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CROATIAN EXPERIENCE IN DEVELOPING SPPIs

Croatian Bureau of Statistics

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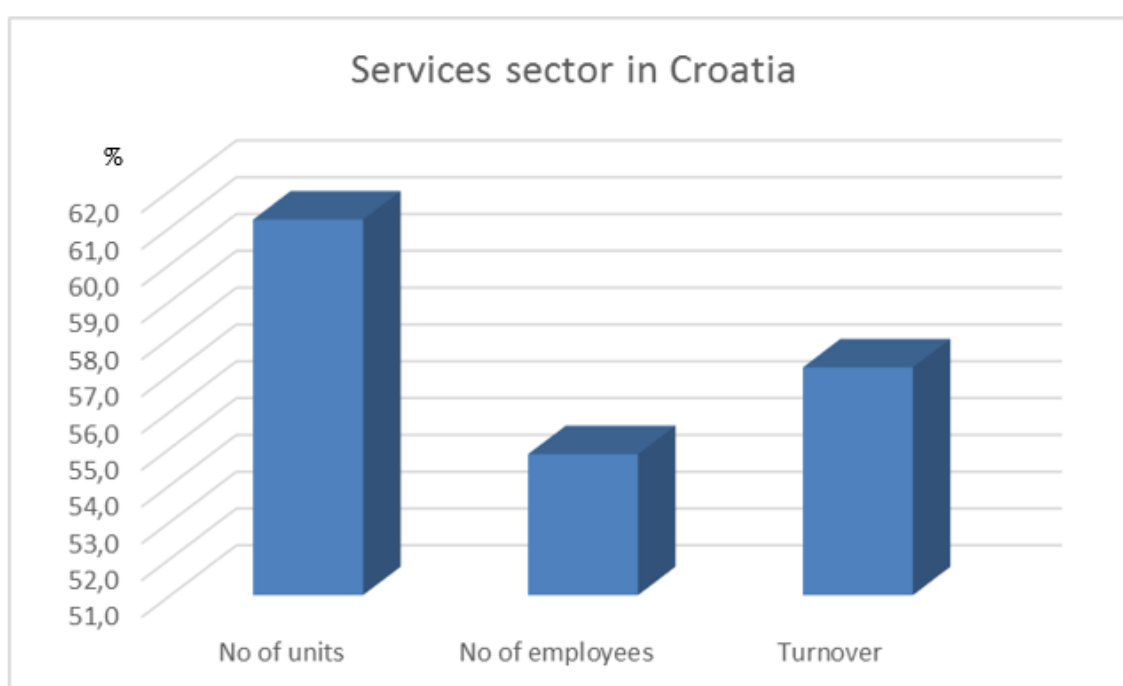
1. INTRODUCTION

Development of the Services producer price indices (SPPIs) in Croatia began in 2008, at the time when the task to develop those indices was assigned to the Trade and Tourism Statistics Department. It was conducted within the European project MB Phare 2006. At that time, the Republic of Croatia was in the midst of negotiations for the accession to the EU and in this context it was necessary to harmonize the official statistics in Croatia with EU regulations.

Until then, the services sector was statistically covered only to a small extent – in the area of trade, catering and tourism. Those domains have always had a great importance for Croatia. All other service activities have been surveyed for turnover variable since 2011, while the SPPIs have been gradually introduced since 2008.

The services sector in the Republic of Croatia is very significant, as can be seen in the chart below.

Figure 1. Services sector in Croatia



Source: Value Added Tax database, 2015

Over 60% of business entities are registered according to their main activity in one of the service activities. A number of employees in the service sector as well as turnover account for over 50% of the overall economy.

Similar to other countries, development of services statistics was lagging behind goods producing statistics (Eurostat – OECD, Methodological Guide, 2015, p. 13). This falling behind is particularly evident for price statistics, though the development of services price statistics was justified by several important uses.

Service producer price indices (SPPIs) are intended to trace price movements that reflect the conditions of supply and demand on the market of services, facilitating thus the analysis of macro-economic conditions and monitoring inflationary pressures. They are also used as deflators in the national accounts to convert the value of a service output into a measure of volume (Eurostat – OECD, Methodological Guide, 2015, p. 13).

Considering that the statistical measurement of service prices is generally very demanding on one hand and, on the other, that Croatia is a small country with limited resources, the decision has been made that the strategy of SPPIs' development in the Croatian Bureau of Statistics should be based on gradual, step-by-step advancement. Respecting resource limitations, the CBS's orientation was to fully respect EU legislation, to follow the highest feasible quality statistical standards and to modernize data collection procedures. It had been decided to start first with those service activities that included a small number of producers. Later on, the scope of covered SPPIs expanded to larger and more complex services, either from the standpoint of the number of business entities engaged in an activity or from the standpoint of the complexity of services offered.

As a part of the development of SPPIs, a sophisticated web application was designed. It is used not only for data collection, but also for data processing and calculation of the index. At present, majority of SPPI surveys are carried out by using that application, but there is still a certain number of surveys that remain outside of that application and their processing is done manually with a help of Excel spreadsheets.

Since 2015, a part of the SPPIs compiled has been regularly submitted to Eurostat, and the plan is that eventually all the indices calculated are transmitted to Eurostat. In April 2016, 15 SPPI series of 19 compiled were disseminated nationally for the first time. Indices selected for publishing were those for which we reached a certain standard of satisfactory quality.

Although present situation concerning the development of SPPIs could be assessed as satisfactory, there is still a lot room for further work and improvements. Intention is to revise existing methodologies of some SPPIs and to introduce new surveys for service activities that have not been covered yet.

2. STARTING POSITION

The task to develop SPPIs in the Croatian Bureau of Statistics has been assigned to the Trade and Tourism Statistics Department, later renamed to the Service Statistics Department (SSD). For the staff, this was an unexpected task considering the existing organization scheme in the Croatian Bureau of Statistics, underdeveloped service statistics and lack of appropriate competence and skills needed for calculating a SPPI in the Service Statistics Department. Development of a completely new statistical domain was a

huge challenge for a small team of three persons at that time. Until then, SSD covered only segments of distributive trade and tourism, collecting data only for one variable, i.e. turnover. Even more, there was a lack of knowledge about the price statistics. These were the reasons why the task of developing SPPIs demanded a lot of studying and research in order to professionally cope with that new working area. On the one hand, adequate knowledge as well as comprehension of price measurement and compilation of price indices had to be obtained, which is in itself a comprehensive science. On the other hand, it was necessary to get acquainted with a matter and to understand specific problems of services statistics. Each service activity has its own specific characteristics, market structure, mode of performance, types of services, pricing mechanism and methods, etc.

When the development of SPPIs began in 2008 with first studies in that area, the assistance of an external expert acting as a project consultant was indeed extremely valuable. He introduced the theory of price index and its practical implications and helped with a selection of services that were the most appropriate for the beginning of the developing the SPPIs. A decision was made to start with simpler activities, either in terms of a smaller number of business units that would provide observed services, or in terms of simplicity of services provided.

After the completion of the basic training, it was necessary to elaborate the Eurostat's requirements, i.e. the legislation regarding the development of these indicators: what particular activities should be included, at which level, terms of delivery and so on. Also, it was necessary to reflect on potential uses of SPPIs beyond the transmission of SPPI data to Eurostat. Within the statistical system, main user of SPPIs is the national accounts statistics. The relevance of SPPIs for the national accounts statistics was not fully comprehended at first, but only later when SPPIs for most service activities were developed.

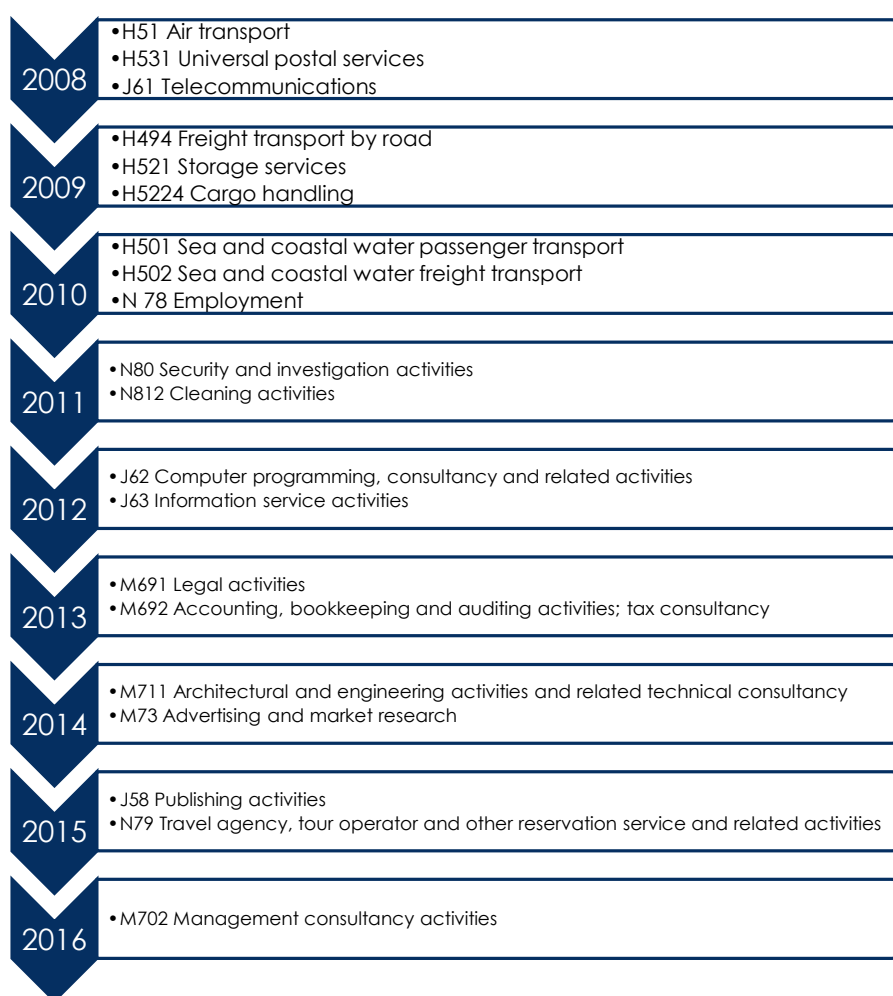
Initially, the following activities were selected: H51 Air transport, H531 Universal postal services and J61 Telecommunications services.

Since those service activities did not include a large number of producers, there was no need for a selection of a sample or for an engagement of the CBS's IT staff. This was also an important practical advantage.

Three business entities were contacted in relation to the mentioned three service activities; two largest enterprises, one controlling the market of the air transport of passengers and the other controlling the market of universal postal services; and a regulatory body that regulates the market of telecommunications services. They assisted in determining representative services for prices to be surveyed and a periodicity of price collection. We have achieved a good cooperation with those companies. At several meetings, we successfully defined a list of representative services and data delivery mode. Later on, we were faced with much more difficulties to establish effective communication and to achieve good responsiveness of business units.

The following figure shows the development of SPPI surveys by years:

Figure 2. Development of SPPIs in CBS over years

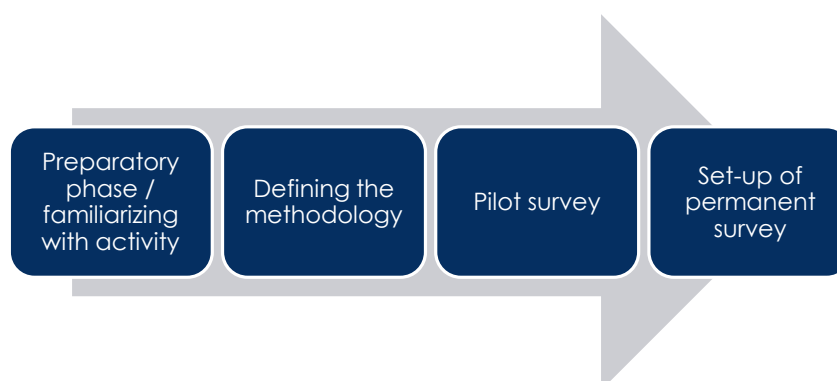


The development of SPPIs in Croatia was all those years supported by several European projects (MB Phare, IPA, European Grants). This largely facilitated all development since it allowed us to hire good experts and IT specialists. Without that support, the whole process would be slower and more difficult.

3. PHASES OF THE DEVELOPMENT PROCESS

As proven from the very beginning of developing SPPIs in the Croatian Bureau of Statistics, the development process can be divided into four main stages for each service activity, regardless of its specific features. Each phase is important and indispensable for a successful conduct of the survey. These phases are described below in more detail.

Figure 3. Phases of the development process in CBS



Preparatory phase – familiarizing with the activity

A development process of a new SPPI begins with the process of becoming acquainted with a respective activity. In this regard, the first step was to study how the service activity was classified in the National Classification of Activities and the Classification of Product Activities. Both classifications are harmonized with the European versions (NACE Rev. 2 and CPA 2008). Information on main services provided in each service activity can be obtained from these classifications. Furthermore, thorough examination of relevant sections of Eurostat-OECD Methodological Guides for Developing Producer Price Indices for Services (2004, 2015) was a precondition for further work.

The next step was to define a relative importance and the structure of the respective service activity in the Republic of Croatia. For this purpose, the distribution of units, employees and turnover by size of enterprises belonging to a particular activity was analyzed. The Statistical Business Register and other sources (Financial Agency, VAT) are used as a data source. That information enables making conclusions about whether the activity is represented by many small units or a few large ones (or vice versa), as well as their relative economic importance. This information is important in making decision on units' coverage and selection of the sample type.

Then a study of available methodological materials followed. The Voorburg Group website offers an excellent resource of methodological materials on SPPIs published in the paper format and/or in the Power Point presentations of service activities. A valuable source for SPPI developers is also the CIRCA BC portal, which has a large number of other countries' reports on the SPPIs development. Practices of neighboring and other countries can also be investigated (through study visits, seminars, workshops or other forms of direct cooperation).

After a detailed study and analysis of available material, more insight into service activity features regarding SPPIs production was obtained. It is possible to determine the market situation, key market players, prevailing pricing mechanism etc. All this is important in determining the methodology to be applied in carrying out the survey.

In this phase, it is worth also to establish contacts with major associations and key market players engaged in a particular service activity.

Defining the methodology

Once we have an idea of the market share of surveyed service activity in Croatia and of main characteristics of that activity, it is necessary to define the methodology to be used in conducting the SPPI survey. This involves determining the basic breakdown of groups of services, pricing mechanisms and pricing methods, treatment of quality changes, weights issues as well as defining index formula, population and sample design.

In order to determine basic service groups, the CPA classification was used. CPA defines headings of service groups for each activity, supplemented by detailed descriptions (explanatory notes) of services included and excluded.

It is necessary to examine service groups according to the classification and decide which services are relevant for service activity in a particular country and have to be included in the survey (some of them might even require additional breakdown) and which ones can be omitted or additionally introduced. At this stage, assistance of activity's representatives is of vital importance. Their cooperation is significant for obtaining an inside information of the market, for checking exhaustiveness and breakdown of classification and for verifying the compliance of CPA translation with the terminology used in practice. Deviations of wording in official statistical classification from ordinary language can lead to serious communication problems with enterprises and, consequently, cause troubles in filling in questionnaires.

Price index should not be affected by changes in quality or changes in sale conditions. In principle, the same quality adjustment methods used for goods can also apply for services. Quality adjustment methods are generally classified into implicit (imputed or indirect) and explicit (direct) methods. It has to be taken into account that services are more difficult to be defined compared to goods and the same holds for their quality treatment. For this reason, elimination of quality on price is carried out manually by administrators using appropriate methods, while for imputation of prices for new and missing services a special IT routine was developed and these imputations are performed automatically.

Creation of a sampling frame and selection of samples is usually based on two data sources:

- Sampling frame obtained from the latest version of the Business Register by applying the same rules as previous year.
- Information from the last year's survey. Excluded from the frame were units from the last year's sample that turned out to be out-of-scope for a target population.

At earlier stage of the SPPIs development, only non-probability samples (mainly cut off samples) were used. In 2013, we introduced the first probability samples (for M 711 Architectural and engineering activities and M 731 Advertising). Selection of units into the SPPI survey using probability sample demanded appropriate amendment of SPPI compilation in terms of defining the weights. Initial weights based on data of turnover of the surveyed service groups were modified by grossing up factors that take into account PPS, response rate and over-coverage.

A SPPI number is a specific measure of average price movement of a certain group of products (services). Index calculation of SPPIs is performed through the following steps:

- In the first step, compilation of ratio (individual price index for a service of a service group for enterprise) is done.

$$Ip_{uge}^{qy/q4y-1} = \frac{p^{qy}}{p^{q4y-1}}$$

- The next step is a calculation of a simple (unweighted) price index for services within the same service group at a company level. The Jevon's formula is used here.

$$Ip_{ge} = \sqrt[n]{Ip_{uge1}Ip_{uge2}.....Ip_{ugen}}$$

$l = 1, 2, \dots, n_{ge}$; number of services within service group g in enterprise e

- Then the calculation of price index for service groups is performed, 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 for that activity. Arithmetic weighted average is used as a compilation formula, which approximates the Laspeyre's index.

$$Ip_g^{qy/q4y-1} = \frac{\sum_{e=1}^E Ip_{ge}^{qy/q4y-1} W_{ge}}{\sum_{e=1}^E W_{ge}}$$

- Finally, the last step is to calculate 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.

$$Ip^{qy/q4y-1} = \frac{\sum_{g=1}^G Ip_g^{qy/q4y-1} W_g}{\sum_{g=1}^G W_g}$$

Symbols used:

$u = 1, 2, \dots, n_{ge}$ (number of services for group g in enterprise e)
 $e = 1, 2, \dots, E$ (number of enterprises producing service within group g)
 $g = 1, 2, \dots, G$ (number of group of services g in activity SPPI)
 $qy =$ quarter q of year y ,

q-1y = previous quarter of year *y*,
q4y-1 = 4th quarter of previous year (base period)
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*
p_{sge} = price of product *u* of group *g* in selected price of reporting unit *e*

It is worth to note that weights are changed yearly. Thus, SPPI series are calculated using the chain linking approach. Such an approach reduces bias inherent to Laspeyre's formula and also facilitates yearly updates of samples of reporting units and services.

Pilot survey

For successful launching of any SPPI statistical survey as regular statistical activity, it is very important to conduct the pilot survey first. The purpose of the pilot survey is to get feedback information on all methodological elements and to identify those elements of the survey that should be changed or improved.

The implementation of the pilot survey requires serious and detailed approach in the same way as it is done for a regular survey. It is necessary to choose a sample, define and test the questionnaire, contact reporting units, process the data collected through the pilot survey and finally asses the pilot results.

Prior to the pilot survey, preliminary questionnaire was additionally implemented for some activities in the pilot phase. The purpose of this auxiliary survey was to update information about main and other activities of the units in population and collect information on types of services performed as well as on the breakdown of revenues by services. This information was mainly used as additional one for defining a sample frame due to deficiency of the Business Register, which is used as a main data source for selecting the sample. It was also helpful in developing a survey questionnaire.

A well done pilot survey represents a good basis for further regular survey conduction. It is therefore necessary to devote enough attention to the evaluation of the results obtained by the pilot survey. Methodology developed, together with supporting IT tools, permits that the control of produced SPPI results can be performed by different approaches, providing also different information aspects of quality achieved. Regardless the approach used, the administrator should focus on those SPPI elements that contribute most to the level of index compiled (selective approach). Control approaches based on SPPI results include: check of preconditions for correct SPPI compilation procedures, analysis of contribution and quality indicators.

Check of preconditions for correct SPPI compilation procedures include a manual comparison of preliminary results for a current period with final results in a previous period. It also includes a comparison of consistency of final results for a current period with final results of a previous period.

It is important to check enterprises within a service group and groups with the biggest impact (weight & dynamics = total impact) on SPPI. Contribution analysis is focused on the relative difference of SPPI dynamics of two consecutive quarters.

Eurostat defined in the manual "Recommended Practice for Editing and Imputation in Cross-Sectional Business Surveys" the following quality indicators for editing and imputation (EDIMBUS, p. 68): unweighted item response rate, weighted item response rate, weighted item response ratio, unweighted imputation rate, weighted imputation ratio, unweighted unit response rate and weighted unit response rate. In SPPI quality reporting, the comprehensive list of quality indicators as defined in the CBS's Quality Data Base is used as a basis for defining and compiling quality indicators of editing and imputation.

Set-up of permanent survey

After a pilot survey is conducted and possible shortcomings are determined and removed, the preparation of a regular survey can start.

The SPPI survey is conducted in two basic ways: through web-based questionnaires and through classical paper questionnaires delivered by post or by e-mail. To conduct survey through the web questionnaire, a special IT application was developed, which covers all phases of the SPPIs production. It has the functionality of data collection through web questionnaires, plausability checks, data editing and calculation of the index. Currently, 11 SPPI surveys out of 19 are conducted this way. Reporting units that are included in the web survey still have an option to enter data via the web application or to send data via the paper questionnaire. If the paper questionnaire is sent, those data are also entered into the web application by administrators.

Launching of a regular survey is introduced by an invitation letter submitted to all units that are included in the survey. Along with informing the potential respondents on the purpose of the SPPI survey, data confidentiality and their role in its implementation, this letter is also used to ask the selected units for contact details of persons who will be in charge of completing the web questionnaire. After receiving required information by e-mail, automated message (directly from the application) is sent to those persons containing the user account data (username and password), which allows an access to the web questionnaire. After that, alert messages are sent every quarter to respondents with information on the beginning of data collection for the respective quarter and on deadlines.

The questionnaires are conceptually harmonized and designed in a similar manner with respect to the specificities of each service activity. They consist of two main parts. In Part A, data on turnover of the unit by main and auxiliary activities and the breakdown of turnover by groups of services are collected. Those data are reported only once a year (in the questionnaire for the first quarter) and are used for compilation of weights. In Part B of

the questionnaire (Figure 4), reporting units have to provide data on prices for the selected representative services for the current quarter in each survey. These services are defined (with the detailed description, unit of measurement, pricing method etc.) when the survey is implemented for the first time.

Figure 4. Part B of the SPPI survey questionnaire

2. Typical services and prices in 2015

Code of group of services ①	Code for way of price formation ②	Identification number; description of service and elements which determine the price ③	Unit of measure ④	Price in HRK, without VAT		Code of reason for change of price ⑦
				Previous quarter ⑤	Current quarter ⑥	
Important: Please do not change description of services in third column. Just in case that in the current period selected service is not available or is no longer a typical or is substantially changed, please choose a new, second typical service for which you will specify the details in the lower part of this table. This note is not relevant for the first fulfillment of questionnaire.						

Special concern is given to the detection of quality changes of the selected services and their appropriate treatment in order to exclude their impact on SPPI. Due to specific pricing mechanism and pricing method of some service activities, respective SPPI questionnaires contain some additional questions in this part of the questionnaire.

The procedure of regular data collection and processing is shown in the following table.

Table 2. The steps of collecting and processing data in SPPI survey

Description	Approximate deadlines
Start of data collection (opening of web questionnaire for input the data)	A week after the end of the reference quarter
The deadline for completing the questionnaire	Three weeks after the end of the reference quarter
Sending of the first reminder	A day after the end of deadline for completing the questionnaire
The deadline for completing the questionnaire (closing web-based input)	5 days after the sending of reminder
Logical control and corrections of errors	45 days after the end of the reference quarter
Calculation of the preliminary results	55 days after the end of the reference quarter
Macro editing	65 days after the end of the reference quarter
Calculation of the final results	70 days after the end of the reference quarter
Transmission of the series to Eurostat	80 days after the end of the reference quarter
National dissemination of data	90 days after the end of the reference quarter

4. CHALLENGES ENCOUNTERED

Various challenges and problems may appear in the SPPIs development. The majority of them are manageable, but some are largely beyond control of a SPPI statistician. As mentioned before, the initial challenges were to gain enough knowledge and competences about the service price statistics and index compilation. Those areas were completely new and unknown to the staff of the Services Statistics Department in the CBS. That part was largely mastered with the assistance of external experts and personal professional development. However, there is still a need for continuous learning and upgrading skills as this statistical domain is progressing and new initiatives appear both in the EU (FRIBS) and worldwide.

One major problem that appeared in several SPPI areas was a difficulty to establish contacts with associations and large companies because of their refusal or lack of understanding of the topic. The climate in Croatia is such that companies perceive statistics as a big burden and are reluctant to deal with statistical questionnaires. On the one hand, this is understandable. Companies get a large amount of questionnaires that must be filled in, not only for national statistics, and at the same time they must perform their primary job. For this reason, they sometimes ignore or simply say that information on the prices is their business secret. The Croatian Bureau of Statistics has not yet established the practice of prosecution for such reporting units (only in certain exceptional cases), although the Official Statistics Act admits this possibility. In our view, more should be done in promoting official statistics, not only to users but also to suppliers of data.

At the meetings with representatives of reporting units (some of those meetings were very successful) it turned out that persons from professional associations or companies could have problems with comprehending statistical concepts and the rationale of statistical production. That caused a certain communication problem: on the one hand, there was no sufficient knowledge about business and about the functioning of individual services, but, on the other hand, data providers, for instance, do not understand certain instructions or what is meant by a particular phrase in the classification.

The accuracy of the Business Register is a permanent problem when it comes to choosing a sample frame. The Business Register requires regular updates and quality monitoring. Efficient handling of different deficiencies of the Business Register (omission of units, misclassified units, falsely active units, delineation between main, secondary and ancillary activity etc.) and maintaining of a quality business register is not possible without a continuous cooperation between several departments in the Croatian Bureau of Statistics and participation of reporting units.

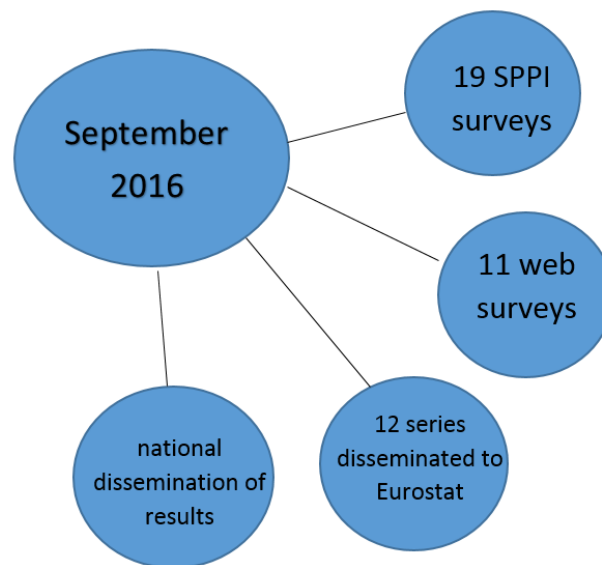
Despite all those shortcomings, the overall response rate for SPPI surveys is rather high – it amounts up to 81% on average. The highest response rate is in the activity N78 Employment activities (98%), and the lowest one in the activity M731 Advertising activities (45%).

5. CURRENT SITUATION AND PLANS

The current situation in the development of SPPIs can be assessed as satisfactory. In 2016, a total of 19 SPPI surveys was carried out, of which 11 via web application. A total of 12 series are regularly sent to Eurostat. In 2016, SPPI results were nationally disseminated for the first time and data are now regularly published in a quarterly dynamics. They can be accessed at the CBS's website under the following link: https://www.dzs.hr/default_e.htm → Statistics in Line → Distributive Trade and Other Services → Services Producer Prices.

In the autumn of this year, a new project funded by the EU will start. Within this project, the development of SPPIs for activity M702 Consultancy management is foreseen. The other part of the project will include a work on the revision of two existing surveys: H501 Sea and coastal water transport of passengers and H 502 Sea and coastal water freight transport. Those two activities were developed among the first ones and, since then, a lot of new knowledge has been gained and market conditions have been changed, so now is the right time to make a revision.

Figure 5. Current state of SPPI production at CBS



According to the respective STS regulation, two SPPI activities are still missing in the Croatian Bureau of Statistics, namely, H532 Courier services and M712 Technical testing and analysis. It is planned that SPPIs for these two activities are going to be developed in the Croatian Bureau of Statistics in the near future.

We are aware of the fact that a new "STS Package" within FRIBS is planned to be introduced in the near future, which foresees the expansion of services that should be monitored in the scope of SPPI.

Along with the development of new SPPI surveys, revision of the existing surveys will be done in order to improve coverage, to better define and specify services, to amend methods of data collection, etc. and thus improve the quality of SPPI statistics.

Another important goal achieved is that the results of these surveys are effectively used in the national accounts as deflators. It must be pointed out that SPPIs are also used in the compilation of the ISP (index of services production). Promotion of SPPI statistics as an important economic indicator of the business sector and other users outside statistics is always an actual and important task of the Croatian Bureau of Statistics.