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## **Findings in Compiling Supply and Use Tables in Slovenia: Lessons for the Transition of Data Sources**

### Abstract

Compiling benchmark supply and use tables provides for any country one of the best ways to cross-check a great number of statistical sources. It is therefore a tool of diagnosis of a system of official statistical surveys and can point at main loopholes and the necessary directions for the development of future data sources. It is not only because providing annual supply and use tables is a requirement for present and future members of the European Union, it is also because cross-checking of sources provides statistical synergy and firmer construction of an official statistical system as a whole. It is even more important in a situation of a very dynamic change in statistical sources that characterises countries in transition. Their statistical sources display, because of common historical legacy, a number of similar structural deficiencies.

Based on Slovenian experience in compiling supply and use tables according to ESA 95 and P60 CPA/ A60 NACE Rev.1 format, the main deficiencies are the lack of surveys of values of intermediate inputs, the lack of general structural business survey of establishments and a deficient coverage of a system of price indexes. There is an abundance of detailed data on quantities, instead of values and prices. And there is a very sparse statistical coverage of services, but this is also a problem in developed countries. Then there are also more fundamental weaknesses in statistical infrastructure like business registers, classifications and organisation, which all finally reflect in a fact, that supply and use tables remain more a data model composed of assumptions and less a data fact. It is especially bothersome if they are to be used to provide check of GDP estimates or to be a better way to make them. A mirror image of problems is a set of proposed solutions.

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## **INTRODUCTION**

In order to comply with international and European standards Slovenian statistical office has started with the implementation of new rules of SNA 93 and ESA 95 in the input - output tables compilation in recent years. This task was of great importance also because of accession process of Slovenia to the EU and with this connected requirements for regular submission of supply and use and input - output tables in the near future.

First working versions of supply and use tables were done with the data for the year 1995. In the years 1999 and 2000 Slovenia participated in the Eurostat project on input - output tables compilation in transitional countries. During this time supply and use tables for the reference year 1996 were compiled. They represent the first set of consistent and balanced supply and use tables for Slovenia and are in compliance with ESA 95.

Compilation of benchmark supply and use tables was a demanding and time-consuming process, starting with a detailed review of all available data sources and of their suitability and of adjustments needed for the use in the compilation. Then, a lot of conceptual and methodological issues had to be solved, especially in the areas, where it has become evident that are less well covered with accurate statistical data.

Some of the most demanding tasks encountered were the dilemma about the definition of proper statistical units, calculation, valuation and completeness of figures for intermediate consumption, overcoming the lack of data on production and use of services, problem of exhaustiveness of figures, calculations of trade and transport margins etc.

As it is characteristic for all transitional countries, also in Slovenia statistical sources have been changing rather quickly in recent years and are still in the process of adaptations. Reasons are in changing economic environment and in transition towards the requirements of EU. Compilation of supply and use tables has served as an efficient tool for cross-checking of a great number of statistical sources. It has pointed at some deficiencies, which will have to be improved in the future.

### **I. WORK ON SUPPLY AND USE TABLES FOR 1996**

#### **1. Statistical sources**

The first task of the compilation process was to examine the statistical sources, which are available in Slovenia and can be used for this purpose. There is no special statistical survey designed for the needs of input - output compilation at present, all data are received from regular statistical surveys or administrative data collections.

Almost all sources are defined in the National Programme of Statistical Activities for the year 1996. It includes surveys and other compilation tasks of the Statistical office and of other organisations, responsible for national statistics. We took notice of all of these items, but our selection focused on the annual surveys of the departments of Economic statistics and National accounts statistics of the Office, although we included also some other sources. The final list of main sources used in the compilation numbers about 50 items.

Statistical sources used can be divided into two main groups: statistical surveys and administrative data sources.

Data from branch statistical surveys were received for the activities of agriculture and forestry (NACE A), fishing (B), mining and quarrying (C), manufacturing (D), electricity, gas and water supply (E), construction (F), trade (G), hotels and restaurants (H), transport (I). Data were used also from price statistics, statistics of labour force, investment survey, household budget survey and foreign trade statistics. Data on imports and exports of services were obtained from balance of payments, which is compiled by the Slovenian central bank.

Administrative data sources comprised data from accounting statements and balance sheets of corporations and other legal units, data from income tax reports of unincorporated producers, government financial statistics and tax data.

An important characteristic of branch statistical surveys is their division into two parts, for incorporated and unincorporated units, with considerable differences in coverage. For the first type of units there are census surveys and coverage is almost complete, only with the exception of the smallest units and non-response. Households' producers units on the contrary are covered by sample surveys and even not in all activities. For this reason combination with administrative sources was needed.

Similar lack of data was encountered for some services, especially business services, which are not covered with statistical surveys. The available data for their estimation are from accounting statements of enterprises. This is an exhaustive source, but has an important disadvantage, that data can be estimated only according to main activity of enterprises. Additional information in this field were sales taxes, from which outputs of some services were estimated. But this source will not be disposable in the future compilation of the tables, since instead of this tax, value added tax was introduced in the middle of 1999.

Another basic feature of branch statistical surveys is their deficiency in the field of intermediate consumption. This area was somehow neglected in the transitional period and presents now one of the weakest points in the data sources for input - output compilation. Data on inputs from individual branch statistics are available only for main materials and mostly in physical terms. There is no survey on inputs for unincorporated units, so it must be estimated on the basis of the same structure as for corporations. The problem are also classifications of intermediate inputs, which are different in individual branches and not compatible with CPA. Besides, some of the surveys have been discontinued since 1996. This is an urgent problem to be solved for the compilation of next tables.

## **2. Producing the data for the supply and use tables**

Data from branch statistics were received mainly as raw survey files and exceptionally as custom-made tables especially required for this project. Data were usually at a level of enterprises, what has enabled introduction of some cross-checking of the figures and comparisons with other sources.

Next step of the compilation process was to analyse the original data, received from the sources, and to adapt them to the input - output requirements.

One of the basic feature of Slovene statistical sources is, from the point of view of input - output compilation, that they are not yet fully adapted to the needs of supply and use tables, both in their coverage of the transactions and units and also in the definitions and classifications used. In this circumstances it has taken a lot of effort to analyse differences between the sources and the ESA requirements and to produce pieces of the tables suitable for the assembly process.

A lot of work and time was dedicated to overcome the problems of different classifications and valuations, especially in the field of intermediate consumption. For the data on output the problem was not so great, since almost all branches already provide data according to NACE and CPA. For other data, in particular for intermediate inputs, bridge tables had to be made from branch specific classifications to CPA. Then, quantities were transformed into values, by multiplying with unit value data from different sources, taking into account domestic and imported component. This task was the most exhaustive in the activity of manufacturing and electricity, it was also done for agriculture, hotels and restaurants activity and transport.

Thus prepared data from individual sources formed separate tables with industry and commodity breakdown according to NACE and CPA at different levels, depending on the available breakdown of data sources.

After a long discussion, considering advantages and deficiencies, we have decided, that in the first phase the columns of supply and use tables should be defined as groups of enterprises, classified according to their main activity to the same NACE Rev.1 branch, and not as groups of establishments. The reasons are in available data sources, which couldn't be obtained at the level of establishments in satisfactory level. Branch specific surveys do have establishments at different levels of homogeneity as statistical units, but they cover mostly output of goods and goods related services, and their coverage of intermediate consumption is not complete. In order to produce supply and use tables we had to use all possible sources. Particularly important were the totals of intermediate consumption from accounting statements, which are available only by branches of enterprises. Finally we decided for such a treatment. Consequently we have more heterogeneous branches and a greater number of secondary products, but we believe, that this is not such a big deviation from the existent practice of other countries. Also, enterprises are fairly small and homogenous in Slovenia.

Tables derived from sources were then transformed to standard A60/P60 format and were ready for the assembling process and the commodity flow balancing. If necessary, they were first adjusted for valuation and coverage. Valuation of transactions is different in individual branch surveys, there is various inclusion of

subsidies, taxes and trade and transport margins, so this problem was solved in this stage. Then the adjustment for coverage for each source was done, using grossing-up coefficients, derived from comparison of employment of branches from the statistical register with the employment of surveyed units. For the household sector the results of the parallel pilot project on exhaustiveness were taken into account. For the elements of use table, like intermediate consumption and value added, data for household sector were linked to outputs by using the same technical coefficients as for corporations, for which more data are available.

### **3. Individual parts of supply and use tables**

#### Agriculture, forestry and fishing (CPA sections A and B)

Output of these branches is for corporations estimated on the basis of 6 census type surveys, which provide data on output quantities and procurement prices (set by government) or market unit values, derived from sales data. Output values are calculated on a detailed product level and then transformed to 6-digit CPA classification level. As it is practice by all branch statistical surveys, statistical units are establishments belonging to the branch (in this case agricultural establishments), which can belong to enterprises with other main activities. So for our supply table this is one of the incoming tables, with production figures classified in different columns, depending of the classification of an enterprise. For households producers there was no survey in 1996 and output was calculated from estimations of harvest quantities, done by a network of expert estimators, and procurement or market unit values. Survey of agricultural households in 1997 showed some differences, which were taken into consideration. In this year an exhaustive census of farms is going to be done, which will give more accurate data.

Intermediate consumption is calculated on the basis of 3 census type surveys for corporations, which comprise only main inputs, and on the basis of commodity balances of other inputs, provided through the co-operation of the agricultural and national accounts department of our statistical office and the agricultural institute.

#### Mining, manufacturing, electricity, gas and water (CPA sections C,D,E)

Basic source for the calculation of output values for corporations is annual survey, which provides data on quantities and unit values of sales of industrial products, quantities of production, own use and changes in inventories. It covers all legal units (enterprises or establishments) registered in industrial activity with at least 5 employees. Data are provided according to the Slovene version of PRODCOM classification. Output of household enterprises is estimated from the income tax reports data.

Data for the calculation of intermediate consumption was taken from a statistical survey, which has included all enterprises and establishments with at least 10 employees engaged in industrial production. This survey was lastly done for 1996. This survey was an exhaustive source, but it had three main deficiencies: it provided only quantitative data, only for main inputs and according to special classification of inputs, incompatible with any other. To solve the problem of classification own converters were made to CPA and CN (combined nomenclature). Unit values for evaluation of inputs were taken from domestic production and imports (in the

survey inputs quantities were separated into domestic and imported). The problem of incomplete coverage of inputs was solved later in balancing process, where total figures were compared with the data from accounting statements of enterprises and the identified gaps of inputs were then filled in the balancing stage by commodity flow method.

#### Construction (CPA section F)

Basic source for the estimation of output for corporations is annual survey, which provides data on the value of construction work. For household production data are taken from income tax source and from a special survey, which provides an estimation of own-account construction of households. Source for intermediate consumption is a census type annual survey for corporations, which covers values of materials and energy inputs, but does not include the value of inputs of services.

#### Trade (CPA section G)

A primary source for the estimation of trade margins and repair activities for corporations are accounting data of enterprises and for household enterprises income tax reports. They give information on the value of goods sold and bought for resale and trade margins are obtained as a difference, in trade and non-trade branches. Supplementary source are surveys on wholesale and retail trade, which provide turnover data, specified according to some trade activities or product groups. There is no survey for intermediate inputs, data are available only from accounting statements.

#### Hotels and restaurants (CPA section H)

The source for output of corporations is quarterly census type survey. Services are there classified according to special branch classification and were then transformed to CPA in the input-output compilation process. In this activity there is also a sample survey for unincorporated enterprises, which was a base for the estimation of their production. Additional source for the estimation of output of corporations and households were data from turnover taxes. For intermediate consumption there is a survey for corporations on inputs for the preparation of food and quantity data on the use of beverages and other inputs.

#### Transport (CPA section I)

There are several surveys of this activity, generally one for each transport mode. They were principal sources for the estimation of output for corporations, but they were supplemented by the data from turnover taxes and income statements, to fill some gaps and provide checks. Turnover taxes were used to identify land transport output of individual non-transport branches, where this transport is not their ancillary activity. Output of transport services of households is estimated from income tax reports and turnover taxes. For intermediate consumption branch surveys provide few data, only on energy inputs and in quantity terms.

#### Other services (CPA sections J, K, L, M, N, O, P, Q)

Information on output of these services in statistical surveys is very limited and as primary sources are used accounting statements of corporations, general government and unincorporated household enterprises. The problem using this sources is, that they give information of output according to main activities of enterprises and not according to groups of products, unless we assume no secondary products. Therefore we tried to use supplementary sources even if they were available only for some services. One such source were turnover taxes, from which we could estimate output of some services. Another source was household budget survey, for the services, which are used entirely by households. For intermediate consumption we had more specified data on inputs only for general government and health and education activity. For the rest we only had estimates of totals for main groups of expenses for each corporation, government institution of NPISH from their income statements. These data are somewhat adjusted and refined in the process of GDP estimation by the production method. These are totals of material, services' and other outlays. The structure of intermediate consumption by branches and by products was obtained in the final phase of balancing of the supply and use table.

#### Imports, exports

Imports and exports of goods are obtained from the foreign trade statistics department, which has data from customs declarations. Imports are valued c.i.f. and exports f.o.b. and they include also value of imports and exports for inward processing and from outward processing. Imports and exports of services are obtained from the Bank of Slovenia, as well as the estimation of c.i.f./f.o.b. adjustment.

#### Final uses

Final consumption expenditure by households are consistent with GDP and ICP estimates. For the NPISH and government final consumption we used already published figures from the GDP estimations. Structure of fixed capital formation by product is estimated for the expenditure side of GDP estimates only on a higher aggregation level, based on INV-01 source and a multitude of other smaller sources. We disaggregated it further based on the work done for the ICP project. For changes in inventories we got rather elaborate estimates directly from sources, separately for different types of inventories. The problem was that we got from different sources very different estimates, so finally we used this item as a residual when balancing supplies and uses by product.

#### Taxes and subsidies on products

Data for import duties and turnover taxes on imports were obtained from foreign trade statistics, based on custom declarations. Turnover taxes on products on accrual basis are received from Tax Administration. The most difficult part to estimate were subsidies on products. They are estimated on the basis of special database, processed for the EU as part of the accession requirements.

## II. SUGGESTIONS FOR THE TRANSITION OF DATA SOURCES

Based on the experience obtained by the compilation of benchmark supply and use tables for Slovenia for 1996 we can summarise some main deficiencies concerning statistical sources, which we believe are fairly representative also for other countries in transition. Filling of these key loopholes would enable supply and use tables to perform their proper statistical role to strengthen the consistency of a statistical picture of a country, in particular for the needs of GDP calculation, and to provide indications of improvements and reconciliation of sources. It would of course also improve supply and use tables in their descriptive and modelling uses.

We identified several general features of statistical sources in countries in transition, where improvements seem to be most urgent. They are:

There is an abundance of detailed data on quantities, instead of values and prices. This is clearly a historical heritage from times, when markets were of smaller importance.

There is a very sparse statistical coverage of services. This problem is not confined to the countries in transition, but is shared on the global scale and involves transition to service economy and new economy.

Weaknesses in statistical infrastructure like business registers, classifications and organisation, that is a universal essential condition for the development of sources.

These general features can be iteratively improved through specific improvements of sources. Our recommendations focus on three main specific problem areas, limiting the quality of SUTs:

1. lack of surveys of product structure of intermediate consumption
2. lack of structural business survey
3. sparse statistical coverage of production price statistics

Let us start with the first problem.

Although we specifically chose as our benchmark year 1996 because of the best data situation concerning intermediate inputs, analyses of sources for that year has shown, that only app. 55 % of the value of product structure of intermediate consumption is covered with statistical sources. The other 45 %, not covered inputs, can be divided into two parts: 23 % of them pertain to branches, that have some statistical surveys of intermediate inputs, but they are not exhaustive – they do not cover all the inputs; the remaining 22 % of not-covered inputs present the intermediate consumption of branches, which do not have any survey on inputs.

The results are presented in the next table.

The situation in following years got much worse, since two surveys were abandoned: in industry (the most important one) and in hotels and restaurants activity. Both the abandoned and still present ones also displayed major deficiencies from the point of view of use table compilation: coverage of only of main inputs, in most

surveys only of their quantities, not covered inputs of services, inappropriate valuation and specific non-compatible classifications. On the other hand, some featured unnecessary frequency, as input structure is a fairly stable phenomena. All considered, there seem to be enough reasons to abandon even the remaining surveying of intermediate inputs and channel freed resources to a new approach of surveying intermediate inputs

We are proposing surveying them only for benchmark years: for the year 2000 and afterwards each five years. The survey would be, resources permitting, census-type for corporations. It would ask for the value of intermediate inputs by purpose from the standardised business cost accounting (instead of quantities of only major inputs as before) and for the estimates of their breakdown to the 2-digit CPA level (about half of the 2-digit P60 nomenclature are services). By the way, starting this year, a CPA based classification became obligatory standard statistical product classification in Slovenia.

Table: Slovenia 1996: Coverage of value of product structure of intermediate consumption with statistical sources

				NACE ACTIVITIES		
				SOURCES	NO SOURCES	
				NACE #	1-45, 55-63, 75, 85	50-52, 64-74, 80, 90-93
				CPA #	Goods and some services	Other services Total
CPA PRODUCTS	SOURCES	1-40	Goods	55 %	22 %	100 %
	NO SOURCES	40-93	Services	23 %		
			Total	78 %	22 %	

Let us turn now our attention to the second problem. A lack of an annual structural business survey puts Slovenian statistics at a disadvantage compared to most European countries. Data from income statements do not provide sufficient detail about the kinds of output needed for national accounting purposes and they neither provide consistent breakdowns of some key enterprise variables by establishment. It is still a matter of deliberation if a new survey is needed or information can be obtained from somewhat extended present branch surveys. In any case, what is particularly needed is data on output of main activity, of goods and of services, from trade margins and from rents.

Third problem: We felt it would be a very brave exercise to deflate newly produced current price Slovenian SUT to produce tables in constant prices, considering the coverage of presently available price indexes. As annual constant price SUTs are one of Eurostat's requirements, we have to think of ways to improve the situation. A project has been initiated to increase coverage of producer price index to include export prices. It is a feat that only some European countries have undertaken, but as a small country Slovenia has a very important share of output in exports and this improvement is considered important. Another problem, which is shared by all other countries as well, is the deflation of output of services. Countries in transition can hardly be in the forefront of methodological advances in this area, but we are ready to follow any good example. In the meantime, we shall have to consider standard more approximate solutions, like defining price indexes for services as some combination of available indexes.

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