



**National Statistics Office of Georgia
(Geostat)**

**Approved by the board of
The National Statistics Office of Georgia
By resolution #1
February 24, 2020**

Producer Price Indices for Services Technical Manual

The presented technical manual is elaborated by the National Statistics Office of Georgia according to the internationally acclaimed methods and practice and is based on the following handbooks:

1. *“Producer Price Index Manual: Theory and Practice”, International Monetary Fund, 2004;*

Responsible organizations: International Labor Organization (ILO), International Monetary Fund (IMF), Organization for Economic Co-operation and Development (OECD), United Nations Economic Commission for Europe (UNECE), and World Bank;

<https://www.imf.org/en/Publications/Manuals-Guides/Issues/2016/12/30/Producer-Price-Index-Manual-Theory-and-Practice-16966>

2. *“Methodological Guide for Developing Producer Price Indices for Services”, OECD, Eurostat and others, 2005;*

Responsible organizations: European Commission, Organization for Economic Co-operation and Development (OECD), European Statistical Office (Eurostat).

<https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-BG-06-003>

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1. Introduction

1.1 Producer Price Indices for Services and their use

The presented technical manual combines methodological principles that are used in calculating producer price indices for services (SPPI). Producer price indices for services include the following indices: producer price index for transportation and storage services, producer price index for telecommunication services, also, producer price index for accommodation and food services.

Producer Price Index for Transportation and Storage Services measures the average price level of the services provided by organizations producing passenger and freight transport services as well as cargo storage and warehousing services compared to the reference period.

Producer price index for transportation and storage services includes land, water and air transport services for freight and passenger transportation, as well as warehousing and storage services, which corresponds to divisions 49, 50, 51 and 52 of the transportation and storage services section (Section H) of the Statistical Classification of Products by Activity (CPA 2008).

Producer Price Index for Telecommunication Services measures the average price level of telecommunication services compared to the reference period. Producer price index for telecommunication services includes wired, wireless, satellite and other telecommunication services, which corresponds to division 61 of the information and communication services section (Section J) of the Statistical Classification of Products by Activity (CPA 2008).

Producer Price index for Accommodation and Food Services measures the average price level of the services provided by hotels, cafes and restaurants compared to the reference period, which corresponds to the section I of the Statistical Classification of Products by Activity (CPA 2008).

Producer price indices for services are used for the following purposes:

- The indices have an important role in deflating different economic indicators;
- The indices are used for indexation of contracts in both public and private sectors;
- The indices are analytical instruments for researchers and representatives of business sector.

1.2 Coverage of Producer Price Indices for Services and the observable prices

For the calculation of producer price indices for services, the prices are collected for the services provided by organizations across the country. In case of transportation and storage services, the observable price is price for service provided by transport organization or cargo storage organization during the specified period. The observable price of telecommunication service is the price of service provided by telecommunication organization in the specified period.

Herewith, the data for passenger transport service prices are obtained from the survey of consumer prices and tariffs. The same method is used for the compiling the producer price index for accommodation and food services.

2. Sampling of observable organizations

The observable service organizations are selected based on the statistical data of enterprises. The turnover of organizations are used for the selection of organizations, especially by using cut-off method (the largest organizations are selected until the coverage at least 80% of the industry).

For the calculation of producer price index for transportation and storage services, all the large organizations that are relevant to divisions 49, 50, 51 and 52 of the transportation and storage services section (Section H) of the Statistical Classification of Products by Activity (CPA 2008) are selected, while small and medium size organizations are selected selectively.

For the calculation of producer price index for telecommunication services, the selected sample consists of all large organizations that are relevant to Division 61 of the information and communication services section (Section J) of the CPA 2008, while small organizations are selected selectively.

After sampling the organizations, they are surveyed in order to determine the characteristics of services. For this purpose, organizations are provided by additional electronic questionnaires and are required to indicate the type of the top four services (less than four in case of absence) provided over the previous year and the percentage share of each service in all services. During the services selection process detailed specifications are determined. Following the specifications is the most important part of price registration, since the monthly recorded price difference should be caused by the pure price change of a service, rather than changes in characteristics, or a service itself. Relying on the obtained survey the prices for sampled services are recorded across the year.

The sample of organizations is updated annually. The basis for the selection is the data of enterprise statistics. In case the organization stops functioning in the reporting period, the substitution does not occur until updating the sample.

3. Price collection fieldworks

During the price collection fieldworks, the representative of the organization fills the questionnaire published on Geostat's website. The price collection fieldworks are conducted from the 1st to the 8th of the month following the reporting period.

In case of freight transport service, the questionnaire contains the following information: the directions of four freight transport, the type of cargo carrier, the type of cargo, measurement unit, prices in the reference and previous months and, in case of price change, the reasons of this change.

In case of warehousing and storage services the questionnaire contains the following information: the selected four storages, the type of things for storage, measurement unit, prices in the reporting, previous and current months, and in case of price change, reasons of this change.

In case of telecommunication services, the questionnaire contains the following information: the type of four telecommunication services, measurement unit, prices in the reference, previous and current months, and in case of price change, reasons of this change.

The base price for service is registered in the beginning of the reporting year and remains unchanged during the whole year.

The information about the service prices provided by the organizations is confidential and is protected by the "General Administrative Code of Georgia" and article 28 of the "Law of Georgia on Official Statistics".

Unless otherwise provided for by the legislation of Georgia, in case of a written or electronic request from the National Statistics Office of Georgia, persons registered in the Register of Entrepreneurial and Non-entrepreneurial (Non-commercial) Legal Entities are obliged to present information available to them in material or electronic forms, including confidential information.

4. Validation procedures

The validation procedures for producer price indices for services are conducted in two stages:

At the first stage validation takes place simultaneously with the price registration fieldworks. In the case of price change, the person responsible for filling the questionnaire is required to define by the comment the reason of the change. After the data are sent to the central office, a responsible employee conducts analysis and logical control of the data.

At the second stage accuracy of the prices, which are extremely deviated from the previous month, is checked after calculating the indices.

The index is considered to be reliable after passing the above mentioned stages.

5. Weights

Weights for indices are calculated based on the business statistics data. The obtained weights represent the share of a particular type of service in the total value of this type of services across the country. The weights are updated annually, which is based on the revenues received by selected organizations for the services provided in $t-2$ period. The list of services included in the index may also be changed while updating the weights.

6. Price imputation techniques

During the calculation of the producer price indices for services, if in the reporting month no price is recorded for one of the services, one of the following price imputation methods is applied:

- 1) For example, if there is no price recorded in April for one of the services, service A, imputed index for this service is calculated using the previous month's long term index for service A and short term index in April for the group, which includes this service. The group index is calculated using the actual price indices of services in this group (see *Table 1*).

Table 1.

Service	Service weight, %	Base price	March Price	April price	Price Ratio (March/December)	Price Ratio (April/December)
Service A	0.051	4.55	4.50	-	$4.50/4.55 \approx 0.99$	1.15*
Service B	0.032	5.20	5.20	5.50	$5.20/5.20 = 1.00$	$5.50/5.20 \approx 1.06$
Service C	0.067	5.00	4.50	5.50	$4.50/5.00 = 0.90$	$5.50/5.00 = 1.10$

**Imputed index*

In April imputed index for service A is calculated in following steps:

1. $Group\ long\ term\ index = 1.06 \times \frac{0.032}{0.032+0.067} + 1.10 \times \frac{0.067}{0.032+0.067} \approx 0.34 + 0.74 = 1.08;$
 2. $Long\ term\ index\ for\ the\ corresponding\ group\ in\ March = 1.00 \times \frac{0.032}{0.032+0.067} + 0.90 \times \frac{0.067}{0.032+0.067} \approx 0.32 + 0.61 = 0.93;$
 3. $Group\ short\ term\ index\ in\ April = \frac{1.08}{0.93} \approx 1.16;$
 4. $Imputed\ long\ term\ index\ for\ service\ A = 1.16 \times 0.99 \approx 1.15.$
- 2) If in the reporting month no price is recorded for service in a group, imputed index for them will be calculated using upper level group's index, according to the structure of CPA 2008. Otherwise, if in the reporting month no price is recorded up to the third level of the structure of CPA, imputed index will be calculated using the price repeating (carry-forward) method, rather than the upper level group's index.

7. Quality adjustment

If in the reporting period organization stopped producing the observable service, but started producing other similar service, it is possible to replace the old with the new service.

If the characteristics of the observable service have changed, but the criteria for comparison is not violated, it is allowed to compare the old and new services. In this case it is important that the price change caused by quality change not be reflected in the index.

In order to ensure the comparability of prices for old and new services, a quality adjustment method should be used, for which conditional base price is calculated using the following methods:

- 1) If in the reporting month a replacement service is qualitatively different from the service in the previous month, and the value of the difference is evaluated, the base price for the replacement service is calculated using previous month's price and the qualitative difference defined by the person, responsible for filling the questionnaire (*Table 2*):

Table 2.

Service	Base price	Price in March	Price in April	Qualitative difference	Price Ratio (April/December)
Service A	4.55	4.50	-		
Qualitatively different service B	5.86*	-	8.50	1.30	8.50/5.86 ≈ 1.45

**Imputed base price*

Imputed price for service B is calculated as follows:

$$\text{Base Price} = \frac{4.50 + 1.30}{4.50/4.55} \approx 5.86$$

- 2) If in the reporting month it is possible to define previous month's price for the replacement service, base price for the replacement service is calculated using this price and the index of previous month (*Table 3*):

Table 3.

Service	Base price	Price in March	Price in April	Price Ratio (March/December)	Price Ratio (April/December)
Service A	4.55	4.50	-	4.50/4.55 ≈ 0.99	
Replacement service B	5.26*	5.20	5.50		5.50/5.26 ≈ 1.05

**Imputed base price*

Imputed base price for service B is calculated as follows:

$$\text{Base price} = \frac{5.20}{4.50/4.55} \approx 5.26$$

- 3) If in the reporting period price enumerator discovers that service A will no longer be sold starting from the reporting month, and it is impossible to get information on previous month's price and value of qualitative difference for the replacement service B, the difference between current month's price of service B and previous month's price for service A will be totally treated as qualitative difference.

Imputed base price of the replacement service is calculated based on current month's imputed long term index and price of service B (see *Table 4*).

Table 4.

Service	Service's weight, %	Base price	Price in March	Price in April	Price Ratio (March/December)	Price Ratio (April/December)
Service A	0.051	4.55	4.50	-	4.50/4.55≈0.99	
Replacement service B	0.051	6.09**	-	7,00		7.00/6.09≈1.15*
Service C	0.032	5.20	5.20	5.50	5.20/5.20=1.00	5.50/5.20≈1.06
Service D	0.067	5.00	4.50	5.50	4.50/5.00=0.90	5.50/5.00=1.10

**Imputed long term index*

***Imputed base price*

Imputed base price for service B is calculated as follows:

1. *Group long term index in April* = $1.06 \times \frac{0.032}{0.032+0.067} + 1.10 \times \frac{0.067}{0.032+0.067} \approx 0.34 + 0.74 = 1.08$;
2. *Group long term index in March* = $1.00 \times \frac{0.032}{0.032+0.067} + 0.90 \times \frac{0.067}{0.032+0.067} \approx 0.32 + 0.61 = 0.93$;
3. *Group short term index in April* = $\frac{1.08}{0.93} \approx 1.16$;
4. *Imputed long term index in April for service A* = $1.16 \times 0.99 \approx 1.15$;
5. *Imputed base price for service B* = $7.00 \div 1.15 \approx 6.09$

8. Calculation of producer price indices for services on different level

8.1 Calculation of the lowest level index

An index, calculated for each service produced by an organization, is the lowest level index for SPPI. Graph #1 shows the structure of transportation and storage services section, where the price indices for service A, B and C are the elementary indices. The lowest level index, compared to the price reference period, is obtained from the ratio of reporting (t) and reference period service prices:

$$I_i^{t/0} = \frac{p_i^t}{p_i^0}$$

where:

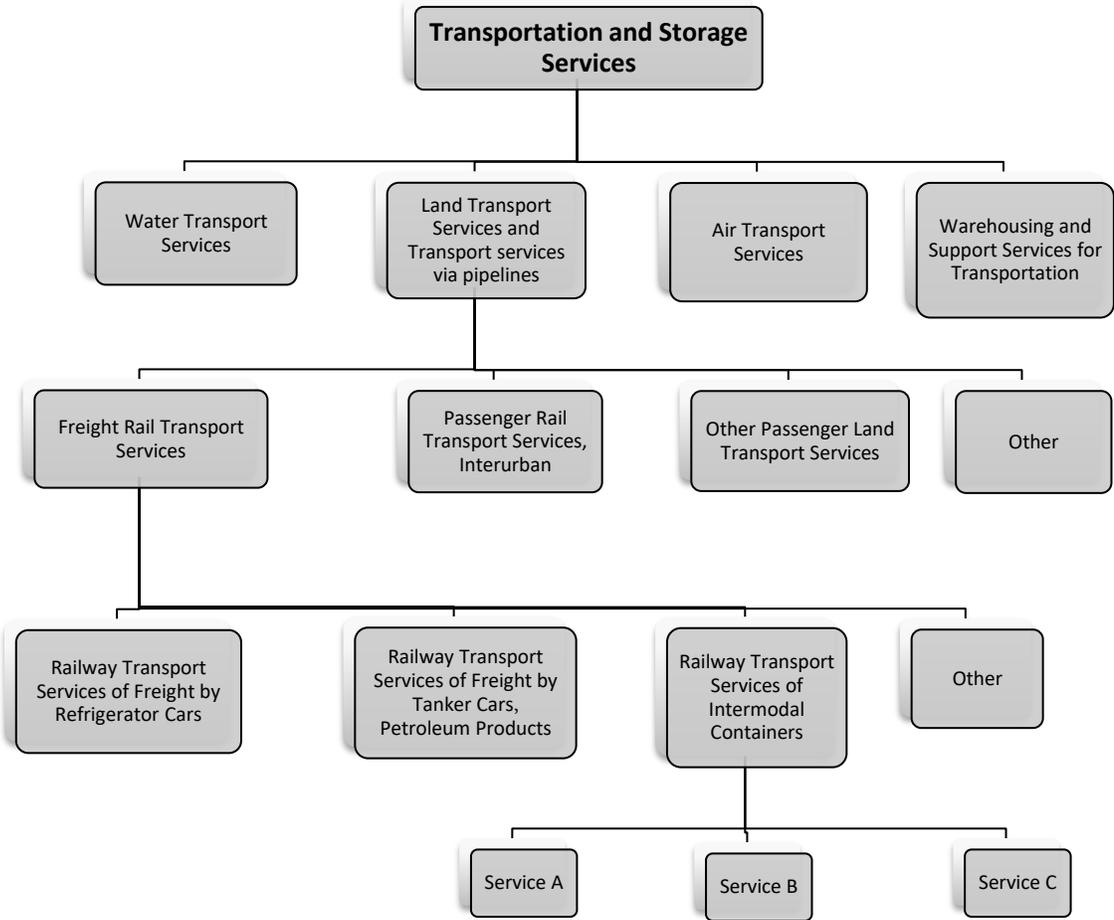
i - a service, produced by an organization, for which a comparable price is registered;

$I_i^{t/0}$ - the lowest level index for service i in the reporting period t , compared to the index reference period;

p_i^t - price of a service i in period t ;

p_i^0 - price of a service i in the price reference period.

Graph #1. The structure of the transportation and storage services



8.2 Producer price index for service for separate groups and sections

Long term producer price indices for service for the whole sections compared to the price reference period are calculated by using the following Laspeyres-type formula:

$$I^{t/0} = \sum_{i=1}^n (I_i^{t/0}) \times s_i^b, \text{ where:}$$

$I_i^{t/0}$ - the lowest level long term index for service i compared to the price reference period;

$s_i^b = \frac{p_i^b q_i^b}{\sum p_i^b q_i^b}$ is the weight of service i in the weight reference period, which represents share of service i in the whole production, where $\sum_{i=1}^n s_i^b = 1$.

p_i^b - the price of service i produced by the sampled enterprise in the weight reference period (b);

q_i^b - quantity of service i produced in the weight reference period (b).

The same formula is used for calculation of all upper level indices. For example, a section index is calculated by weighting long-term indices of the services, which belong to the section, where the sum of weights equals to 1.

Short term index compared to the previous month is obtained from the ratio of long term indices in the reporting and previous months, calculated comparing to the price reference period.

8.3 Chain Index

During annual update of samples of services and organizations in the update period, December, prices are collected for services both in old and new samples. This enables chain-linking of indices, calculated for two different samples. Chaining enables to calculate indices with a long term reference period, notwithstanding the changes in weights.

For example, before December 2016, compared to December 2015, for the whole section of the transportation and storage service was calculated using w_i weights, whereas the 2017 index is calculated comparing to December 2016, using k_i weights (see *Table 5*).

X_1 is the chain index for January 2017, which is calculated with the reference period of December 2015. Calculation of this index can be represented as follows:

Table 5.

12.2015=100	12.2016=100
12.2016: $I^{12.16/12.15} = \sum_i I_i^{12.16/12.15} \times w_i = 106$	12.2016: $I^{12.16/12.16} = \sum_i I_i^{12.16/12.16} \times k_i = 100$
X_1	01.2017: $I^{01.17/12.16} = \sum_i I_i^{01.17/12.16} \times k_i = 102$

$$\frac{106}{X_1} = \frac{100}{102}, \text{ resulting } X_1 = \frac{106 \times 102}{100} \approx 108$$

The same result can also be derived from the following chain-linking:

$$I^{12.2016/12.2015} \times I^{01.2017/12.2016} = 106 \times 102/100 \approx 108$$

9. Data dissemination

Every month the time series for producer price indices for service are published on the Geostat's website compared to the following base period: previous month, the same month of the previous year, 12 month average over the previous 12 month average, the long term basis. The published indices are rounded to four digits and are final data. Corresponding graphs of time series data of indices are attached on the Geostat's website.

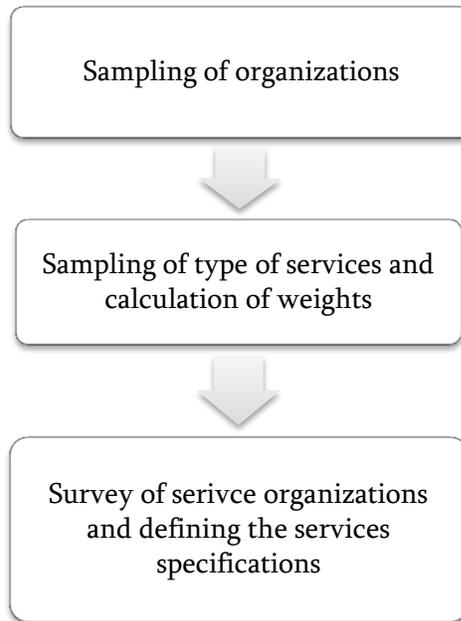
Additionally, press releases for producer price indices for services are published through the Geostat's website on a monthly basis. They contain information about monthly and annual indices rates, as well as contributions of groups to the indices formation. Press releases also include different time series graphs.

The data are also available by using PC-Axis - data dissemination software. It is a complex system of data dissemination that gives an opportunity to a user to obtain different types of needed information in different format (text, tables, graphs, etc.) from the Geostat's website (www.geostat.ge). Producer price indices for services are also disseminated through android application.

Graph # 2 represents stages of producer price indices for services calculation and their periodicity.

Graph #2. Stages of calculation producer price indices for services

Annual activities:



Monthly activities:

