

DRŽAVNI ZAVOD ZA STATISTIKU
CROATIAN BUREAU OF STATISTICS

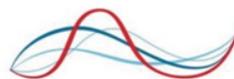
**Mini- Presentation for SPPI on
Architectural and Engineering Activities and Related
Technical Consultancy
(ISIC Rev.4 code 7110)**

**32nd Voorburg Group Meeting
New Delhi, 23 – 27 October, 2017**

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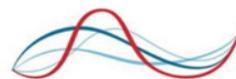
Introduction

2014 - Development of the SPPI for Architectural and Engineering activities in Croatia

- The first pilot survey was carried out for the third quarter 2014

2015 - SPPI surveying continued as a regular quarterly survey

2016 - SPPI for M 71.1 was disseminated nationally and sent to Eurostat for the first time



Market conditions and constraints

Distribution of turnover, enterprises and employees for Sector M, NACE Rev. 2

NACE Rev.2 code	Activities	Turnover	Number of enterprises	Number of persons employed
		In %	In %	In%
M 69	Legal and accounting activities	28.2	40.2	33.7
M 70	Services of head offices; management consulting activities	11.9	14.2	11.9
M 71	Architectural and engineering services; technical testing and analysis	37.8	24.5	31.8
M 72	Scientific research and development services	5.5	0.9	3.6
M 73	Advertising and market research	10.1	9.7	9.3
M 74	Other professional, scientific and technical activities	3.6	9.5	6.6
M 75	Veterinary activities	2.9	1.1	3.1
Total	Sector M	100.0	100.0	100.0

- In terms of turnover, the most important division in Sector M is M71

Source: Structural Business Statistics, 2014, Croatia

Turnover share of M 71 in nonfinancial services (sectors G, H, I, J, L, M, N and S division 95)

NACE Rev. 2	Number of businesses	Turnover	Number of persons employed
M71.1	7.6 %	5.5%	5.4%
M71.2	0.6%	1.5%	1.2%
M 71	8.2%	7.0%	6.6%

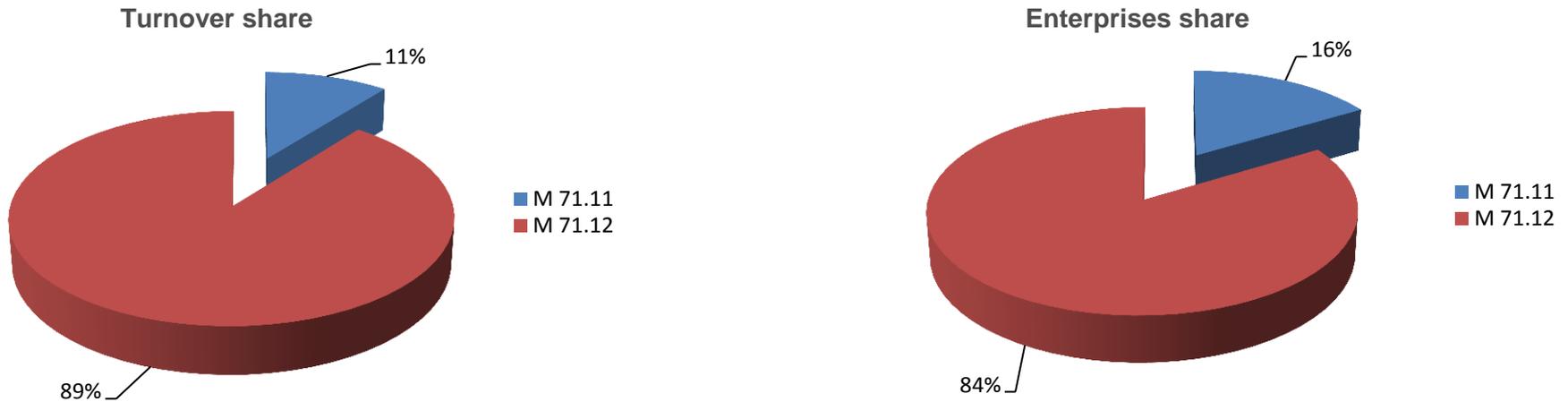
- Share of M 71 in nonfinancial services in 2014 was 8.2%
 - Contribution of M 71 to GDP in Croatia in 2014 was about 2.3 %

Source: Structural Business Statistics, 2014, Croatia

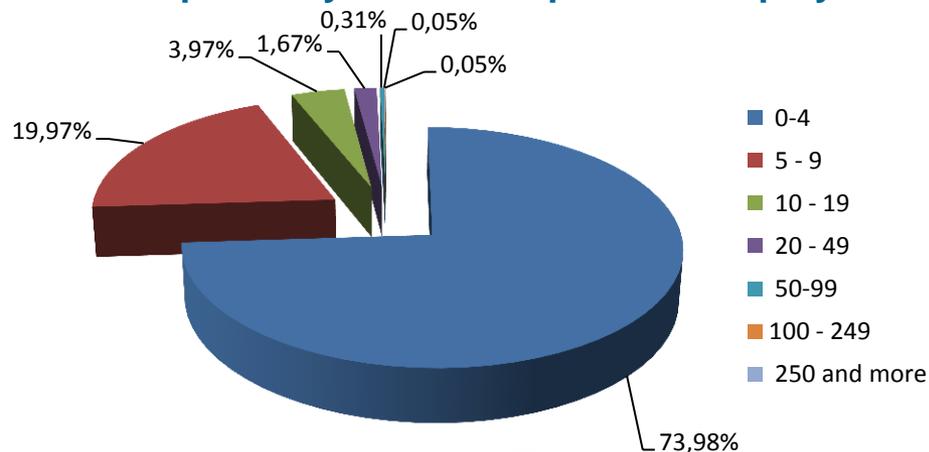


Market conditions and constraints-cont.

Coverage of statistical units for M 71.1 by NACE Rev.2 classes of activities



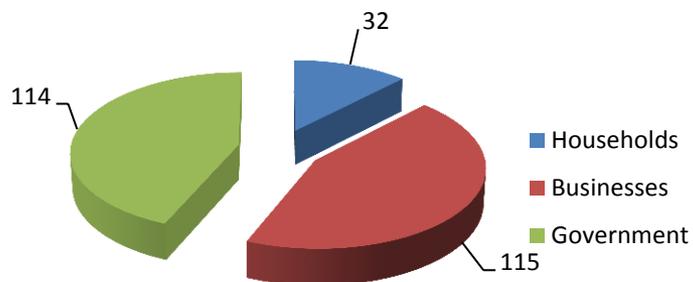
Distribution of enterprises by number of persons employed for M 71.1



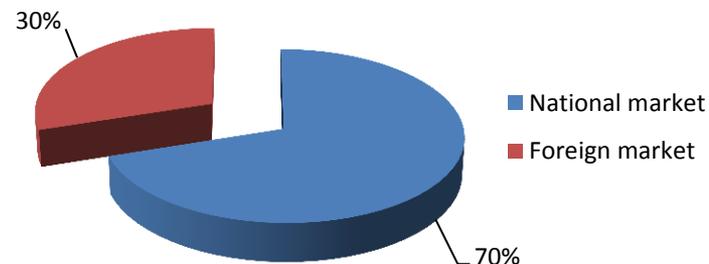
Market conditions and constraints-cont.

- Compilation of SPPI in Croatia relies on B2All concept
- Architects and engineers provide services to households, businesses and government
- Export represents a significant share of this industry`s output

Number of quotes by type of consumer,
SPPI Survey for M71.1, 2015

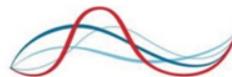


Turnover share by type of market,
SPPI Survey for M71.1, 2015



Market conditions and constraints-cont.

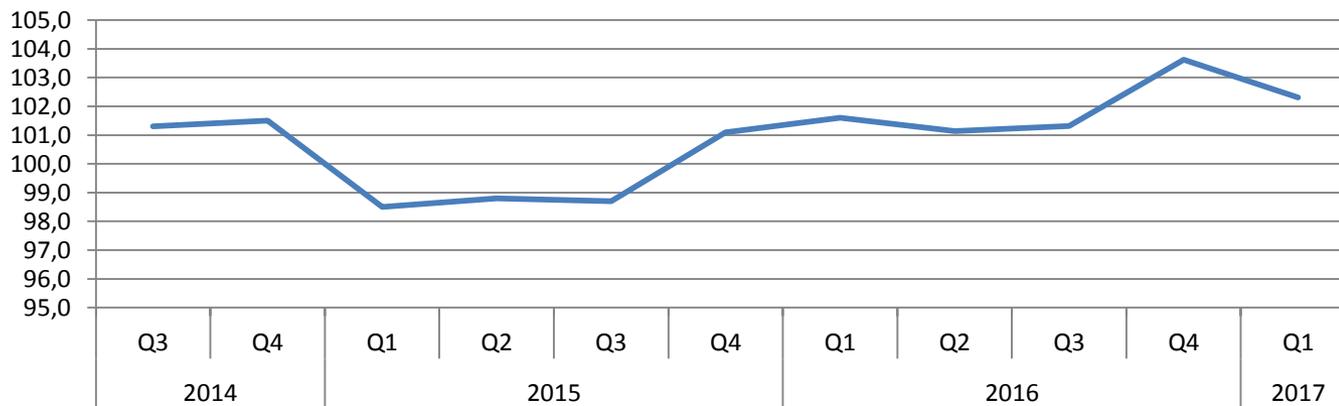
- A huge variety of different services
- Many of services are input to almost all industrial and construction sectors and therefore are confronted with some similar changes in environmental regulations and market conditions
- Large companies often provide both - architectural and engineering services
- For complex projects, large engineering or architectural companies sometimes engage sub-contractors
- Sub-contractors are often small companies



Measurement of SPPI- General framework

- From 2016 SPPIs for M71.1 are regularly sent to Eurostat and disseminated nationally
- Deflators used in the quarterly GDP calculation for this industry are combination of the input indicator method (wages rate, number of employees) and SPPI
- SPPI for M71.1 will be used in the compilation of the ISP (Index of Services Production)
- Some reporting units occasionally use the SPPI for M71.1 for the purpose of escalating their contracts

SPPI for Architectural and engineering activities, \emptyset 2010 = 100



Source: Statistics in Line, Services Producer Prices, Q1 2017, CBS



Measurement of SPPI- Measurement issues

- The classification scheme of services groups is closely related to CPA
- Some inevitable modifications were introduced due to market and output characteristics in Croatia

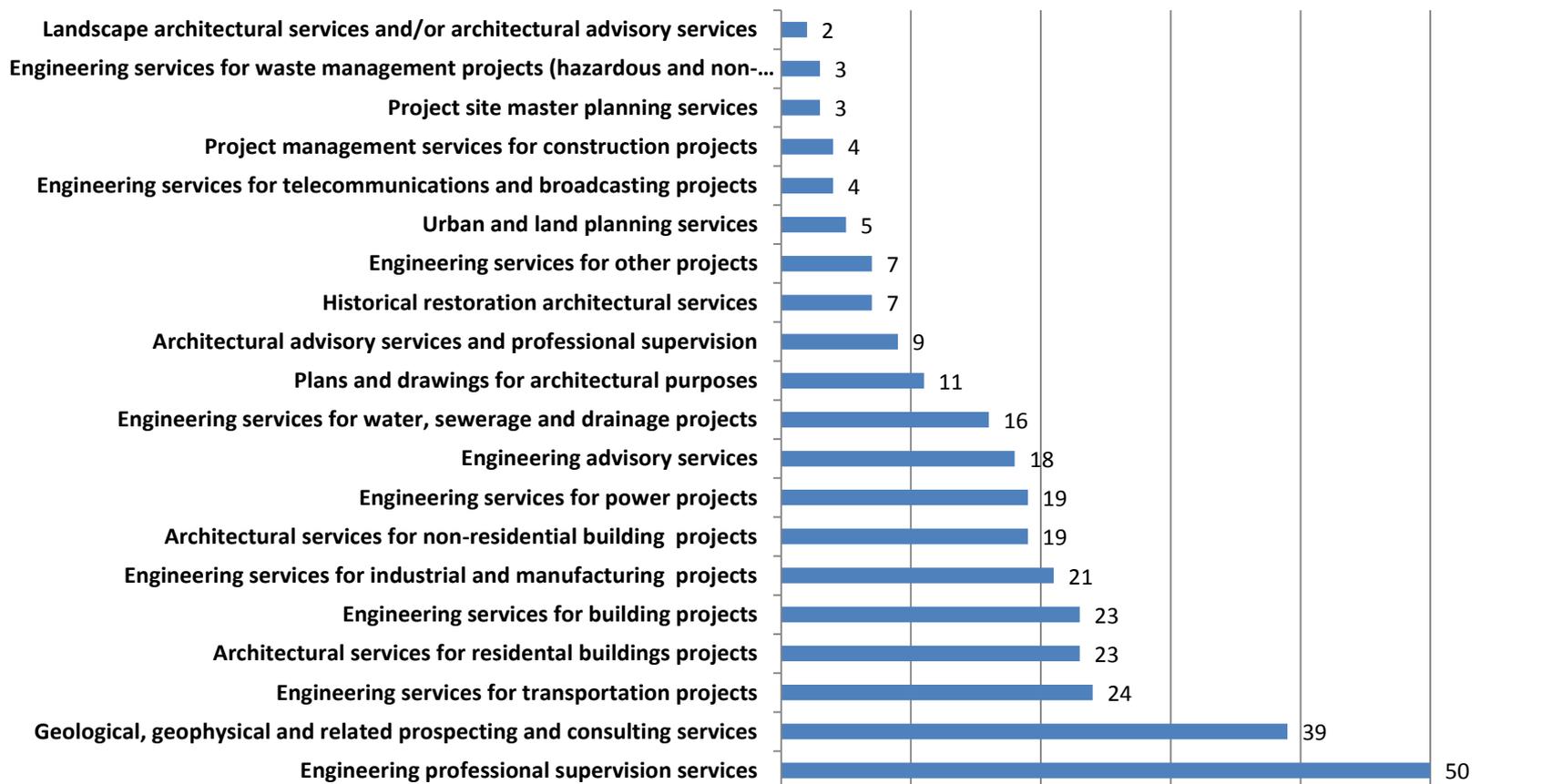
Service groups in SPPI M 71.1 questionnaire	CPA classification code
Plans and drawings for architectural purposes	71.11.10
Architectural services for residential buildings projects	71.11.21
Architectural services for non-residential building projects	71.11.22
Historical restoration architectural services	71.11.23
Architectural advisory services and professional supervision	71.11.24
Urban and land planning services	71.11.31
	71.11.32
Project site master planning services	71.11.33
Landscape architectural services and landscape architectural advisory services	71.11.41
	71.11.42
Engineering advisory services	71.12.11
Engineering professional supervision services	71.12.11
Engineering services for building projects	71.12.12
Engineering services for power projects	71.12.13
Engineering services for transportation projects	71.12.14
Engineering services for waste management projects (hazardous and non-hazardous)	71.12.15
Engineering services for water, sewerage and drainage projects	71.12.16
Engineering services for industrial and manufacturing projects	71.12.17
Engineering services for telecommunications and broadcasting projects	71.12.18
Engineering services for other projects	71.12.19
Project management services for construction projects	71.12.20
Geological, geophysical and related prospecting and consulting services	71.12.3

- Methodology used for compilation SPPI in Croatia is based on product approach
- Product based indices are created from service groups selected by sampled reporting units



Measurement issues-cont.

SPPI survey for M71.1, number of quotes by group of services (261 quotes in total), 2015



Measurement issues-cont.- Sampling and weights

- The sampling frame is determined by taking from the Business Register all the units which main activity is according to the 3-digit NACE Code 71.1
- Combination of probability sampling (for small enterprises) with census (for medium sized and large enterprises)

Units selected in the sample by strata for activity M 71.1 for SPPI survey, 2014

NACE group	Activities	Employment groups – number of employees	Number of units in Frame	Number of units in Sample	Share
71.11	Architectural activities	20+	7	7	100.0%
71.11	Architectural activities	0 - 19	411	15	3.6%
71.12	Engineering activities	20+	97	97	100.0%
71.12	Engineering activities	0 - 19	1976	70	3.5%
71.1	Total			189	

Source: Statistical Business Register, 2014, Croatia

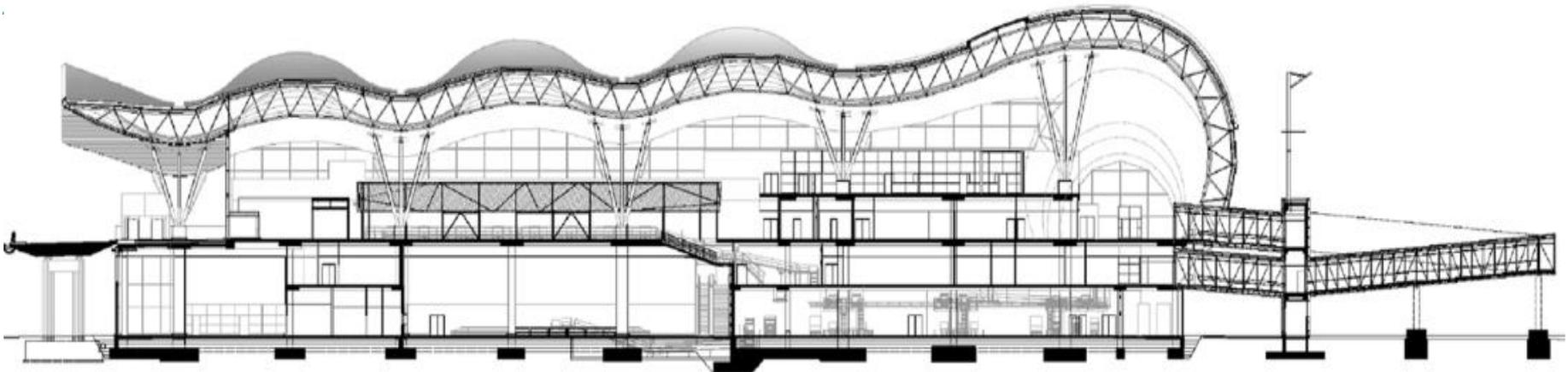
- SPPI weights are updated annually; data on turnover share according to the group of services are collected for a previous year by using the SPPI survey carried out during the first quarter each year
- Initial weights based on turnover share data of the surveyed activity are modified by grossing up factors which take into account PPS, response rate and over-coverage



Measurement of SPPI - Description of pricing methods and criteria for choosing the method

Architectural services - Aesthetical and functional design from buildings to equipment and infrastructure

- Development of architectural designs for :
 - new buildings, water supply and sewage disposal installations in buildings
 - landscape planning designs for all construction works, and landscape architecture designs
 - the current state of buildings and landscape architecture facilities
- Determining the fulfilment of the basic requirements for a construction work for buildings and landscape architecture facilities
- Development for parts of removal design for all construction works, within the framework of the tasks for which the architectural profession is authorised to design



Description of pricing methods and criteria for choosing the method-cont.

Engineering services - Technical design of buildings and other products and services

-Civil engineering profession tasks:

- developing construction designs for all construction works, water supply and sewage disposal installation
- determining the fulfilment of the basic requirements for a construction work for all construction works
- developing parts of removal design for all construction works
- audit of the main design and removal design for all construction works with regard to mechanical resistance and stability

-Mechanical engineering profession tasks:

- developing mechanical engineering designs for mechanical installations, equipment and facilities in all construction works, including the supporting systems, auxiliary devices, installations and the accompanying parts

-Electrical engineering services - projects from all spheres of electrical engineering, e.g. the electric-power supply, electric power drives, controlling, regulation, automatics, lighting, grounding and other

-Geodetic services - acquisition of specific geolocated data about buildings, facilities, sites and topography, the elaboration of drawings and maps, the drawing-site transition process, and the geo-technical surveillance during construction performance

-Professional construction supervision – purpose is to enable the building's realization concept, defined by the building permit, before and during the construction performance, and a construction performance in compliance with the regulations in effect



Description of pricing methods and criteria for choosing the method-cont.

Price determining characteristics of services

- A main aspect of architectural services and engineering services for building projects is their uniqueness
- Engineering services for power, transportation, waste management, water, sewerage, industrial and telecommunications projects often include relatively homogeneous types of services
- Prices for services are influenced by many factors :
 - level of qualifications of the staff (licensed architect or engineer, draftsman, etc..)
 - customer type (private households, private enterprises or public institutions)
 - hours worked
 - type of building
 - size of facility
 - duration of the contract
 - construction costs
 - value of building
 - the degree of complexity of the building, structure or installation
- Official Scale of Fees for Services by Architects and Engineers*

* The Assembly of the Croatian Chamber of Architects and Civil Engineers has brought the Official Scale of Fees for Services by Architects and Engineers. This Scale of Fees arranges the architects' and civil engineers' fees for services related to the area of planning documents elaboration, projects/design elaboration, technical consultancy and construction supervision service. Minimum and maximum rates allowed for intermediate points of calculation units (CU) stated in the tables presenting fees, must be established by the default formula according to the type of service. These rates are a starting point and they provide the basis for each tender offer.



Description of pricing methods and criteria for choosing the method-cont.

Price methods chosen

Percentage fee -Pricing method for **architectural and engineering services for building projects**

-Estimation of the price of the final service output by multiplying the percentage and the value of investment.

Time-based method -Pricing method used in **all groups of architectural and engineering services**.

-For some groups of services this is only possible method, e.g. in Professional construction supervision or Engineering consultancy services.

Three different types used in M71.1:

1. Hourly charge-out rate - simplest time based method

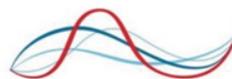
2. Hourly list rates - Modifications of prices are necessary and corrected prices are calculated. The data used are list prices, number of hours invoiced, **Tlq**, and worked, **TWq**, as reported in the quarterly survey.

Price = List Price x (Tlq/ TWq)

3. Wage rates – if charge-out rates are not directly available, respondents are asked to provide data on wages per unit of time by staff category. Modifications of prices are necessary and corrected prices are calculated. The data used are the following: wage data, number of hours invoiced, **Tlq**, and worked, **TWq**, and margin rate, **rq**, obtained from the quarterly survey.

Price = Wage data x (Tlq/ TWq) x (1/100) x (100 +rq)

Direct use of prices of repeated services - Often used in **engineering services for power, transportation, waste management, water, sewerage, industrial and telecommunications projects** and in **geodetic services**, but only when services are not complex and they when they are relatively homogeneous.



Description of pricing methods and criteria for choosing the method-cont.

Index estimation procedure

1. Compilation of ratio -individual price index for a service of a service group for enterprise. The base period is the last quarter of a previous year.

$$Ip_{sge}^{qy/4y-1} = \frac{p^{qy}}{p^{4y-1}}$$

2. Calculation of a simple (unweighted) price index for services within the same service group at a company level.

$$Ip_{ge} = \sqrt[n]{Ip_{sge1}Ip_{sge2}.....Ip_{sgen}}$$

$l = 1, 2, \dots, sgen$; number of services s within service group g in enterprise e

3. Calculation of price index for service groups - using price indices of service groups by companies (as elementary aggregates) and weighting them by share of turnover of that group in a company's turnover.

$$Ip_g^{qa/4a-1} = \frac{\sum_{h=1}^H Ip_{gh}^{qa/4a-1} W_{gh}}{\sum_{h=1}^H W_{gh}}$$

4. Calculation of the price index for the activity as a whole, using price indices of service groups and corresponding weights calculated as a sum of turnover for group of services by companies.

$$Ip^{qy/4y-1} = \frac{\sum_{g=1}^G Ip_g^{qy/4y-1} W_g}{\sum_{g=1}^G W_g}$$

Symbols used:

- $s = 1, 2, \dots, nge$ (number of services for group g in enterprise e)
- $e = 1, 2, \dots, E$ (number of enterprises producing service within group g)
- $q4y-1 = 4$ th quarter of previous year (base period)
- $qy =$ quarter q of year y
- $P_{sge} =$ price of product s of group g in selected price of reporting unit e

- $q-1y =$ previous quarter of year y
- $g = 1, 2, \dots, G$ (number of group of services g in activity SPPI)
- $W_{ge} =$ weight at period $y-1$ for group g in selected price reporting unit e
- $W_g =$ weight at period $y-1$ for group g

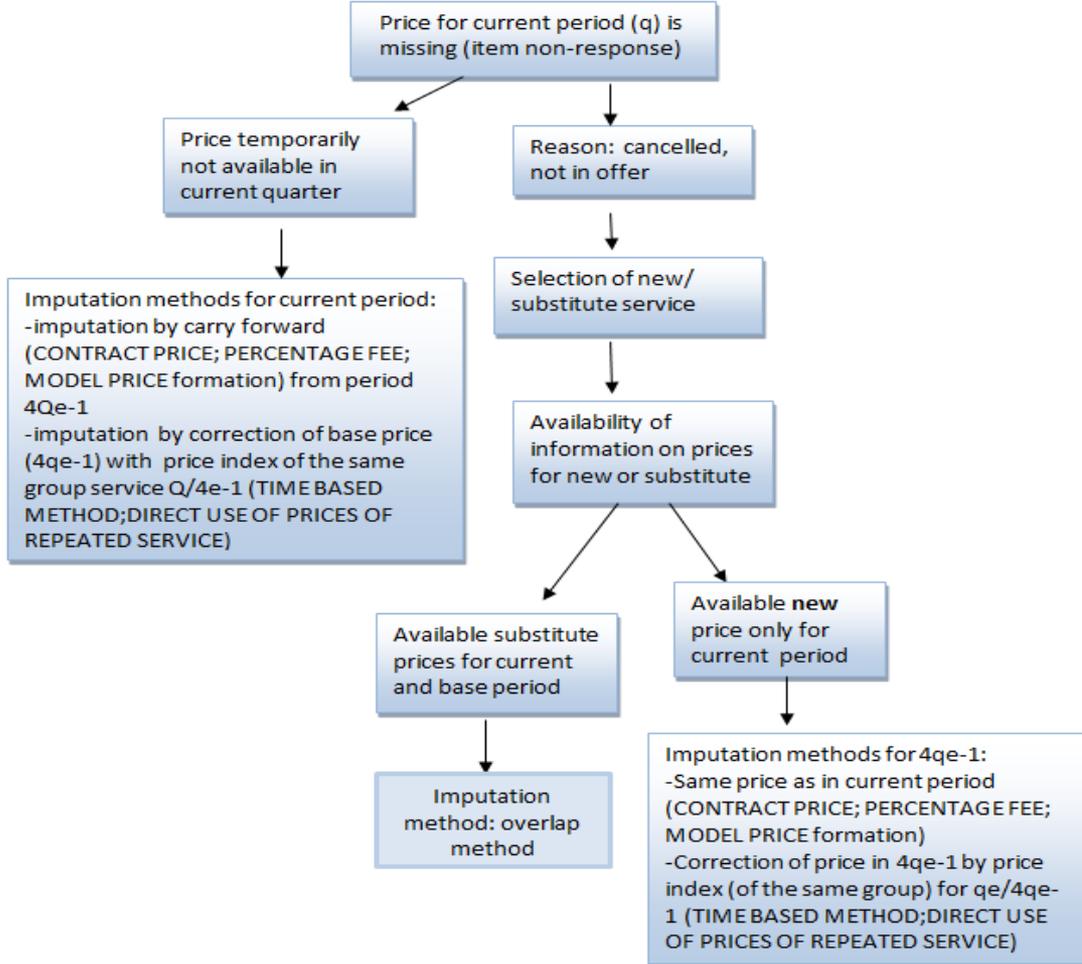


Description of pricing methods and criteria for choosing the method-cont.

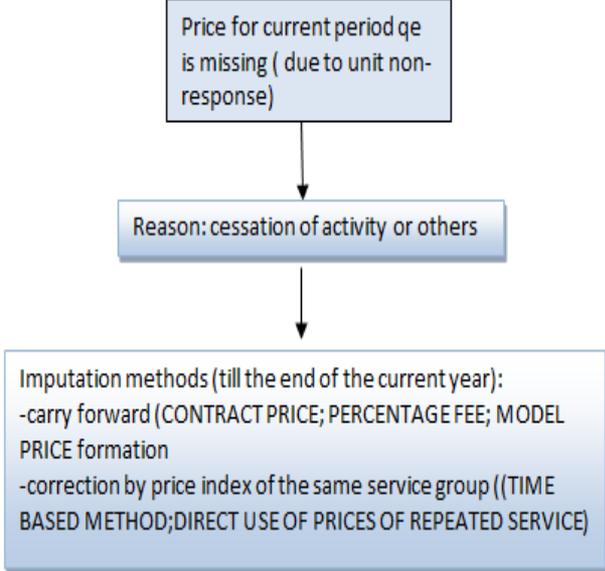
Estimation of missing prices

In SPPI web processing system, imputations for missing prices are implemented automatically:

Price for current period is missing - Item non-response



Price for current period is missing - Reporting unit non-response



Description of pricing methods and criteria for choosing the method-cont.

Quality adjustment methods

- Services in this industry are often complex with many components included
- A wide range of unique projects

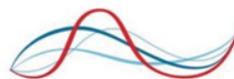
Several rules are implemented on web questionnaire form:

1. When a reporting unit reports a representative service:

- this service has to be specified : by detailed factors that are relevant for its price formation and by pricing method used for reporting price
- they have to provide information: on price in current and previous period; on unit of measure referring to the reported price and on reason of price changes or reasons for data missing

2. Web applications for SPPI surveys have several types of automatic data check at micro level (individual web questionnaire (WQ)):

- Errors: At data entry essential errors are identified which forces reporting unit (RU) or administrator to eliminate them; if not, the WQ cannot be successfully completed.
- Warnings: in the process of filling in WQ, RU is informed on deviations from methodological guideline and on inconsistencies, but these failures are tolerated and WQ can be completed and submitted anyway.
- Logical and numerical control (LNC): LNC of selected variables after complete data entry.
- Control at questionnaire level (search WQ)
- Administrator`s individual investigation of WQ with selected characteristics.



Comparability of Price data with Output data

- In 2017, the CBS has supplemented the quarterly dynamics of conducting turnover survey with a monthly dynamics of turnover changes in service activities.
- The data are based on the Monthly Report on Trade and Other Services and administrative data sources (data bases of value added tax reports)
- Data from turnover survey for Architectural and engineering activities, together with Technical testing and analysis, are collected and disseminated nationally on monthly basis at the two digit level
- For calculation of ISP, when the deflation of the monthly turnover in service activities is in question, there is a need to disaggregate the quarterly service price indices into three monthly indices
- For Architectural and engineering services, for which the quarterly deflator is on disposal, sufficiently correlated auxiliary index will be used for disaggregation



Evaluation of measurement

- Product based indices

Advantages - price indices by group of services are available (important for imputation and data quality control) and this approach is conceptually in line with national accounts.

Disadvantages - more data from reporting units are needed which leads to a high burden on reporting units. Due to dominance of small enterprises, more data are sometimes a difficult task.

- Weights are changing annually, data on turnover are collected every first quarter each year, for the previous year.

Advantages of annual change- new services are introduced easily and a list of reporting units is constantly updated , which is in line with Eurostat requirements and PPI methodology at CBS.

Disadvantage - higher burden on reporting units.

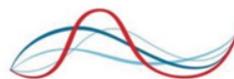
- Percentage fee and Time based methods

- the most often pricing methods used due to complexity of services and a wide range of unique projects

- Direct use of prices of repeated services

- this method is conducted mostly by rather small companies and companies with relatively homogeneous types of services.

Despite all the burden on reporting units and shortcomings, the overall response rate for this survey is rather high – it amounts up to 80% on average.



Thank you!

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