

METHODOLOGICAL MANUAL

FOR CALCULATION OF THE VOLUME INDEX OF INDUSTRIAL PRODUCTION IN BOSNIA AND HERZEGOVINA



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Agency for Statistics of
Bosnia and Herzegovina

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Foreword

In the process of accession to European Union and harmonization with the EU standards and practice, the statistical system of BiH is expected to harmonise its activities with the requirements of European Statistical System. Nevertheless, the transition period implies significant changes in politics, legislation, and economics and requires adoption of new statistical standards and methods. Accordingly, statistical system has to ensure the high quality and timely following the changes occurring in the new circumstances and to allow international comparison of statistical data. The objective of the CARDS Twinning Project “EU Support to the Statistics Sector of Bosnia and Herzegovina- Phase III”, funded by the European Union, was to support Bosnia and Herzegovina in carrying out this important obligation.

Within the frame of the aforementioned Project, the Component “Business Statistics”, sub-component “Volume Index of Industrial Production (IPI)” was implemented. Publication “Methodological Manual for Calculation of Volume Index of Industrial Production in Bosnia and Herzegovina” is the result of the joint efforts of experts from the Italian National Institute of Statistics (ISTAT) and statisticians from three statistical institutions in Bosnia and Herzegovina.

We would like to express our gratitude and thanks to the European Union, the Delegation of European Commission to Bosnia and Herzegovina and Eurostat for their joint efforts in the implementation of this project as well as providing financial, administrative and technical assistance.

Furthermore, we would like to express our special thanks to the expert team from the Italian National Institute of Statistics – ISTAT, led by Mr. Gian Paolo Oneto, Team Leader of the Component “Business Statistics”, for their open and professional efforts to contribute to the development of a new methodology compliant with European standards, and designing the IT tools for IPI compilation.

Special thanks go to Ms. Cecilia Pop, the Resident Twinning Advisor and her team for highly professional and committed support to the BiH statistical system.

We are very glad to offer to all our users the Methodology for compilation of BiH industrial production index in line with the EU standards and regulations.

A. INTRODUCTION

A.1. INDUSTRIAL STATISTICS

Business statistics are important components of economic statistics aimed at making available to users statistical information of such extent and quality to measure appropriately the structural features and the evolution of important economic phenomena of a particular country and as such, to enable monitoring and understanding the developments in different economic activities or groups of activities.

Statistical data should also be comparable internationally and ready to be used for monitoring of social and economic changes, tendencies and development at the global level.

According to the European standards industrial statistics make integral parts of the statistics of economic activities of enterprises, and consequently, they are important subjects of business statistics.

Basic requirements set upon business statistics by European and worldwide standards, particularly in the domain of industry, should be reflected in statistical system of Bosnia and Herzegovina.

Explicit obligation to harmonize official statistics with statistics of EU was set upon the statistical system of Bosnia and Herzegovina in the plan for implementation of Stabilization and Association Agreement between Bosnia and Herzegovina and European Union (EU). Direct implication of this very wide and complex requirement is establishment of a country-wide statistical system, based on internationally harmonized conceptual framework to be used in carrying out statistical surveys and in compiling and producing statistics. The harmonization process and fostering the comparability between BiH and EU statistical standards, and consequently with the UN standards, have started by introducing a new Classification of Activities in Bosnia and Herzegovina - KD BiH¹⁾. KD BiH is directly related to the EU standard NACE Rev. 1.1.

The policy relevance and multiple use of a coherent set of internationally comparable industrial statistics pertain to two distinct but interrelated set of annual statistics and short-term industrial statistics. Moreover, these industrial statistics form part of a broader domain of structural and short-term business statistics covering other economic activities like construction, distributive trade and services.

Industrial statistics, as a component of a single EU system of business statistics, comprise three main areas:

- Structural Business Statistics – SBS
- PRODCOM Statistics
- Short Term Statistics – STS

The three main areas are interconnected and could not be treated independently, but only as elements strongly related one to another forming an integrated system of industrial statistics.

Structural business statistics are production-related statistics collected and compiled to establish the structure, activity, competitiveness and performance of enterprises at the national,

¹⁾ *Classification of activities in Bosnia and Herzegovina - CA BiH (KD BiH) was introduced in 2006 as an obligatory standard for all statistical surveys related to the activity (The Law on CA BiH was published in Official Gazette of Bosnia and Herzegovina 76/06, and the Decision on the CA BiH in Official Gazette of Bosnia and Herzegovina 84/06)*

regional and international level. By contrast, the **short-term business statistics** are infra-annual production-related statistics that are collected to monitor business cycle with respect to the short-term evaluation of supply, demand and production factors. **PRODCOM statistics** are specific, product-oriented statistics, exclusively related to industry.

International recommendations on industrial statistics together with similar international recommendations on other economic activities articulate a common integrated framework encompassing both the structural and short-term business statistics for goods and services producing industries with the 1995 EU System of National Accounts (ESA)95) as the overarching macroeconomic framework. This means that common methodological principles and common definitions of data items should be used, such to allow for a coordinated compilation of harmonized statistics, reliable and flexible enough to meet the needs of governments, business community and other main users to the level of required details.

Globally, industrial statistics are based on UN recommendations and EU regulations relevant to the three above mentioned areas. The UN recommendations are not legally binding, while the basic EU regulations (relevant regulations of the Council of the European Union or regulations of European Economic Commission) set forth legal framework to be directly applicable in all Member States, according to the Agreement on the European Economic Area (EEA Treaty)²⁾.

A.1.1 BASIC INTERNATIONAL REGULATIONS AND RECOMMENDATIONS

Harmonization of the official industrial statistics in Bosnia and Herzegovina with the statistics of European Union is based on implementation of the following EU regulations and other important international recommendations, both general and specific ones: The Council of the European Union has adopted a series of Regulations for a uniform European system of statistics on all businesses. Prominent amongst these are the **Regulation on the statistical units, Business Register Regulation, Regulation on European System of National and Regional Accounts, Regulation on Statistical Classification of Economic Activities NACE, the Structural Business Statistics Regulation, Short Term Statistics Regulation and the PRODCOM Regulation**. Also, the most important and recently updated UN document is “**International Recommendations for Industrial Statistics – IRIS 2008**, Provisional Draft of 5 November 2007”.

The most relevant EU regulations, manuals and international recommendations are listed in ANNEX I – INTERNATIONAL REGULATIONS AND RECOMMENDATIONS

It is important to emphasize that EU have introduced a new statistical classification of economic activities NACE Rev. 2³⁾, that entered into force on 19 January 2007 and should be applied from 1 January 2008.

Classification NACE Rev. 2 replaces statistical classification of economic activities – NACE Rev. 1.1, which was the basis for KD BiH, statistical classification that is still in official use by the statistical system of Bosnia and Herzegovina. The 2008 Work Plan of the BiH Agency for Statistics envisages establishment of a new Classification of Activities KD BiH (based on NACE Rev. 2) and its statistical implementation starting from 2009. In this way statistical data of

²⁾ *Agreement on the European Economic Area, 1992*

³⁾ *Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006, establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as some EC Regulations on specific statistical domains*

Bosnia and Herzegovina will become comparable with statistical data of any European or other country in response to basic needs of main users.

A.1.2 MAIN TASKS AND GOALS OF INDUSTRIAL STATISTICS

Main task of Business Statistics, and of industry statistics in the same context, is to ensure the efficient means for relevant and qualitative economic analysis whereas the following has to be ensured:

- Comprehensive, timely, reliable and comparable data on structure, activities, and competitiveness and on characteristics of enterprise activities, which are collected and processed with different periodicity (annually, once in a couple of years, monthly, quarterly...)
- Support i.e. assistance in decision-making and planning of the economic development (new approach in creating economic and social policy, competitiveness policy, environment protection or in the entrepreneurship development has to be based on initiatives and decisions made at the basis of relevant and qualitative statistical data). A scope of duty for Business statistics is to provide reliable, mutually and internationally harmonized data required with a short notice for the bodies making important economic decisions at the EU level, within the countries or particular enterprises,
- Data required to calculate different components of National Account Statistics, primarily the real GDP calculations (Gross Domestic Product) where the business statistics play a key role.

The industrial statistics of BiH have to ensure the statistical information related to the competitiveness and other important characteristics of industrial activities and business entities in the country, in its two entities (Federation of BiH and Republika Srpska) and in Brcko District, but in such a way so to ensure the data comparability in the country as well as internationally and to ensure the possibility of data aggregation at the European and world levels.

The BiH industrial statistics data will mainly be used for:

- Analysis of the structure and its long-term changes, i.e. overall industrial development and development by particular industrial activity groups,
- Monitoring of short-term trends of development of industrial activities by certain groups of industrial activities and in total,
- Analysis of industrial production factors and other elements providing an assessment of quality and competitiveness of these activities,
- Analysis of domestic and international market,
- Analysis of success in business,
- Analysis of demographic changes of the enterprise,
- Analysis of the specific characteristics of enterprise by chosen activities and their groups to the product level

A.1.3 SCOPE OF INDUSTRIAL STATISTICS (COVERAGE BY ACTIVITY)

Industrial statistics are statistics reflecting characteristics of a limited set of economic activities undertaken by all resident units in the country primarily engaged in the following areas of NACE Rev 2 classification of activities:

- Mining and quarrying (Section B)
- Manufacturing (Section C),
- Electricity, gas, steam and air conditioning supply (Section D);
- Water supply; sewerage, waste management and remediation activities (Section E).

In Bosnia and Herzegovina, the national Classification of Activities - KD BiH is based on NACE Rev1.1, so the scope of industrial statistics in BiH covers the following sections:

- Mining and quarrying (Section C)
- Manufacturing (Section D),
- Electricity, gas, steam and water supply (Section E)

A.1.3.1 Outsourcing (subcontracting)

A very important issue in determining the scope of industrial statistics is the phenomenon of “Outsourcing” i.e. transfer/allocate the production to another unit– This is the most frequent and essentially a boundary between manufacturing and wholesaling.

Outsourcing = contractual agreement by which the principal requires the contractor to carry out a specific production process.

Sometimes, the term "subcontracting" is used as well.

The term ‘outsourcing’ of production has been used when the principal unit (i.e. the principal) contracts another production unit (i.e. the contractor) to carry out specific aspects of the production activity of the principal, in whole or in part in the production of a goods or a services. It should be noted that the activity classification of the principal does not change with the outsourcing but its activity is very much affected by the nature and extent of the outsourcing.

The trend of outsourcing the manufacturing activities has been growing recently. Therefore, it is imperative that the criteria for the classification of the principal outsourcing its economic activity to the contractor have to be clarified to ensure international consistency in its classification - ANNEX VI – Standards and definitions .

Production unit i.e. the contractor is classified in Section C, D or E and into the specific activity class in accordance with production process being carried out through “outsourcing“.

The Principal is classified into the specific activity class based on the ownership of the physical input materials and whether the whole or some portion of the production process is being outsourced to the Contractor.

There are **three possible cases of outsourcing**:

- (a) outsourcing of support functions,
- (b) outsourcing parts of the production process and
- (c) outsourcing the complete production process.

Correct and consistent treatment of outsourcing is a very important step for appropriate classification of statistical units by activity, selection of harmonized coverage of observation units in statistical surveys on industry and, also for efficient and adequate data collection and processing.

The most precise and the most recent classification rules to be applied to such situations are specified in the documents: “Introductory guidelines to NACE Rev.2” and “International Recommendations for Industrial Statistics IRIS 2008”.

A.1.4 POPULATION ASPECTS IN INDUSTRIAL SURVEYS (COVERAGE OF STATISTICAL UNITS)

There are two main levels of populations relevant for design and implementation of business surveys:

A Target population

B Population of interest (the minimum required coverage of target population)

Real target population is usually restricted to population of statistical units in business register (those classified according to relevant scope of industrial activities).

Population of interest i.e. sample population consists of the units drawn from the statistical business register (or any other comprehensive register) for which data are requested.

The field of interest covered by the statistics could be explained in terms of activities or in terms of statistical units (establishments or kind of activity unit). Of course, it is desirable to cover all the industrial activities, including the minor industrial activities of predominantly non-industrial enterprises or establishments. In practice, it could be better to separate the industrial from the non-industrial activities in terms of statistical units (enterprise and parts thereof) by distinguishing those which are predominantly industrial from predominantly non-industrial ones. A statistical unit which conducts several activities, but which is not organized to be treated as two or more statistical units is then classified wholly **in** or wholly **out of** the industrial sector.

A.1.4.1 Size threshold

When considering statistical surveys, the **size thresholds** (cut-offs) play an important role in determining the target population and, where relevant, the population of interest (sample population).

Traditionally many statistical business surveys have been conducted for units above a certain size threshold imposed on specific variable. The reasons for this are diverse and include the desire to limit the size of the survey, the response burden and, also to take account of the problems of maintaining registers for smaller units. For the purpose of international comparisons, cut-off thresholds should be selected in accordance with relevant EU regulations or international recommendations. Different variables could be used to set up suitable size threshold when selecting population of interest, such as: a number of employees, value added, turnover, working hours...

SBS, PRODCOM and STS regulations specify population requirements in industrial surveys.

A.2. STATISTICAL SURVEYS ON INDUSTRY IN BIH

According to international recommendations the periodicity of statistical surveys could be quite different, generally depending on the purpose of a survey.

A.2.1 ANNUAL STATISTICAL SURVEYS ON INDUSTRY IN BIH

These surveys include the structural business surveys (SBS surveys) and detailed industrial production surveys at the level of product/service (PRODCOM survey). The annual surveys are aimed at collection and processing of a wide scope of data and consequently, providing a good platform for study and analysis of industrial production behavior and its share in the total economy of the country.

Annual statistical surveys on industry represent a central data source for industrial statistics and in general, they are characterized by a very wide coverage of observation units and they enable collection of detailed information needed for all the necessary estimates, comparisons, definition of the population of interest or identification and selection of representative products for the purpose of short term statistics.

Data collected through annual statistical surveys on industry in selected base year is used for defining the system of weights, which is a keystone in calculating the short-term indicators for industrial statistics, primarily the volume index of industrial production. Weights system will be used in longer period (through several years), until the change of the base year.

STRUCTURAL BUSINESS SURVEY is aimed to collecting, processing and publishing data on structure, activities, competitiveness and operating characteristics of business entities. The survey is generally dealing with financial data and business results aggregated for different levels of activity classification. The survey is primarily related to activity of observation unit indicators – the concept of activity.

Structural business statistics generally provide annual information referring to the whole reference year. They show changes from one year to another, and can be used to judge the accuracy of STS surveys which are often implemented as surveys based on a smaller coverage and shorter frequency (monthly or quarterly). The production figures from structural business surveys, when administered, should be complemented by specialized commodity production (PROD COM) surveys.

PRODCOM SURVEY is aimed at collecting, aggregating and publishing data on volume of production at the level of a single product (goods or services as defined by the Nomenclature of Industrial Products - NIP BiH 2005). The survey is a product oriented (product concept). The Nomenclature of Industrial Products - NIP BiH 2005 was based on the EU PRODCOM list from 2005 and published in Official Gazette of Bosnia and Herzegovina 19/06 of 20 March 2006. It was introduced as an obligatory standard for all the surveys of industrial statistics and other statistical surveys related to industrial products.

So far, the SBS and PRODCOM surveys on industry in BiH have been carried out altogether as a single annual survey, using IND 21 questionnaire for data collection. The questionnaire is attached as ANNEX III - ANNUAL SURVEY ON INDUSTRY.

The main characteristics of statistical surveys on industry in BiH are:

A.2.1.1 Statistical units (reporting and observation units) of the annual survey

The reporting unit in the annual statistical survey on industry IND 21 could be enterprises, i.e. legal units and their registered local units classified according to their main activity in industry (Sections C, D or E of KD BiH). The reporting unit could also be a legal unit that is not classified in industry, but comprises some business parts, i.e. establishments performing industrial activities, no matter whether such establishment is legally constituted or not.

In the PRODCOM part of annual statistical survey on industry the reporting units are, at the same time, observation units. In the SBS part of annual statistical survey on industry observation units are kind of activity units (KAU) while reporting units are collecting data on them. Reporting units (legal units) are providing data on each industrial local units they comprise of. In some instances, registered local unit can report its own data directly.

Only legal units (legally registered units) could be considered reporting units, according to the criteria of the survey coverage, while physical units such as entrepreneurs, craftsmen, etc. could not be considered as reporting units.

Selection of reporting units to be included in the survey and to be provided with the IND 21 questionnaire and required to collect and submit SBS and PRODCOM data should be done at the basis following the criteria for selection of population of interest A.2.1.3 POPULATION OF INTEREST (THE MINIMUM REQUIRED COVERAGE OF TARGET POPULATION) FOR Annual Statistical surveys on industry in BiH.

A.2.1.2 Target population in the annual survey

The target population are enterprises (and their parts) which have the main activity or some of secondary activities within the Sections C, D or E in the BiH Classification of Activities, as well as parts of non-industrial enterprises that predominantly perform industrial activities. (Each year, the entity statistical offices and Brcko District Branch Office prepare, i.e. update, the list of statistical units of target population in the annual surveys on industry (Address List) using, up to now, data obtained from the surveys on National Accounts and results of their own surveys, but in the future they will use data from the Statistical Business Register).

A.2.1.3 Population of interest in the annual survey (the minimum required coverage of target population)

The threshold approach is used for the selection of population of interest. The threshold is applied on the value of production and the following criteria should be met: summary production value of selected enterprises in every class of activities of the KD BiH has to be higher or equal to 90% of the total production value (by the EU regulation: “to enable the collection of data, representing at least 90 % of national production for each NACE Rev.1.1 class of sections C, D and E). As a measure of production value of target population, the combination of data from previous year should be used: value of production from units included in industrial survey coverage and a total turnover, compiled from National Accounts surveys (related to registered main activity). In the future, when the statistical business register is fully established and SBS survey carried out, data from statistical business register should be used i.e. those data that are harmonized with SBS variables and more precisely linked to each industrial activity really performed by statistical unit, not only referred to registered principal activity.

1. At the level of BiH, these criteria will be implemented at the basis of harmonized coverage of enterprises in the entities and District Brcko in the way that the population of

interest will cover all the enterprises and their parts having a number of employees ≥ 10 and those enterprises and their parts with annual turnover ≥ 500.000 KM.

NOTE:

Data collected and submitted to BHAS by entity institutes and DB should be also harmonized and strictly in line with the above mentioned criteria.

A.2.1.4 Regular updating of the population of interest in the annual survey

At the beginning of each calendar year the coverage of responding units i.e. the population of interest for the annual survey of industry IND 21 has to be defined based on the above-mentioned criteria i.e. checked for compliance with the requirements of A.2.1.3. The task to prepare (update address lists of respondent units for the survey) using annual and monthly data from previous years, as well as data from other sources (in the first place National Accounts) is primarily allocated to each entity statistical institute and DB. Address lists are to be used for data collection i.e. for sending questionnaires to selected responding units (final registers of observation units i.e. population of interest should be created for the annual survey on industry).

A.2.2 MONTHLY STATISTICAL SURVEYS ON INDUSTRY IN BIH

So far, the monthly statistical surveys on industry IND 1 have been performed primarily in order to compile the industrial production volume index (IPI). The volume of production index - IPI is regarded as one of the most important measures of economic activity. Developments in the industrial production index describe the economic cycles of industry, and this can be used to assess the development of GDP as a whole. The IPI has the same conceptual basis as the output measure of Gross Domestic Product (GDP); it is designed to be a short-term measure of gross value added (GVA).

What concerns the STS this index is the reference indicator for economic developments and it is used in particular to identify turning points in economic developments at an early stage. The major advantage of the production index compared with other indicators is its combination of fast availability (relative to GDP for example) and, at the same time, its detailed activity breakdown.

The STS-Regulation (Council Regulation (EC) No 1165/98) requires short-term statistics on production (Variable 110) under the provisions of Annex A in the form of index number and with monthly periodicity.

The production index is also known as an output index or a production volume index. In fact, the theoretical purpose of the index is not meant to reflect production but value added. In practice, however the index is not referred to as a value added index, because in practice, value added is not available on a monthly basis. Therefore, data on some other variables, other than value added, are generally collected for the purpose of IPI compilation. The key issue is to develop a "good" economic indicator of the business cycle. Possible alternative variables for the compilation of an IPI are: (gross) output quantities, gross production value, turnover, raw material consumption, labor input and energy use.

In BiH the output quantity has been selected as a main variable to be used as a short-term measure of the development i.e. as a measure of changes of the volume of gross output at the

level of the individual class of activity (KD BiH), which is a key economic variable by itself. Aggregation of the class indices (as a weighted average) such to obtain any index of the higher level of activity aggregation according to KD BiH (group, division, subsection, section, total industry and MIGs) is based on the net output concept – the value added at factor costs is used for weighting.

The appropriate variable for an IPI is total production, in terms of value and volume, since the entire economic activity of the unit is to be measured.

Total production = production sold + net increase in stocks of finished goods and work in progress + production for further processing

Questionnaire IND 1 and relevant instructions how to fill in data requested is given in ANNEX II - MONTHLY SURVEY ON INDUSTRY IND-1

A.2.2.1 Statistical units (reporting and observation units) of monthly survey

Reporting unit of monthly statistical survey on industry IND 1 could be enterprise i.e. legal units and its registered local units that are classified, according to the main activity, in industry (Sections C, D or E of KD BiH). Reporting unit could also be a legal unit that is not classified in industry, but having some business parts i.e. establishments performing industrial activities, no matter whether such an establishment is legally constituted or not.

In the monthly survey on industry the reporting units are also and at the same time observation units. Reporting units (legal units) provide data on each industrial local unit they comprise. In some instances, registered local unit can report its own data directly.

Due to the fact that data on a single industrial product is being used for calculating the production index IPI in BiH, type of statistical unit selected for observation unit does not play an important role (STS regulation requires the use of KAU for all the short-term indicators).

Only **legal units** (legally registered units) could be considered as reporting units, according to the criteria of the survey coverage, while physical units such as entrepreneurs, craftsmen etc. could not be considered reporting units.

Selection of reporting units to be included in the survey and to be provided with the IND 1 questionnaire and requested to collect and submit monthly data on industrial production should be done at the basis of criteria for selection of population of interest A.2.2.3 POPULATION OF INTEREST (THE MINIMUM REQUIRED COVERAGE OF TARGET POPULATION) FOR Monthly Statistical surveys on industry in BiH.

A.2.2.2 Target population of the monthly survey

In the monthly survey the target population is defined by enterprises and their local units, which have the main activity or some of secondary activities classified within the Sections C, D or E in the KD BiH, as well as business parts of non-industrial enterprises that predominantly perform industrial activities, but those ones that are included in the coverage i.e. population of interest of annual PRODCOM survey (for a time being this is the same coverage as for SBS survey on industry in BiH).

A.2.2.3 Population of interest – panel of statistical units for monthly survey (the minimum required coverage of target population)

Panel of statistical units for monthly survey on industry is the selected portion of the population of interest for PRODCOM survey, meaning that this PRODCOM coverage is the sample frame for STS survey (monthly survey on industry).

As the aim of IPI is to show in a representative manner, the short-term development of the activity of individual segments of industry and of industry as a whole, it is not necessary to include all products and/or all observation units. Rather, a selection of products and/or units, so called **panel of statistical units**, can be utilised. The quality of panel selection should be verified based on a comprehensive annual production survey (PRODCOM survey). It must also be ensured that the selection does not become too outdated and that actual structural changes and technical progress are reflected in the IPI.

Monthly survey on industry is a specific statistical survey of so called longitudinal type, its basic feature is data collection, mainly done from the same units on multiple occasions (monthly), thus enabling monitoring of basic phenomena through a longer time period. In monthly survey on industry a fixed panel of statistical units should be used, implying that initial selection of population of interest has to be done for the base year and kept stable until the change of base year (main revision of panel). Panel must be updated over time (each year) taking into consideration longitudinal demographic changes of selected statistical units (disappearance, appearance of new units, merging of units from panel with the ones in or out of panel, and so on). New statistical units should be entered in the panel only as substitute for units whose activity has ended, such jeopardizing the required coverage. Size of a new unit must be comparable to the size of the unit that stopped operating.

Selection criteria for panel i.e. population of interest at the level of BiH (as well as entities and DB) are to be applied to reporting and observation units for monthly survey in industry, as well as to the representative products. Those criteria are based primarily on requirements of the EU STS regulations (Council Regulation (EC) No 1165/98 and No 1893/2006).

When selecting panel of statistical units for BiH, for each entity and DB the following criteria should be applied:

A.2.2.3.1 Criteria related to activity

1. The population of interest within section C covers all the activities at all levels of index aggregation.
2. The population of interest within section E covers all the activities at all levels of index aggregation, excluding only division 41 and branch 40.3, in accordance with EU STS Regulation No 1165/98
3. The population of interest within Section D covers all the sub-sections and all divisions, in accordance with EU STS Regulation No 1165/98. Activity coverage at the class and group level could be restricted on dominant activities. Dominant activities to be followed by monthly survey are selected in such a way to insure that **indices at group level (the 3-digit activity code) and at class level (4-digit activity code) represent at least 90 % of the total value added at country level in a given base year. The above mentioned criterion is fulfilled if the same requirement is set upon entities and DB.**

Generally speaking, this step can be skipped when BiH is concerned, given the fact that many groups and classes of activities are completely inactive, the population of interest covers all the activities for which some production was detected in the base year (2005), but the mechanism mentioned in point 3 is included in IT application in order to be used in the future.

Panel of enterprises (statistical units) for calculating of IPI is of longitudinal type; it is selected for the base year and should be kept in use up to the new base year. Panel should be constructed in such a way to respect requirements on regional representativeness i.e. to comprise at each class level at least the lowest number of enterprises (the largest enterprises) ensuring the required coverage.

In practice, all classes being active in the base year i.e. statistical classes comprising units that manufactured at least a single PRODCOM product are included in the panel.

Also, it is possible to avoid including into the panel some specific groups and classes if they are judged as of minor importance for the future economic developments in BiH.

A.2.2.3.2 Criteria related to products

In practice, for the purpose of panel construction, the most representative products in each class are selected using data collected through annual survey on industry in the base year, in the following way:

1. All the products produced in the Sections C and E are treated as representative products, as they are sparse in BiH.
2. As to the Section D (manufacturing industry) all products of one class (data collected by annual PRODCOM survey in the base year (2005)) should be ranked by their share in the total production value for the given class and only those products ensuring the total coverage of the production value by $\geq 80\%$ should be treated as representative ones. For this purpose, a derived variable is used and calculated at the basis of data provided by annual PRODCOM survey:

$$VP = \text{"Value of Production"} = \text{"Production achieved"} * \text{Average unit value in KM}$$

When a class comprises 3 or less products, then each of them is treated as representative one. The products forecasted in the base year to have a significant market influence in the following years, according to expert judgement, can also be included in the selection of representative products.

A requirement concerning the first selection of representative products in the base year could be mathematically expressed in the following way:

$$j \equiv \left\{ \sum_{p \in A_4} VP_p^0 \geq 0,8 \sum_{p \in a_4} VP_p^0 \right\}$$

where:

- a_4 - is a group of all activities at the level of a class
- 0 - the base year
- A_4 - sub-group of all selected activities at the level of class
- p - individual product from NIP BiH (PRODCOM list)
- j - individual representative products from any class $a_4 \in A_4$
- J_4 - group of all representative products j selected from all classes $a_4 \in A_4$
- P_{t_0} - group of all products produced in the base year 0 (collected by PRODCOM survey and used as a sample frame for the first selection of representative products)

VP_p^0 - value of production of each product p in the base year

$\sum_{p \in a_4} VP_p^0$ - total value of production of the class a_4 in the base year

Value of production by individual product is obtained by micro data aggregation over all observation units. The aggregation covers only finished products and services of own production type and contract based production type, defined by their own PRODCOM code. Average unit value of each PRODCOM product has to be compiled or estimated at the basis of data on market value of finished product, not at the basis of data on fee paid by contractor for industrial contract production if “outsourcing” takes place. Given the products that are produced during the base year only on the contractual basis, an expert estimation of their total production value (as if they were own products) has to be prepared.

For each concrete individual class i ($i = 1$ to 173 in Section D) a group of representative products will be made:

$$J_{4i} \equiv \{j_i \in a_{4i}\}, \quad \forall a_{4i} \in A_4$$

where:

j_i - is a representative product from the class “ i ”

a_{4i} - is a class of activity “ i ”

A_4 - subset of the set of all selected activities at the level of class

J_{4i} - set of all representative products j_i from the class “ i ”

what makes, together with all products from sections C and E, a set of representative micro products in the base year.

$$P^0 \equiv \{j\}$$

A set (list) of representative products in the base year is the starting point for the selection of panel of statistical reporting and observation units (population of interest) for monthly surveys on industry and for grouping all products into the wider groups – macro products. Macro products are initial building blocks in the compilation process of industrial production index (A.2.2.4 MACRO PRODUCTS).

A.2.2.3.3 Final selection of the panel of statistical units

The selection of statistical units panel (enterprises and business parts thereof) for monthly survey on industry (units collecting data to be used in the industrial production index compilation) will be made for the base year and afterwards the panel could be slightly updated only if absolutely necessary at the beginning of each calendar year (y) using data on representative products in previous years (cumulative monthly data from the year ($y-1$) and annual data from the year ($y-2$)). The same criterion (2), as in the initial panel selection, should be used but representativeness has to be checked based on available production data from the previous years, not from the base year. Based on the results obtained from such analysis an updated list of representative product

should be created. All modifications, adding or deleting from the list of representative products have to be very carefully/precisely recorded and stored.

Initial panel of the base year should comprise all statistical units producing representative micro products (PRODCOM products). In order to reduce the burden of reporting units the following approach could be used: for each representative micro product a ranking list of units producing such a product (from any activity class) could be made following their share in the total production value of such product and include in the panel of the statistical units (population of interest) those units which together guarantee coverage $\geq 80\%$ of the total production value of the product. In order to reduce a burden on the reporting units, the questionnaires may be sent only to units selected in such a way, but it depends on the special requests of the entity statistical offices and Brcko District.

At the end, nonce again checking whether the basic requirement (3), of the EU STS regulation, related to the representativeness of the panel units at the level of the class ($h = 4$) and the level of the group ($h = 3$), is met for the selected enterprises such to ensure 90% coverage of total value added for Section D in the base year (t_0):

$$A_h \equiv \{a_h\} \text{ so that } \sum_{a_h \in A_h} VA_{a_h, t_0} \geq 0,9 * VA_D^t$$

where:

A_h - is a group of selected activities at the level of class and the level of group ($h = 4, h=3$)

If the requirement is not met, the panel will additionally include the lower ranked units.

NOTE:

Data submitted to BHAS by entity statistical institutes and DB should comply with requirements on coverage as defined in A.2.2.3 for the entities and DB level.

A.2.2.3.4 Management of the panel of statistical units

Panel of statistical units for monthly survey on industry is subject of some slight updates, usually at the beginning of each calendar year (y) before sending the questionnaire. Updates are based on available data on representative products and data on demographic events related to the statistical units surveyed in the previous years (cumulative monthly data for the year ($y-1$) and annual data for the year ($y-2$)).

Units that stopped their production are excluded from the panel, the criterion on coverage in accordance with STS Regulation is checked and, if necessary, some additional units are included in the panel such to replace inactive, excluded units. Additionally, included units should be comparable with excluded ones regarding the size and production activity.

Only in situations when, in the period between two base years, a new enterprise starts operation, having very significant industrial production or when some of existing units, not included in the panel, change production from the weak one to the intensive and stable one, such units should be additionally included in the panel.

The same criterion on products (2), as it was applied in initial selection of the panel, should be applied when analyzing possible additional units for panel update, but representativeness of products should be checked using data from previous year, not data from the base year. Such

analysis results in updated panel and updated list of representative products. Precise records on all changes, inclusions and exclusions of units from the panel should be continuously kept. Updated list of representative products is also being kept as a basis for the selection of new panel for the new base year.

A.2.2.4 Macro products

There are two reasons for introducing the macro products in the indices calculation system:

1. **to simplify the indices calculation process**, i.e. to rationally limit the number of elementary indices that will with further steps be aggregated into indices of all levels of aggregation, starting with class indices, over branch indices, area, subsection, section, MIGs to the indices of complete industry. The use of a separate elementary index for each product (what is a current practice of entities and DB) can be useful in following up the behaviour of production changes very precisely and at very disaggregated level, while avoiding the risk to sum up quantities expressed in different measuring units, or to sum up completely different products in terms of weight, quality, purpose, etc. On the other hand, management of too many elementary indices is very troublesome, because each month new products could appear and some old could disappear, while further serious problems arise due to the lack of weights for new products and lack of average volume data for the base year;
2. **to ensure regular and simple corrections of indices in the case of appearance of new products and disappearance of old products** where the weighing system already exists for the macro products and stay unchangeable (used for the aggregation of indices at all levels).

In small countries like Bosnia and Herzegovina, the industrial production is reflected not only through dynamic changes in volume and production assortment but, also through considerable changes in production and market conditions. According to internationally adopted conventions, the correction of this kind of changes is done via complete changing of weighting system which is conducted every five years based on annual survey on production B.4.3 BASE YEARS AND BASE YEAR CHANGES.

The appearance of new and disappearance of old products is a process that is usually gradual in stable economies and fairly rapid (in leaps) in unstable developing economies. This kind of changes is much easier to monitor than the changes in the production structure. Data on changes in the structure of production are collected through annual industry survey and in the most favourable situations, the first results become available not earlier than eight months after the end of the observation year and could be potentially used for corrections of the weights only twelve months after the end of the reference year.

This is the reason why in the process of compilation of industrial production volume indices only those corrections related to the appearance of new and disappearance of old products should be introduced on the regular i.e. monthly basis using group indicators for macro products, while the entire weights system will stay unchanged and be corrected every 5 years.

Introduction of corrections related to the appearance of new and disappearance of old products could be automatic by grouping the products in the so called macro product groups.

Macro products are initial building blocks in compiling volume index of industrial production at the activity class level. At the level of macro products, the elementary indices are calculated using input monthly micro data and related data from the base year. The indices of macro products are aggregated into the indices of classes using unique weighting system (See B.4.4 stages in compilation of volume index of industrial production). The macro products indices or indices at the level of class activity are further simply aggregated into any upper level of aggregation.

Another important and useful advantage of the grouping of individual PRODCOM products into the macro products is the stability of the index compilation process and reduction of its sensitivity to the constant changes of codes or measuring units (PRODCOM list changes on the annual bases). When the macro product list (basket) is used then the short term industrial indicators are not directly linked to the PRODCOM products and the changes in PRODCOM list (nomenclature of industrial products) are not relevant.

Grouping of the individual PRODCOM products into the macro products will also help the protection of confidential data (at present not dealt within publications).

A.2.2.4.1 List of micro products (basket) in BiH

The list of the macro products has to be harmonized and used as a common standard for grouping the products and IPI calculations at all levels of the aggregation in BHAS, FIS, RSIS and DB.

The first grouping of PRODCOM products into a set of macro products was done following the idea that all products of NIP BiH should be included in its own macro product. All the changes in the list of products (appearance of new and disappearance of some products produced in the base year) are automatically included into calculation of indicators of the related macro product.

The main criteria for the initial grouping and creation of macro products are:

- Within each class of activity the representative products are identified and used as a basis for grouping. The idea is to establish one or more groups of NIP products (PRODCOM) within the class of activity of KD BiH (NACE Rev. 1.1) as a link between these two classifications.
- The grouping of PRODCOM products, by concentrating them around representative products or grouping together a number of representative products should take into account the relations of complementarities and interchangeability within the group (relevant analyses should be based on some criteria for correlation measurements). Products that are highly correlated, positively (complementary) or negatively (replaceable) could be grouped together. Resulting group of products should primarily have a sound meaning from the economic point of view (i.e. considering production processes and open markets).
- each group of PRODCOM products within one class should be wide enough such to ensure system of weights (established in the base year for the existing products) applicable to possible new product appearing in the next 5 years.
- The coverage by classes should be comparable between the Entities and the agreement on use of a single basket should be reached between all the statistical institutes in Bosnia and Herzegovina. Basket should be coherent ensuring that product is well measured at the country level and each Entity level (if a product group is relevant in one Entity it has to be considered also in the other one).

Within each macro product, representative products that meet the condition A.2.2.3.2 CRITERIA RELATED TO PRODUCTS will be constantly defined and monitored. Within the five-year period of using the first weighting system, reporting units will provide monthly data on their products, and according to such data, in the phase two of defining the list of macro products (when a renewed system of weights for the new base year would be calculated) a study of demographic changes (appearance of new and disappearance of existing) will be carried out, in order to monitor the changes of the significance for the products within the class (representative) and analyze the efficiency of the first grouping into the macro products. According to this type of analysis and in order to simplify monthly surveys on industry, i.e. to avoid an overburden of the reporting statistical units, a new list of macro products will eventually include only important products and reporting units will be requested to collect and submit reduced scope of data (data on important products).

The system to identify macro products is such to enable easy identification of correlation between the macro products and class into which such macro product is classified. Macro product is identified with 5 digits out of which the first four denote a class and the last one (fifth) denotes the serial number of macro product in the given class.

B. VOLUME INDEX OF INDUSTRIAL PRODUCTION

B.1. ORGANIZATION OF INDEX COMPILATION (INDUSTRIAL PRODUCTION INDEX IPI)

Volume index of industrial production is calculated at the state level (Bosnia and Herzegovina), entity levels (Federation of Bosnia and Herzegovina and Republika Srpska) and at the level of Brcko District. Within the Federation of BiH indices are calculated at the canton level. Indices at the level of BiH, FBiH, RS and BD have to be calculated using the same methodological approach and input data from the annual and monthly surveys on industry. Entity statistical institutes and branch office in Brcko District will perform input data editing and missing data estimation before they are delivered to BHAS.

Indices for the level of FBiH, RS and DB are calculated by the Institute of Statistics of FBiH (FIS), the RS Institute of Statistics (RSIS) and the BHAS Branch Office - Brcko District (BDO) following this Methodological Manual and at the basis of fixed panel of statistical units.

The specific panels of statistical units for monthly survey are mutually defined in line with A.2.2.3. As far as the panel updating is concerned the criteria following A.2.2.3.4 will be applied. In the harmonization of panels for the base (2005) year and its regular annual updating, the micro data at the level of statistical units collected in the FBiH, RS and DB will be used. Only harmonized panels of entity statistical offices and DB office create the panel for the level of BiH (as explained in B.2.1). In case that FIS, RSIS and/or DB need a wider panel for their own purposes they will provide only the data needed for the State, as per in specific panel constructed and agreed for country level.

In the compilation of the volume index of industrial production at the state level BHAS will apply two approaches available for:

1. Direct indices calculation at the state level, using micro data collected at the level of statistical unit and based on agreed panels in the Federation of Bosnia and Herzegovina, Republika Srpska and Brcko District,
2. Calculating indices at the state level by aggregating the elementary indices that, for the level of the group of products (macro products), are calculated by FIS, RSIS, BDO, based on agreed panels of statistical units. In order to use this approach the entity institutes and DB should provide BHAS with the monthly survey panel, elementary indices for the level of macro product and data on value added at the level of macro product.

Indices for the level of FBiH, RS and DB will be calculated by the Institute of Statistics of Federation of BiH (FIS), the RS Institute of Statistics (RSIS) and the BiH Agency for Statistics - Branch Office in Brcko, in accordance with agreed panel of statistical units.

The BiH Agency for Statistics intends to use the approach 1 for verification purpose.

The BiH Agency for Statistics, in line with the recommendations emerged from the co-operation with the international experts participating to the twinning project intends to start using the second approach as standard compilation method. At every turn, the first method shall be maintained as a supplementary approach enabling the Agency in verifying the correctness of the current compilation process, primarily to check how the coverage requirements (annual survey population and monthly panel) are respected and what is the quality of input data.

The BiH Agency for Statistics will design IT application for IPI calculation according to the adopted joint methodology and will make it available to the above mentioned entity institutes and Branch Office in Brcko.

B.2. DATA

B.2.1 DATA SOURCES

The main input data series used to compile the Industrial Production Index is the “Monthly questionnaire on industrial production” (IND 1) - ANNEX II - MONTHLY SURVEY ON INDUSTRY IND-1

Entity Statistical Institutions and Branch Office in Brcko conduct monthly survey on industry IND 1 (ANNEX II) according to harmonized methodological approach as defined by this document. Base data from this survey is monthly volume of production at the product level. Concepts and definitions that are used in the statistical surveys on industry are specified in the ANNEX VI – STANDARDS AND DEFINITIONS.

For the purpose of monthly statistical survey on industry, each entity and DB shall harmonize, together with the BiH Agency for Statistics, their individual panels and relevant criteria for panel management. The union of harmonized panels of FIS, RSIS and DB, put together, shall create the resulting panel for BiH, to be maintained over time such to reflect demographic changes of statistical units comprising it. Maintenance of the panel for BiH shall perform BHAS on regular basis in coordination with entity institutes and EDB, using their precise information on statistical units.

Entity statistical institutes and DB branch office have established address books to be exclusively used by industrial statistic surveys and they will run them as substitute for the missing statistical business register. Harmonized panel of statistical units for the year 2005 is to be established, in accordance with criteria A.2.2.3 Population of interest – panel of statistical units for monthly survey (the minimum required coverage of target population)), based on data from address books and used for indices compilation. Address books are constructed and updated using data from administrative registers, department of national accounts and industrial statistical surveys.

Entity statistical institutes and DB branch office shall submit to the BiH Agency for Statistics the following information:

- Regular data from monthly surveys on PRODCOM products from each statistical unit (from panel)
- panels of statistical units for monthly survey. The identification of the unit included in current surveys and the follow-up of their demographic changes is necessary in order to verify the degree of coverage in respect to the whole population, as required by STS Regulation (comparison of panel and total population in respect to value added or production value), to enable the construction of harmonized panel, to monitor the degree of non-response and to calculate other quality indicators.
- basic data on total population used for construction of the panel, such to enable monitoring of stability and quality of the coverage.
- quality indicators as per specification in B.2.3.4 QUALITY INDICATORS

It is necessary for the entity statistical institutes and DB branch office to use unique detailed protocol for regular monthly data transmission with clearly specified volume, content and deadlines. There are two deadlines for calculating of monthly index: deadline for preliminary and deadline for revised index.

Micro data submitted to the BiH Agency for Statistics have to be previously checked and of such quality to ensure calculation of consistent indices for BiH, Entities and DB and calculation of quality indicators for BiH.

Basic data from these surveys (direct and derived) are production volume, volume and value of sale at the product level and value added at the activity class level.

Data on annual surveys on industry IND 21 from the previous years and list of representative products from the base year are also used for panel construction and regular updating. Basic data for this purpose are: volume of production, volume and value of sale at the product level and on the observation unit level, number of employees at the observation unit level and value added at the activity class level.

Data on annual survey on industry are also used for comparability with monthly data in order to monitor consistency of results within overall industry statistics system.

B.2.2 DEADLINES FOR DATA COLLECTION AND TRANSMISSION

FIS, RSIS and DB must provide input data for the calculation of the monthly index on a regular basis (derived from monthly survey IND 1) no later than the 15th to 17th of the following month. Based on the data provided, a set of preliminary (the first release) indices shall be compiled and published not later than 25 days after the end of the reference month.

When transmitting preliminary data for the reference month FIS, RSIS and DB must provide also revised data for the month, preceding the reference month. It means that revised data must be sent to BHAS not later than 47 days after the end of the reference month. Based on the revised data a set of revised indices (for the month preceding the reference month) shall be compiled and published not later than 55 days after the end of reference month. Commonly agreed publication strategy is to publish together the first release indices of the reference month and revised indices of preceding month. Prior to publishing of indices for BiH, entities and DB, it is necessary to check the consistency of results and make corrections, if necessary. The close cooperation between BHAS, RSIS and FIS regarding data checking is a prerequisite for validation of revised-final figures to be published.

FIS, RSIS and DB must provide input data for checking and harmonization of the coverage of respondent unit (data from annual survey IND 21), primarily data related to calculation of value added and value of production, no later than 1. September of the following year, and after separation of PRODCOM and SBS annual surveys, before 1 June of the following year (according to annual plans and deadlines stipulated by Eurostat).

B.2.3 DATA QUALITY ASSURANCE

All statistical surveys are affected by different problems and errors that could be roughly grouped in two categories: response and non-response errors. Non-response errors occur when the survey fails to get a response to one, or eventually, to all questions. Response errors occur when reporting unit gives incorrect data (wrong code, wrong measuring unit, extreme value ...). To solve these problems of missing, invalid or inconsistent responses, **editing and imputation** have become an integral part of all data processing operations related to establishment/enterprise surveys.

Editing is the systematic examination of data collected from respondents for the purpose of identifying and eventually modifying the inadmissible, inconsistent and highly questionable or improbable values, according to predetermined rules. It is an essential process for assuring quality of data collected.

Micro editing (also called input editing) focuses on the individual record of questionnaire, as opposed to **macro editing** where checks are performed on aggregated and derived data. Micro editing is the task of entity statistical institutes and DB. Macro editing is performed by all institutions of statistical system in BiH.

The following edit checks are very useful for detecting data errors:

(i) checks on degree of **non-response and formal errors** checks (input editing checks) - are *routine* checks used to test whether all questions which should have been answered in fact do have been answered, and if so, whether answered in a proper form;

(ii) **Outlier** checks (input and output editing checks) – are **Valid value checks and Rational checks (logic controls)**, used to test whether answers are permissible and consistent or not.

In **Valid value checks** the response to a particular data item in the questionnaire is checked against a valid value range specified for the purpose. Any observation lying outside the valid value range may be an ‘outlier’. In an industrial survey, the valid value range is often very wide because of the varying size and characteristics of the statistical units.

In **Rational checks (logic controls)** a set of statistical analysis of respondent data is performed (checks of a ratio between two variables, which should be within specified limits, another arithmetic checks, for instance specifying that a sum of variables should be equal to a specific variable and similar).

Imputation is a method of estimating (predicting) missing data, while using available and suitable data from recent or far past periods, collected from the same or similar statistical units. Imputations are mainly carried out in automatic mode in accordance with predefined rules. Entity statistical institutes and DB are tasked with imputation.

B.2.3.1 Input data (Micro data)

Data provided by the entities and DB should have the same quality, i.e. should pass the same quality tests. The common set of detailed checking rules that input data have to undergo is listed in ANNEX IV - DATA EDITING AND DATA CONTROL .

B.2.3.1.1 Editing of input data

There are few different groups of checks and subsequent activities, aimed at reducing problems of incorrect or missing data and ensuring quality of output results:

1. **automatic check** of consistency, detecting missing data on the base of logic control and identifying extreme values (outliers) on the base of threshold values determined for related controlling variables. These checks are done in automatic mode when entering data. In such cases, an operator accepts offered solution, performs corrections by himself or accepts incorrect data with obligatory accompanying explanation. This is done for all panel units, except for influential units. All cases from ANNEX IV - DATA EDITING AND DATA CONTROL belong to this group.
2. **correction and/or repeated collection** of missing data **for special group of statistical units from the panel**, and these are all reporting units (**influential units**) whose data dominantly affect industrial production index. In case of missing data or inadmissible data values, it is necessary to contact each **influential** unit and collect real data directly from them for preliminary index as well. The cases from 6 to 18 ANNEX IV - DATA EDITING AND DATA CONTROL
3. **additional analysis of situation or analysis of extreme values** determined in cases 3 and 13 to 19 from ANNEX IV - DATA EDITING AND DATA CONTROL

NOTE:

Some statistical unit have specific features implying that the inclusion of information related to them (or symmetrically the exclusion due to non-response) has dominant impact upon the final result. Data concerning such units are usually called “*influential observations*”. Efforts and attention paid to the editing process should primarily focus on these data (and the underlying data collection process). It should be pointed out that large enterprises, as a rule, are the source of influential observations and that is the reason why data from large enterprises must be checked directly and thoroughly.

Entity institutes and DB must have their own list of significant enterprises and focus on their possible data errors.

B.2.3.1.2 Imputation of missing input data

As for compensation of **non-response** the general rule is:

- for recognized large firms (main i.e. influential industrial business), they should be re-contacted and real data should be collected;
- for all other small and medium enterprises and their local units (SMEs), the use of imputation techniques is recommended.

For BiH the method of automatic predicting (estimation) the missing data for all business units proposing the method of automatic predicting (estimation) the missing data for all business units that were not included in the group of main (influential) industrial businesses has been accepted. Available historical data on the same variables from the same and other enterprises should be used to estimate missing value. Generally, Predictor 1 (EUROSTAT recommendation) would be used and Predictor 2 for the seasonally sensitive data:

Predictor 1:

$$\hat{Y}_{mi} = Y_{(m-1)i} * \frac{\bar{Y}_{mR}}{\bar{Y}_{(m-1)R}}$$

where:

i is a responding unit not submitting data

R is a group of units (enterprises) that had provided data

\hat{Y}_{mi} is estimation of the missing value of the observed variable for the current month

$Y_{(m-1)i}$ actual data value from the previous month

$\frac{\bar{Y}_{mR}}{\bar{Y}_{(m-1)R}}$ is a rate of change of average data value for observed variable compared to the previous month

Predictor 2:

$$\hat{Y}_{mi} = Y_{(m-12)i} * \left(\frac{\bar{Y}_{mR}}{\bar{Y}_{(m-12)R}} \right)$$

where:

i is a responding unit not submitting data

R is a group of units (enterprises) that provided data

\hat{Y}_{mi}	is estimated missing data value of observed variable for the current month
$Y_{(m-12)i}$	is actual data value from the same month of the previous year
$\frac{\bar{Y}_{mR}}{\bar{Y}_{(m-12)R}}$	is rate of change of the average data value for observed variable compared to the same month of the previous year

For estimated data values (imputed values) a specific flag should be attached and also the methods and sources of imputation should be identified.

B.2.3.1.3 Establishing input data register

Data from monthly surveys (from two entities and Brcko District), which passed all the control procedures, estimations and confidentiality tests, should be stored in the final observation registers to be used for calculation of indices. For storing input data into the base, an appropriate variable to mark data quality (flag) is used to indicate if data is correct, corrected (instead of incorrect), imputed (instead of missing) or incorrect (with accompanying explanation). Incorrect data, which are not corrected, are refused and treated in the same way as missing data i.e. automatic imputation is performed for them. Flag variable in the record of input data ensures compilation of the requested quality indicators. Two sets of final data for the purpose of monthly IPI compilation are the result of general approach to revision policy of the results to be published:

- data for **preliminary indices** constructed using flash estimations and omitting some missing or potentially erroneous data and
- data for **revised** indices when all data are collected or when final estimations of higher quality are made

B.2.3.2 Revision of micro data

Data derived from annual and monthly survey on industry provided to BHAS have to be identical to data used by the FIS, RSIS and BDO within the process of compilation of their own indices. All the necessary revisions of data already provided to BHAS could be made only in the upcoming period of calculation of the indices. Revised data are to be provided to BHAS within given deadlines for the purpose of upcoming calculation (B.2.2 DEADLINES FOR DATA COLLECTION AND TRANSMISSION). After expiration of any set of deadlines (deadline for compiling data for calculating preliminary index or deadline for calculating revised index), no further modifications of data are allowed, the registers of micro data must be fixed and stored in the proper way).

Annual revision of input data derived from monthly survey related to industry is to be carried out by entity statistical institutes and Brcko District Branch Office. Final data are to be provided to BHAS in order to assure additional, so called, annual revision of already published indices.

B.2.3.3 Aggregated and processed data (Macro data)

Input data for the level of BiH are obtained by aggregation of entity and Brcko District input data.

First level of aggregation means aggregated data for each PRODCOM product or macro product (aggregating data from all units of statistical panels). This aggregation is performed by entity statistical institutes, branch office Brcko and the BiH Agency for Statistics.

Further processing of such aggregated input data is performed through different phases of index compilation, and results in a set of different aggregated data (macro data), different intermediate results and indices at the different levels of aggregation (according to Classification of Activities). In accordance with joint methodology of index compilation, these phases are identical in all statistical institutions, and index for BiH is compiled in two ways: basic and control approach (B.1 organization of index compilation (Industrial production index IPI))

BHAS, FIS, RSIS and BDO are carrying out the basic logic controls on aggregated data; compare them with the same data of the previous months and the previous years, while BHAS also confronts data from two entities and BD. Data comparison and data confrontation is done at the aggregated level (PRODCOM products and macro products), at the level of derived intermediate results (volume of production relatives i.e. macro product relatives, macro product changes in production value and changes in production assortment) and at the level of compiled indices (from the elementary index of macro products up to the level of overall indices for each entity, BD and BiH). The basic controls of macro data are similar to those that are performed on micro data and these controls are performed by monthly dynamic. The list of main controls is given in ANNEX IV - DATA EDITING AND DATA CONTROL.

Derived results (cumulative, annual value of production and average annual indices) confront with data from annual surveys.

Editing of macro data is a complex task and demands detailed expert analyses throughout a longer period of time, with the purpose of identifying the rules of index behavior, and thus economic effects of the changes in industrial production with possible prediction of future development. For this purpose, it is necessary to construct time series of original indices, prepare their analysis and split them into the components: trend cycle, seasonal component and irregular component, which ensure simple detection of extreme anomalies, but also of some characteristics, which repeat regularly and have an economic explanation.

Analyses and resulting conclusions have sense only in case of ensuring a stable panel of representative units so that the monitoring and controlling panel coverage is one of the important tasks of macro editing.

The IPI production team in BHAS (as well as in FIS, RSIS and DB) should introduce regular monthly Quality Assurance Procedures. The purpose of this is to understand and explain movements in the data, to allow quality adjustments on missing and erroneous data and to check that the computer system has been calculating correctly the indices published.

The main step in quality assurance procedure is the analysis of IPI behaviour through the time. All of the available time series of monthly indices at all levels of aggregation up to and including the IPI for the total industry, together with tables of input data and revisions to data that are inputs to the system should be examined to identify anomalies.

Resulting output tables and graphs showing index numbers and rate of changes and trends, help to identify unusual behaviour.

Information that is available at request from other data suppliers should also be used for confronting with the IPI results. External consistency checks i.e. confrontation of data from different surveys (PRODCOM, SBS, NA, OPI ...), first at the aggregated level and where necessary at the micro level, may help to reveal discrepancies or inconsistency between them and so to identify possible errors. For such an exercise it is a prerequisite that all surveys should be

carried out within a conceptually consistent framework for all business statistics, using standardized variables and classifications, see ANNEX VI – Standards and definitions.

Sometimes information on some variables of interest may be also available from other sources (outside of statistical system) which should be used for validation of data obtained from industrial surveys.

B.2.3.4 Quality indicators

Quality indicators are standard indicators used for quality assessment of statistical process and output results obtained in such a process. Basically, quality indicators must fulfill the following criteria:

- quality assurance in accordance with EUROSTAT definitions [Eurostat 2003a],
- based on calculation method, precisely defined
- provide simple information for interpretation and analysis

In order to estimate quality of the index of industrial production volume in BiH, the indicators, which are simple to calculate and which primarily provide information on availability of data required for index calculation, are used.

Strange values of an indicator must be further investigated to detect real problem in the process of statistical results production.

Quality indicators have to be calculated by FIS; RSIS and BDO, and at the basis of the same input data, the quality indicators for the BiH level will be prepared by BHAS. The following standard quality indicators are selected (from the complete set of indicators determined by Eurostat):

B.2.3.4.1 Simple and Weighted Response Rate

According to definition [Eurostat 2003b] “non response” is the failure of a survey to collect data on all survey variables, from all the population units designated for data collection. The difference between the statistics computed from the collected data and those that would be computed if there were no missing values is the non response error.

In BiH, considering the characteristics of monthly industry surveys, the rate of non-response can be simply calculated as non-response of statistical units (since the questionnaire is sent to all statistical units from the panel, and they themselves enter codes of their products, it is difficult to determine the number of requested data for 1 product).

Simple Response Rate is “ratio”, expressed in percentage, of the number of the units which provided data on all variables or the main selected variable (produced quantity) to the number of eligible units in the statistical panel”; it is calculated in the following way:

$$SRR_u = \left(\frac{n_R}{n} \right) * 100\%$$

where:

- n_R is a number of statistical units which provided requested data
- n a number of statistical units in the panel

This indicator will be compiled monthly for each activity class.

Weighted Response Rate

For calculating this indicator a special and relevant variable for which the total data were collected from the previous period (base or previous year) is used and served as a substitute for a number of data collected, and at the same time reflected the importance i.e. part of statistical data in the total result. A variable: production value of each macro product is used for this purpose in BiH.

This indicator shows how the process of data collecting is effective and representative for the selected panel of statistical units.

$$WRR_{MP} = \left(\frac{\sum_{i=1}^{n_{RMP}} X_{Ri}^t}{\sum_{i=1}^{n_{MP}} X_i^t} \right) * 100\%$$

where for a given month m:

n_{RMP} is a number of data collected for a given macro product

n_{MP} total number of data for a given macro product in the base year

X_{Ri}^t data on production value collected for a given macro product at time t

X_i^t all data on production value for a given macro product at time t

time t can precede the reference month m (in this case all the values X are available, even for non-respondants) or t can be equal to the month m itself (if estimations for X over non-respondants are available in order to be used at the denominator of WRR formula)

In the first period of introducing quality indicator, this indicator will be calculated each month for each macro product. This indicator may be calculated also for the upper level of aggregation for the activities (class level, branch, and so on until the level of the whole industry).

B.2.3.4.2 Editing Rate

This indicator shows the share (percentage) of corrected data in the total number of data collected.

$$ER = \frac{n_{RE}}{n_R} * 100\%$$

where:

n_R is a number of data collected

n_{RE} is a number of corrected data

In the first period of introducing quality indicator, this indicator will be calculated each month for each macro product. Number of the corrected data could be calculated using appropriate flag associated to input micro data.

B.2.3.4.3 Estimation Precision Rate

This indicator shows the precision of estimates (imputations) introduced for missing data.

$$PR_{\hat{Y}} = \sum_{i=1}^{n-n_R} \left| \frac{\hat{Y}_{ti} - Y_{ti}}{Y_{ti}} \right| * \left(\frac{1}{(n-n_R)} \right) * 100\%$$

where:

n_R is a number of data collected
 n a total number of data
 \hat{Y}_{ti} estimated data value
 Y_{ti} real data value.

This indicator could be compiled posterior, when missing data become available i.e. the revised data of previous month could be used for indicator of current month.

Strange values for any indicator should result in further investigations of the real problems in statistical production processes.

For monitoring purposes of the statistical processes and output data quality over time, it is recommended to compile the indicators annually, but in the initial period after introducing quality indicators, for most of indicators it makes sense to calculate them more frequently (i.e. monthly or quarterly).

B.3. CONSISTENCY IN INDEX COMPILATION

Conditions ensuring consistent compilation of industrial production volume indices are as follow:

B.3.1 PRODUCTS AND SERVICES INCLUDED IN INDEX COMPILATION

Within the process of calculating the index of industrial production volume only finished products and services from own production will be monitored and according to the production based of contract that has its PRODCOM code.

In the process of calculating the volume indices of industrial production an average unit value of each product has to be used regardless the type of production (own production or contracted production). The average unit value for each PRODCOM product in the base year is calculated for the level of BiH and the same value should be used in compilation of industrial production indices in entities and BD. Accordingly, the direct collection of data or proper expert estimation of unit value for each PRODCOM product in the base year is necessary, in accordance with available information on market value of the relevant product or service.

Entity institutes and BDO are obliged to submit all data necessary for calculation of the common unit value for each PRODCOM product from all reporting units in the base year, based on their market value, regardless the type of production (own production or contracted production). Entity institutes and BDO are obliged to submit their estimates of unit values for those products for which data were collected on the production, not data on sales (there were no sales) in the base year.

B.3.2 DERIVED VARIABLES NECESSARY FOR INDEX COMPILATION

The value of production and the value added are used as the basic derived variables in the calculation process of volume indices of industrial production. Intermediate consumption and the output are the basic components for the calculation of the value added.

Value added at the activity class level is used to calculate the system of weights.

In addition to the value added another important derived variable is also used for the calculation of weights system at the lowest level of index aggregation (from the level of product to the level of macro product) – value of production.

The definition of the variables that are used to calculate the volume indices of industrial production are specified and described in details by the EU regulations (SBS Regulations No. 2700/98 and 1670/2003)

B.3.2.1 Calculation of value added at the activity class level

Data on value added by activity level of KD BiH are used in order to calculate weights system and to reflect the structure of production. Ideally, data on value added related to homogenous activities at the level of class should be used. Annual survey on industry (Table 2, IND 21) in the base year collects data from each observation unit included in the panel by any particular activity (main and secondary activity) at the class level and are used for to create the weights system.

Calculation of value added is based on data available and collected through the relevant statistical surveys (Table 2 IND 21) and the following derived variables should be calculated initially: Turnover, Output and Intermediate Consumption.

TURNOVER

Turnover represents total invoiced sale value of goods and services provided or delivered by statistical unit to the third parties during the observation period. Turnover is expressed in producer prices, or market prices.

TURNOVER_{at producers price} = Total market value of self-produced goods and services sold during reference month + Market value of goods and services sold during reference month in the same condition as purchased (resale)

Producer price is the ex-factory value received by a producer for a unit of product or service that does not include expenses related to transport to be paid by purchasers and invoiced separately. This price should include all taxes and duties on products and services except deductible VAT that is directly invoiced to the buyer.

Basic price is the amount received by producer for unit of product or services, excluding taxes on products, but including subsidies on products.

Producer price differs from the basic price for net taxes on products and subsidies on products.

So it follows:

TURNOVER_{at basic price} = Total market value of self-produced goods and services sold during reference month + Market value of goods and services sold during reference month in the same condition as purchased – total net taxes (sum of taxes on products and customs fees and duties) + subsidies and donations related to products

OUTPUT

Output is a result of the production activity of an enterprise or observation unit covering all deliverable products and services to other units.

Products and services generated as a result of production process of some enterprise (in particular, in case of some side activities) still used within the same enterprise but for other production process are not included in the calculation of an output (not considered output).

Output at producer prices =

1. **Market value of sold self-produced goods and services**
+
2. **Value of changes in stocks of finished products and production in progress (at the end and beginning of observation period)**
+
3. **Gain or trade margin from resale of goods**
+
4. **Value of market goods used for various purposes, for example in kind payments, barter etc.**
+
5. **Other operating income such as revenues from transport services, rent of buildings etc.**
+
6. **Capitalized production that includes the own-account production of all goods that are retained by their producers as investment**

OUTPUT at basic prices = **OUTPUT** at producer prices – taxes on products + subsidies and donations related/affiliated to products

INTERMEDIATE CONSUMPTION (IC)

Intermediate consumption represents the **value of all goods and services used as input to production and consumed in process of production, excluding consumption of fixed assets** (buildings, machinery, equipment, land). Goods and services could be transformed or completely used in the production process, meaning raw materials and other consumables as well as wide variety of services used by producers in the production process

Value of intermediate goods and services is expressed at purchase prices or prices paid by the purchaser (**excluding deductible VAT**) for similar goods and services at the time of entering into production process.

Purchase price = producer prices + transport costs + trade margin

Intermediate consumption is calculated in the following way:

IC = Value of purchased raw materials, energy, consumables and services i.e. inputs to production – value of changes in stocks for such inputs + other intermediate consumption

VALUE ADDED

Value added is the difference between the value of output and intermediate consumption. It can be measured on gross or net basis or prior to deduction of consumption of fixed capital (depreciation).

Gross value added (GVA) is a measure of contribution that every single producer or specific activity level provides to gross domestic product.

Depending on the prices used for the valuation of the main elements of production (output and intermediate consumption), GVA could also be expressed and calculated by using 3 methods:

- a) **GVA at basic prices:** difference of output at basic prices and intermediate consumption at purchase prices

- b) **GVA at producer prices:** difference of output at producer prices and intermediate consumption at purchase prices
- c) **GVA at factor cost:** GVA at basic prices less other taxes and subsidies on production

In the compilation process of industrial production indices in BiH the main variable to create system of weights is the gross value added at factor costs, which could be calculated using survey data as follows (for the enterprise in total):

$$\text{GVA}_{\text{at factor cost}} = \text{Output}_{\text{at producer price}} - \text{taxes on products} + \text{subsidies and donations related/affiliated to products} - \text{IC}_{\text{in purchase price}} - \text{subsidies and donations related/affiliated to production}$$

By survey results:

$$\text{GVA}_{\text{at factor costs}} = \text{Revenue from sales of self-produced goods and services} + \text{Value of changes in stocks of finished products and production in progress} + \text{Income from resales} + \text{Value of changes in stocks of goods for resale} - \text{Value of goods purchased for resale} + \text{Value of market goods used for various purposes such as in kind payments, barter etc.} + \text{Other operating income} + \text{Capitalized production} - \text{Taxes on products} - \text{Customs fees and duties} + \text{Subsidies and donations related to products} - \text{Value of purchased raw materials, energy, consumables and services i.e. input to production} + \text{Value of changes in stocks for input} - \text{Other intermediate consumption} - \text{Taxes and subsidies related to production}$$

However, the two different situations should be distinguished:

1. **GVA for each specific activity of the enterprise at the class level "i"** (all industrial KAUs, namely main activity and all secondary activities) are calculated using the above mentioned formula but based on data relevant to the specific industrial activity, but excluding data on resale (Income from resale, Value of goods purchased for resale and Value of changes in stocks of goods for resale –).
2. **GVA for overall non-industrial activities at class level** are calculated using cumulative data for all non-industrial activities carried out by the enterprise (not falling under Sections C, D and E) but excluding data on industrial production (Value of changes in stocks for input and Taxes and subsidies related to production)

The key information to define the system of weights for the process of industrial production index compilation is value added for the class level. Value added at any class level is obtained by aggregation (summing up) of value added data on the same activity (at class level) from all the responding units.

Data on value added for the whole enterprise are obtained as a sum of values added of all individual industrial and non-industrial activities (KAUs) and could be used to confront them with the results of NA surveys.

B.3.2.2 Problem of negative value added

The process of calculating value added at the level of enterprise, class or higher levels of activity classification often results in negative VA. Negative values in some enterprises (causing potential negative VA at the class level or higher level of activity) could be explained by

temporary unfavorable market conditions and temporary losses generated by the subject enterprises. In a market economy, such situation would not be sustainable. So, it is reasonable to presume that such enterprises could survive for a certain time and remain the part of stable statistical panel for the monthly survey on industry, only if they have very specific role in the economy of each entity or BD and if their business operations are supported by the government bodies.

As regards IPI compilation, the appearance of negative value added should be treated as temporary phenomenon, resulting from the specific, unfavorable business conditions and therefore, they should be replaced with the adequate positive estimations.

Prior to any replacement of negative value added each entity institute and BDO should perform a thorough and competent analysis of each event in order to eliminate possible errors and fault data.

There are two options commonly agreed as a solution to overcome appearance of a negative VA:

1. **When the production of enterprise is not homogeneous and there is a significant production in number of different classes**, some of which generates a negative value added, **but the overall value added of the enterprise is positive** the solution is as follows:

to follow **the rule of subdividing (allocating) the overall value added of the enterprise to different activities at class level (KAU) according to employment**. This approach allows leaving the total value added unchanged, assuming that production processes, output prices and production costs (labor productivity) are comparable between the activities of the same enterprise. Value added per employee is **deemed to be the best estimate of the share of each activity at class level (KAU) in overall value added of enterprise**, as labor productivity presents a rather stable inter-industry variable.

$$C_{oe} = \frac{VA_{oe}}{EMPLOYEES_{oe}}$$

or

$$VA_{CLASS} = C_{oe} * EMPLOYEES_{DCLASS}$$

where:

oe is an overall enterprise

D_{CLASS} is a activity at class level in section D

2. **For all other cases** – when a **negative value added at enterprise level occurs for a longer period** the solution is as follows::

to replace **negative value added with the corresponding positive value added** determined using data from the relevant “Donor” enterprise. “Donor” enterprise is the similar unit (in terms of size) that operates in the same class but with positive value added. The method is based on hypothesis that the both enterprises are operating in the same or very similar technological and economic circumstances. Data from “Donor” enterprises are used to calculate a **coefficient of transformation (Ctd)** which is the value added per unit of output of the “Donor” enterprises. This coefficient should be applied to output data of the enterprise showing, at the moment of calculation, a

negative VA to estimate the positive value added. Underlying this rule there is the attribution of the average technology for all enterprise in the same class. If no adequate donor enterprise is available at the class level and/or if available donors do not have a sufficient amount of production to allow a robust comparison within each entity, **in this case** all suitable BiH enterprises could be considered and, if it is still not possible to apply the rule, **“Donor” can be taken using EU average data.**

$$C_{td} = \frac{VA_d}{OUTPUT_d}$$

$$VA_e = C_{td} * OUTPUT_e$$

where:

d is a donor enterprise

e is an enterprise with negative value added

Entity institutes and DB should also submit, together with annual survey data for the base year, additional information on statistical units and parts thereof (within the annual survey coverage) that originally gained negative value added, as well as description of the method used for compensation of each negative value added.

Tests should be performed before choosing the preferred methodology having in mind that, whatever the rule selected, this must allow correction of the largest negative value added occurrence.

B.3.2.3 Calculation of value added for the group of products (macro products)

Value added of each products or group of products (macro products) within a single activity class is calculated by distributing (allocation) value added of the class to each product or macro product included in this class, using for this purpose the distribution coefficient. Distribution coefficient represents the share of production value of each component (product or macro product) in the total production value of the class. Value added of each products or group of products could not be compiled directly because data at such detailed level were not collected.

Value added macro product is calculated using the following formula:

$$VA_{MPx} = K_{MPx} * VA_c$$

where:

K_{MPx} is a distribution coefficient calculated as follows:

$$K_{MPx} = \frac{\text{Production value of macro product MPx}}{\text{Production value of the class}}$$

$$K_{MPx} = \frac{\sum_{p \in MPx} Q_p^0 * P_p^0}{\sum_{x \in c} \sum_{p \in MPx} Q_p^0 * P_p^0} = \frac{VP_{MPx}^0}{\sum_{x \in c} VP_{MPx}^0}$$

where:

x	is each macro product that belongs to the class “c”
p	is each product that belongs to macro product “MPx”
0	is a base year (2005)
$\sum_{p \in MPx} Q_p^0 * P_p^0$	is a value of production of macro product “x” (VP_{MPx}) representing the sum of production values of all PRODCOM products “p” comprising the given macro product
$\sum_{x \in c} \sum_{p \in MPx} Q_p^0 * P_p^0$	is a value of production of class “c” (VP_c) j representing the sum of production values of all individual macro products “MPx” comprising the given class

B.4. ELEMENTS OF INDEX COMPILATION

STS Regulations state explicitly that provision of the industrial production indicators in the form of index number is obligatory.

Indices in STS are expressed with reference to a base value and this base value is representative for a base year. For a monthly series, the base value is the monthly average during the base year. By convention, the index value of 100 % is assigned to the base year value.

The volume of industrial production indices as an indicator of changes in the industrial activity gives us a useful tool for understanding current developments in industrial production only if the periods of comparison are fairly short and if quick and regular (monthly) publication of the results is assured. Indices on volume of industrial production could be used for monitoring long-term trends in behavior of production only if the relevant data (representative products and specific character of their production process determining their share in resulting index) used in compilation of the indices are corrected-revised (updated) from time to time. This implies a need for provision of detailed data derived from the annual survey of very extensive coverage for the base year, frequently enough to enable indicators to realistically reflect changes in industrial production and also means that change of the base year should be done with adequate frequency. Data collected in the base year should be comparable with data derived from monthly surveys for reference month and should not be so outdated such to loose relevance in reflecting industrial production behavior.

B.4.1 BASIC CHARACTERISTICS OF THE INDEX

Industrial production volume index is calculated and published in different ways, depending on the following main characteristics (parameters):

- **reference** period of the index,
- **base** period of the index, i.e. the period of comparison
- **weighting system base period** of the index, i.e. base year
- **formula** used for calculation (Laspeyres, Fisher...)

Reference period of the index is 1 calendar month of observation year, i.e. current year for monthly indices of industrial production. In other words, changes in volume of industrial production within one month are monitored.

Base period (comparison period) of the index is the comparison period of the volume of production (period of comparison is commonly a base year or year for which weight system is already calculated, but it could be any previous period – usually the previous year).

Weighting system base period of the index is the base year – the year for which weight system is derived.

Formula is the mathematical model used for index compilation.

Formula, the most frequently used in compilation of industrial production volume index is the standard **Laspeyres** formula:

$$IPI_j^{t,y/0} = \frac{\sum_{i \in j} q_i^{t,y} * P_i^0 - \sum_{k \in j} \delta_k^{t,y} * A_k^0}{\sum_{i \in j} Q_i^0 * P_i^0 - \sum_{i \in j} \Delta_k^{t,y} * A_k^0}$$

where:

$q_i^{t,y}$, Q_i^0 is a quantity of product (i) produced in the month (t) of the year (y) and average monthly quantity of product (i) produced in base year (0)

$\delta_k^{t,y}$, $\Delta_k^{t,y}$ is a quantity of input (k) spent in the month (t) of the year (y) and average monthly quantity of input (k) spent in base year (0) for production of product (i)

P_i^0 is an average monthly unit value of product (i) in base year (0)

A_k^0 is an average monthly unit value of input (k) in base year (0)

i is an output product or service

k is an input (raw materials or services)

j is an activity level

In practice, only modified Laspeyres formula could be used for compilation of industrial production index in BiH at class level. This means that standard Laspeyres formula is modified in such a way to exclude consumption of raw materials, because the data are not available for a level of product or group of products in monthly frequency.

Modified Laspeyres formula for the class index is:

$$IPI_j^{t,y/0} = \frac{\sum_{i \in j} q_i^{t,y} * P_i^0}{\sum_{i \in j} Q_i^0 * P_i^0}$$

and also

$$IPI_j^{t,y/0} = \sum_{i \in j} W_i^0 * \frac{q_i^{t,y}}{Q_i^0} = \sum_{i \in j} W_i^0 * R_i^{t,y}$$

where:

$R_i^{t,y}$ is a quantity relative for product or group of product “i” (ratio between quantities produced in the reference period and in the base period i.e. base year)

W_i^0 is a weighting coefficient (weight) determining the contribution of each product or group of products in the total index

j is a class level

i is a product or group of products level

A Laspeyres industrial production volume **index** is computed by taking the ratio of the total production value of a specified group of output products and services in the reference period to the total production value of that same group at base-period (base year), while the value of production is calculated in constant prices (prices of the base period). Index is calculated from a set ("basket") of fixed quantities of a final list of goods. The basic assumption is availability of data on quantities in two different periods (reference and base period).

The formula used for compilation of industrial production volume index when using data on individual products (i = p) is as follows:

$$W_p^0 = \frac{Q_p^0 * P_p^0}{\sum_{p \in c} Q_p^0 * P_p^0} = \frac{VP_p^0}{\sum_{p \in c} VP_p^0} \quad \text{and} \quad R_p^{t,y} = \frac{q_p^{t,y}}{Q_p^0}$$

The formula used for compilation of industrial production volume index when using data on group of products i.e. macro products (i = MPx) is as follows:

$$W_{MPx}^0 = \frac{\sum_{p \in MPx} Q_p^0 * P_p^0}{\sum_{x \in c} \sum_{p \in MPx} Q_p^0 * P_p^0} = \frac{VP_{MPx}^0}{\sum_{x \in c} VP_{MPx}^0} = K_{MPx}^0 \quad \text{and} \quad R_{MPx}^{t,y} = \frac{\sum_{p \in MPx} q_p^{t,y} * P_p^0}{\sum_{p \in MPx} Q_p^0 * P_p^0}$$

The formula used for compilation of industrial production volume index on regular basis (monthly) in BiH is of the “base-weighted Laspeyres form” in which quantum relatives $R_i^{t,y}$ are weighted with the net production value of output product groups (macro products) in the base year. Laspeyres formula results in weighted arithmetic mean of quantity relatives - better known as Laspeyres quantity index.

Using the formula we measure not merely the change of quantity but the change of **the volume of production in value terms at constant prices**.

Some “proxy” variables \mathbf{XP} (e.g. value of production, inputs as labour, energy..) could be used instead of the physical quantities \mathbf{Q} to estimate the relatives $\mathbf{R}_p^{t,y}$, if the ratio \mathbf{XP}/\mathbf{Q} can be

regarded as stable enough such that the ratio $\frac{\mathbf{x}p_p^{t,y}}{\mathbf{XP}_p^0}$ is a good approximation for the ratio $\frac{q_p^{t,y}}{Q_p^0}$.

B.4.2 BASIC FORMS OF THE INDEX

“**Base-weighted modified Laspeyres**” formula is the basic form used for calculation and presentation of monthly production indices and used also for the construction of time series for continuous monitoring of industrial production behaviour relative to the base year.

Given that this form of index is observing monthly changes in volume of industrial production in each reference period (year) relative to the average monthly production in the base year it is being called “**index to the base year**” i.e. the index to the **fixed weight base period** (“**Base-weighted Laspeyres**” type of index). This type of index is requested by EU (STS Regulation 1165/98).

Given that the base year indices are calculated relative to average value of monthly production in the base year i.e. relative to single fixed and constant value, they also enable us to make calculation of other types of index by plain combination process (rate of change, index of cumulative production value etc.),

Pursuant to convention, value of all indices in the base period or comparison period is defined to 100 %.

A very convenient form for calculation and presentation of monthly volume indices of industrial production is so-called series of **chain indices**, whereas calendar month is defined as a reference period, but reference base period (comparison period) is usually previous year (**a roll-on weight base period – each year is the year of the new weights system**). Representative value of industrial production in a period of comparison remains the average monthly production value but that one produced in the previous year.

$$IPI_j^{t,y/y-1} = \frac{\sum_{i \in j} q_i^{t,y} * P_i^{y-1}}{\sum_{i \in j} Q_i^{y-1} * P_i^{y-1}}$$

Chain indices are especially useful in situations of dynamic changes in industry production and in cases whenever type of products produced by active enterprises is subject to frequent changes. New enterprises appear and old disappear causing significant differences in the type of products available. It comes about products for which weights were originally determined and in a course of indices calculations, relatives of quantities were also calculated. Chain indices require updating of weighting system on regular basis, which in turn requires also regular collection of SBS data. Chaining of indices is a more convenient method for monitoring and making permanent updates through the comparison of relative changes in the quantities for shorter reference base periods. In such situations, chain indices will reflect more precisely the changes in the structure of production. Also, chain indices give us a clear picture of relative changes in volume of industrial production compared to the previous year. This is of essential interest for all users of statistical information. On the other hand, the use of chain indices increases the quantity of data that should be collected and also, increases the work burden related to parallel compilations and updating the results.

For the calculation of industrial production indices in BiH the modified Laspeyres formula was selected, and it considers the use of fixed weighting system from the base year and regular revisions of monitored monthly input data (according to B.2.3.2 REVISION OF MICRO DATA) in terms of volume of production.

B.4.3 BASE YEAR AND BASE YEAR CHANGES

Base year is the year for which the weight system is calculated with a purpose of its use in the several following years. According to internationally adopted standard (STS Regulation), a change in system of weights is to happen every five years. (Base years are: 1995, 2000, 2005, or in other words, calendar years that end with either "0" or "5").

The first system of weights for BiH will be calculated for the year of 2005 as a base year using data from the annual survey IND 21 for 2005 (PRODCOM and SBS data). The new system of weights shall be calculated for the entities and DB in the same way as calculated for BiH. Industrial production monthly indices shall be experimentally compiled for 2006, 2007 and the first months of 2008. According to international recommendations, whenever calculation of new indices based upon new weights system is introduced (new base year), it is necessary to publish indices calculated by using both weights (old/new) for the entire period of overlapping that must cover at least 12 months, allocated before and/or after introduction of new weights (new base year). Within calculation process of indices of monthly production volume in BiH the year 2006 and/or 2007 could be the year of overlapping.

B.4.4 STAGES IN COMPILATION OF VOLUME INDEX OF INDUSTRIAL PRODUCTION

The index of industrial production at country level is to be constructed within the BHAS information system using dedicated application programmes and data base. The BiH Agency for Statistics (BHAS) will design an IT application for IPI calculation according to the requirements of the harmonised and joint methodology and will make it available to the entity institutions and Branch Office in Brcko.

The IPI compilation process comprises several stages i.e. the IPI computer system can be represented by a simple pyramid, as shown in the figure below (Fig. 1).

Starting from the foundations of the pyramid, the structure is built up in layers, with each layer processing less and less data series than the one below it. The stages of processing are known as:

- **Pre-processing** (the 'foundations' of the pyramid)
- **Class level** (processing approximately 175 series in 2005 for BiH)
- **Group level** (just approximately 90 series in 2005 for BiH)
- **Division level** (27 series)
- **MIGs level** (4 series)
- **Subsection level** (16 series)
- **Section level** (3 series)
- **Top level – total BiH industry production index**

The reported numbers of series relate to NACE Rev. 1.1

Monthly data on products represents a real base for compilation of volume indices of industrial production in BiH. Data on products are used for calculation of elementary indices for macro products and for subsequent aggregation of elementary indices to the most detailed level of the **activity** classification i.e. 4-digit level of KD BiH - the level of the class. This is the first step in the process of index compilation.

Indices for the higher levels of activity classification KD BiH are compiled combining indices at the more detailed level using relevant system of weights to produce indices at successively higher and higher levels of the activity classification. One exception to this general practice is the calculation of indices for MIGs (Main Industrial Groupings) that are compiled directly from the 3-digit level of NACE Rev.1.1 – the group level.

In aggregation process when combining indices at the more detailed level into the higher level indices, the relevant system of weights is calculated based on known value added for each activity level.

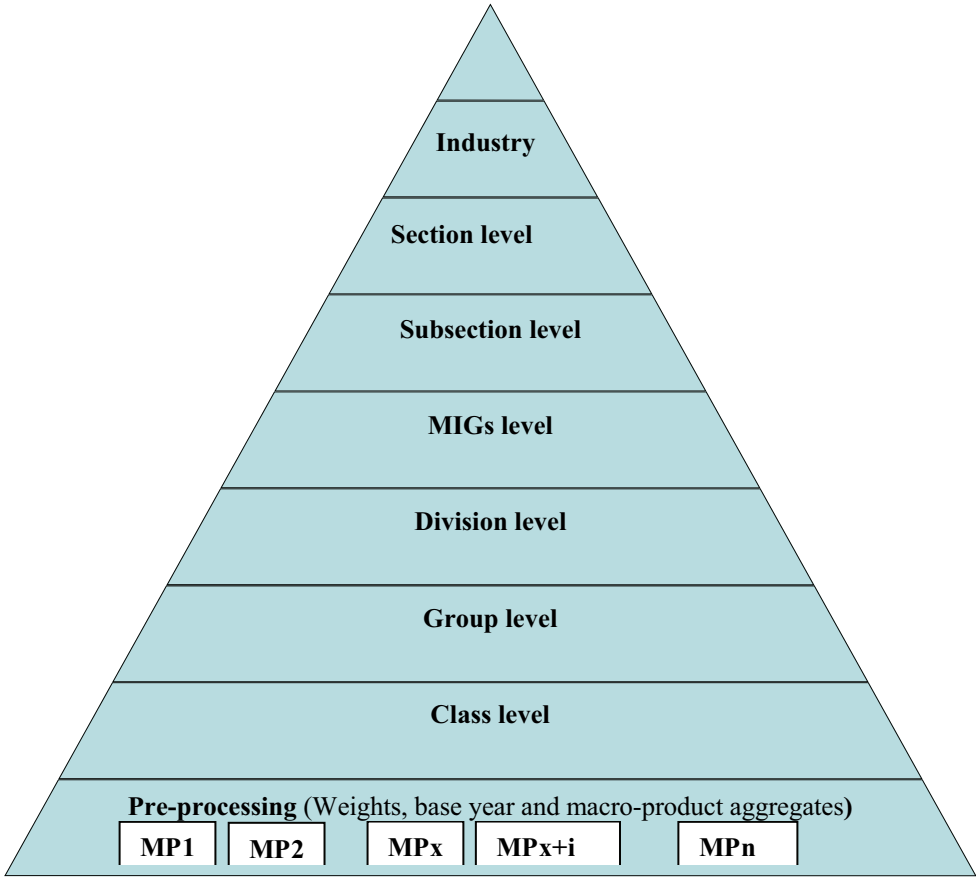


Fig. 1. Stages of IPI processing

It should be noted that for any activity at any level of KD BiH the sum of the weights for all of the comprising activities at lower level, must be equal to 1.

The following general formula can be applied:

$$IPI_j^{t,y/0} = \sum_{i \in j} W_i^0 * IPI_i^{t,y/0}$$

where:

- W** is the weight,
- IPI** is the index,
- j** is the higher level of activity (for example a Group) made up of (k) lower level activities (for example - Classes),
- i** is an indicator of lower level indices (i = 1 do k) used to generate the higher level index (j)
- 0** is the base year
- t** is the current reference period (current month)
- y** is the current reference year.

B.5. PRE-PROCESSING

B.5.1 PROCEDURES FOR INPUT DATA CONSOLIDATION

For the purpose of effective and correct class level index compilation, a number of automated procedures have been evaluated, as a part of the IT application for industrial statistics, in order to consolidate, organize and prepare all inputs in IPI compilation process such to fit to a standard structure (pattern) and to enable correct output to be produced. Those are the custom made procedures and modules for:

- taking over and checking input data submitted monthly by two entity statistical institutes and DB, aggregating and storing them in corresponding data registers **Error! Reference source not found. Error! Reference source not found.** (data for **temporary indices** and data for **revised indices** -B.2.3.2 Revision of micro data),
- checking input and derived data according to B.2.3.3. Aggregated and processed data (Macro data)
- data aggregation and calculation of all constant parameters of IPI compilation process using annual and cumulative monthly data sets from the base year (values of production for PRODCOM products, macro products and activity classes, the unit values for PRODCOM products, average monthly volume of production for each PRODCOM product, value added for each macro product and activity class and resulting value added structure of all lower activity levels in the scope of relevant higher level of activity, up to the level of total industry) and storing them in the corresponding relational data tables.
- organization of data links such to enable different level of index aggregation

Also, some operator interactive procedures have been developed for the communication between operator (system user) and IT system such to ensure:

- analysis of input data and harmonization of coverage, by size of units and representativeness of products, for BiH level A.2.2.3.1 CRITERIJA RELATED TO ACTIVITY (using set of 12 months input data, or longer series),
- regular periodic revisions or revisions on demand, of input data used for compilation of published indices or historical review of inputs.

B.6. INDEX COMPILATION IN BIH

Volume indices of industrial production are compiled for the different aggregation levels according to the classification of the activity KD BiH. The calculation of the IPI starts from the elementary indices for the macro product level and after that, such elementary indices are used for the calculation of the indices of the all the upper levels of the aggregation.

B.6.1 ELEMENTARY INDICES OF MACRO PRODUCTS

Elementary index of macro product is given by the ratio between the value of production at the current time (reference period) and average monthly value of production in the base year for the same macro product. Elementary index is calculated as follows:

$$IPI_{MPx}^{t,y/0} = R_{MPx}^{t,y/0} * 100\% = \frac{\sum_{p \in MPx} q_p^{t/y} * P_p^0}{\sum_{p \in MPx} Q_p^0 * P_p^0} * 100\% = \frac{VP_{MPx}^{t/y}}{VP_{MPx}^0} * 100\%$$

where:

$q_p^{t,y}$ is a production volume of each product "p" comprising macro product **MPx** in

the reference month **t**, in the year **y**

Q_p^0 is a monthly average of production volume for each product "**p**" comprising macro product **MPx**, calculated for the base year

P_p^0 is a monthly average of production value for each product "**p**" comprising macro product **MPx**, calculated for the base year

This type of calculation of the elementary index for macro product makes it possible to include all changes and modifications, related to individual products into the relevant class level index (the lowest level of activity), after this stage the process of index compilation for all higher activity levels stays unchanged, given that weights system is kept stable till the new base year.

In order to make appropriate index correction at any activity level, so to reflect the appearance of a new product, everything that has to be done is to correct the elementary index of the relevant macro product. To do so, the **only information needed is the current production volume of the new product and its average unit value within the base year**. Since **average unit value for the new products within the base year** is not available, the value **has to be estimated according to its current value using data collected through the monthly survey IND 1, which could possibly be deflated by available or estimated inflation rate, until the producer price indices become available**. In the case of disappearance of a product, elementary index of the relevant macro product is automatically corrected, i.e. reduced.

The problem which can be encountered in the practice relates to the appearance of a product in the class where no production was recorded within the base year and consequently, for such product, no data on value added or production value exists. This problem can be, possibly solved in the way that the new product, if it is considered as important one, is temporarily added to the most adequate macro product within the nearest "active" class that belongs to the nearest group of activity. Another solution is compilation of chain indices, if appearance of a new production is very frequent and very important and needs to be taken into account.

B.6.2 INDICES OF UPPER LEVELS OF AGGREGATION

System of weights is commonly used in the process of index compilation at all upper levels of activity (starting from the class index up to the total industry level) in such a way that index for each upper level is calculated as a weighted average of the lower level indices that belong to the given upper level. This could also be expressed as a weighted average of the lowest level indices i.e. elementary indices (indices of macro products). The following general formula is used for compilation of the base year indices (indices to the base year):

$$IPI_j^{t,y/0} = \sum_{i \in j} W_i^0 * IPI_i^{t,y/0} = \frac{\sum_{i \in j} VA_{MPx}^0 * IPI_{MPx}^{t,y/0}}{\sum_{x \in j} VA_{MPx}^0}$$

where:

W_i^0 is the weight of each index at a lower activity level "**i**" to be aggregated in the index of higher activity level "**j**" (the share of value added of lower activity level "**i**" in respect to value added of higher activity level "**j**")

$$W_i^0 = \frac{VA_i^0}{VA_j^0} = \frac{VA_i^0}{\sum_{i \in j} VA_i^0} = \frac{\sum_{x \in i} VA_{MPx}^0}{\sum_{x \in j} VA_{MPx}^0}$$

$IPI_{MPx}^{t,y/0} = R_{MPx}^{t,y/0}$ index of macro product “x”,

- j the higher level of activity (for example a Group) made up of (k) lower level activities (for example - Classes),
- i lower level of activity (i = 1 up to k) used to generate the higher level index (j)
- 0 the base year
- t the current reference period (current month)
- y the current reference year

B.6.3 WEIGHTING SYSTEM CONSTRUCTION

Main variable for weights system calculation is the gross value added at factor costs (see B.3.2.1 CALCULATION OF VALUE ADDED). Weight is a factor that shows the share of value added generated at the lower level of activity (for example: class) in respect to the value added of relevant upper level of activity (for example: group).

Having the intention to create the consistent system of weights to be implemented uniformly in compiling indices at any level of aggregation it is necessary to calculate value added for each activity class (as the first step) based on data from annual survey on industry IND 21. Value added data on each class shall be aggregated (summed up) to get value added figures for all higher activity levels, up to the level of overall industry.

On the other hand, value added of each activity class is distributed between components of lower level i.e. between macro products, using coefficient of distribution (K_{MPx}), calculated as share of production values between macro product and class to which it belongs. Coefficient of distribution is, in fact, the weight at the level of macro product.

Value added for macro product is:

$$VA_{MPx} = K_{MPx} * VA_c$$

where:

K_{MPx}

Coefficient of distribution is calculated as follows:

$$K_{MPx} = \frac{\sum_{p \in MPx} Q_p^0 * P_p^0}{\sum_{x \in c} \sum_{p \in MPx} Q_p^0 * P_p^0} = \frac{VP_{MPx}^0}{\sum_{p \in c} VP_{MPx}^0}$$

x

indicator of macro product within the class “c”

p

single PRODCOM product within the macro product “MPx”

0

the base year (2005)

$$\sum_{p \in MPx} Q_p^0 * P_p^0$$

value of production of macro product “x” (VP_{MPx}) is the sum of production

values of all PRODCOM products “p” included in the relevant macro product

$\sum_{x \in c} \sum_{p \in MPx} Q_p^0 * P_p^0$ value of production of the class “c” (VP_c) is the sum of production values of all macro products “MPx” included in the relevant class

Value added of macro product is understood as elementary weight in the distinctive and single calculation process to establish all other weights necessary for index aggregation at each upper level of activity. This single system of elementary weights is given in scaled form, such to avoid publishing of direct data on value added:

$$w_{MPx}^{element} = VA_{MPx} * K$$

Weights are calculated separately for Bosnia and Herzegovina, Federation of Bosnia and Herzegovina, Republika Srpska and Brcko District and complete system of weights should be agreed.

Data on value added should be consistent i.e. data must be calculated based on harmonized coverage of observation units in the entities and DB in the base year.

Harmonized coverage is discussed in A.2.1.3 POPULATION OF INTEREST (THE MINIMUM REQUIRED COVERAGE OF TARGET POPULATION).

System of weights to be used in compilation of higher level indices i.e. in aggregation of relevant indices of any lower level “i” into the given index of higher level “j” was compiled using elementary weights (weights based on value added of macro products). The following formula is used:

$$W_{i/j}^0 = \frac{\sum_{x \in i} VA_{MPx}^0}{\sum_{i \in j} \sum_{x \in i} VA_{MPx}^0} = \frac{VA_i^0}{\sum_{i \in j} VA_i^0}$$

It means that index aggregation weights could be compiled using directly grouped relevant data on value added or already grouped weights of elementary level.

The general formula for index compilation based on aggregation weights is:

$$IPI_j^{t,y/0} = \sum_{i \in j} W_{i/j}^0 * IPI_i^{t,y/0}$$

The following weights are calculated in a way to enable easy aggregation of indices to all standard upper activity levels (Annex V – weighting system 2005):

1. Weights for index aggregation from class level to the group level
2. Weights for aggregation of indices from level of group to the level of divisions
3. Weights for aggregation of indices from level division to the level of subsection
4. Weights for aggregation of indices from level of subsection to the level of section
5. Weights for aggregation of indices from the level of section to the level of total industry

6. Weights for aggregation of indices from division and group levels to the level of Main Industrial Groups (GIG/MIG).

B.6.4 AGGREGATION OF INDICES

The most detailed **activity** level for index compilation is the class level.

The following indices should be calculated for the standard higher activity levels:

1. Group indices
2. Division indices
3. Subsection indices
4. Section indices
5. Total industry index
6. Main Industrial Groups (GIG/MIG) indices.

B.7. COMPARABILITY BETWEEN THE INDICES OF BIH AND INDICES OF THE ENTITIES AND DB

Volume indices of industrial production should to be compiled for BiH, FBiH, RS and BD. Within FBiH indices are to be also compiled for 10 Cantons. For their own needs, entities will probably use different (or not exactly the same) coverage of statistical units (they may use wider coverage), but nevertheless the scope and quality of data transmitted to BHAS must be harmonized in accordance with criteria specified in A.2.1.3 POPULATION OF INTEREST (THE MINIMUM REQUIRED COVERAGE OF TARGET POPULATION) for annual survey and in A.2.2.3 Population of interest – panel of statistical units for monthly survey (the minimum required coverage of target population) for monthly survey and B.2.3 DATA QUALITY assurance

The unique panel of statistical units for monthly survey on industry in BiH is the combination (union) of panels established in two entities and DB according to A.2.2.3. Entities statistical institutes and DB are responsible for managing (updating) their panels but they are obliged to submit to BHAS the complete information on each change regarding the initial panel. Entity statistical institutes and DB should also submit to BHAS the list of main statistical units, whose data must be collected directly and cannot be imputed (estimated).

The list of macro products to be used in index compilation was agreed by and approved as common standard for index compilation in all statistical institutes of BiH. The weights system is calculated using the single method of calculation and data from annual survey on industry in the base year. The single average unit value of each PRODCOM product is used in index compilation, as well as data on average monthly volume of production for each PRODCOM product in the base year and data on value of production and value added at macro product level, that are calculated in both entities, DB and BiH in the same way.

Also, for their own needs, entities will use their own system of weights applying the same method of compilation B.6.3 WEIGHTING SYSTEM CONSTRUCTION (mandatory) and the same input data from monthly and annual survey they submit to BHAS (possibly enhanced by data from wider coverage of individual entity). It means that data submitted to BHAS should be subset of data used in each entity and DB for index compilation. Entity statistical institutes and DB shall perform input data editing (controlls and checks) and compensation for non-responses (B.2.3.1 INPUT DATA (MICRO DATA)), doing the same on the preliminary and revised data prior to their transmission to BHAS (B.2.3.2 REVISION OF MICRO DATA). Entity statistical institute and DB shall submit, together with input data, the agreed set of quality indicators i.e. data necessary for compilation of quality indicators at the BiH level.

Volume indices of industrial production for the level of BiH will be compiled by the BiH Agency for Statistics (BHAS), but two approaches see B.1 organization of index compilation (Industrial production index IPI) will be applied to the calculations:

1. Direct indices calculation at the state level, using micro data collected at the level of statistical unit and based on agreed panels in Federation of Bosnia and Herzegovina, Republika Srpska and Brko District,
2. Calculation of indices at the state level by aggregating the elementary indices that, for the level of the group of the products (macro products), were calculated by FIS, RSIS, BDO, based on the agreed panels of statistical units.

Macro product indices are the building blocks of the aggregation process resulting in all higher level indices up to the total industry index of BiH. Common formula to be used for all activity levels is the following:

$$IPI_{FBiHj}^{m,y/0} = W_{FBiHj/BiHj}^0 * IPI_{FBiHj}^{m,y/0} + W_{RSj/BiHj}^0 * IPI_{RSj}^{m,y/0} + W_{DBj/BiHj}^0 * IPI_{DBj}^{m,y/0}$$

where:

- j is an activity aggregation level of the index
- BiH, FBiH, RS and DB notation for state, entity and District
- $W_{FBiHj/BiHj}^0, W_{RSj/BiHj}^0, W_{DBj/BiHj}^0$ aggregation weights for FBiH, RS and DB for compilation of BiH indices, calculated as follows:

$$W_{xj/BiHj}^0 = \frac{VA_{xtj}^0}{VA_{FBiHj}^0 + VA_{RSj}^0 + VA_{DBj}^0}$$

The two approaches will be regularly tested in the period of experimental compilations to judge the consistency and quality of results. BHAS will include in the proces of test compilation of industrial production volume index for BiH also the test compilation of corresponding entities and DB indices using single system of weights. Decision on the approach and results to be published will be made upon analysis of experimental results.

B.8. TYPES OF INDEX

Industrial production volume index is a basic short-term indicator, calculated and published each consecutive month for the previous month according to EU STS regulation No. 1165/98 (deadlines). While doing so, produced volumes for observation month are compared with the average monthly volumes of base year (**base year index** i.e. the index to the base year – what is the main requirement of STS regulations). Quite often, it is very useful to make comparison between the current monthly production and average production in the previous year or to calculate rate of change of the base index against any index of any other reference period.

The average monthly volume produced within the base year or any other base period is the average value of monthly production within the year (sum of volumes produced within each month of the year and then divided by 12).

The volume index of industrial production for BiH, entities and BD shall be published for the level of divisions, sections and total industry as well as for the MIGs.

The calculation procedure of industrial production index starts after determination of the weights system, by regular processing of monthly data and calculation of selected monthly indices **for each macro product** and their subsequent aggregation into the **index of each class**. As a second step in the compilation procedure related to volume indices of industrial production is the process of aggregation of class indices into base year indices of subsequent higher and higher levels of activity classification. By using base year indices it is possible to calculate all other types of indices (indices related to different comparison periods) and rates of change for any activity level.

B.8.1 TYPES OF INDICES USED IN BIH

The following types of indices used to be compiled in BiH (in the entities and DB):

- 1.1 Monthly index to the base year**: production in the reference month against average monthly production in base year,
- 1.2 Monthly index to the previous year**: production in the reference month against the average monthly production in the previous year,
- 1.3 Monthly index to the same month of previous year**: production in the reference month against production of the same month of the previous year,
- 1.4 Monthly index to the previous-month of the same year**: production in the reference month against production of the previous month in the same year, i.e. in two consecutive months,
- 1.5 Index of cumulative production in the reference month to the previous year**: total production up to the end of the reference month of observation year against the **average monthly** production in the previous year,
- 1.6 Level index of the reference month to the previous year**: total production up to the end of the reference month of observation year against the total production up to the end of the same month in the previous year,
- 1.7 Average monthly index of the reference year to the previous year** to be calculated as annual average value of monthly indices to the previous year, or sum of all such monthly indices divided by 12.
- 1.8 Average monthly index of the reference year to the base year** to be calculated as annual average value of monthly year indices to the base year or sum of all such monthly indices divided by 12.

It must be noted that only the index 1.1 above is the form of index accepted as European standard and recommended by the international experts participating to the co-operation project; according to this recommendations the other forms included in the list shall be gradually discontinued focusing the dissemination of results on the standard index forms (raw, working day adjusted, seasonally adjusted) and on the rate of changes defined in paragraph B.8.3 below.

The selection indices to be published regularly is specified in B.9 PUBLISHING OF THE RESULTS.

According to a standard convention, the value of all indices in the base period or comparison period is defined as equal to 100 %.

B.8.2 RELATIONS BETWEEN VARIOUS TYPES OF INDICES

The basic form of monthly volume index of industrial production is the base year index i.e. monthly index to the base year (1.1). Index is compiled by comparing the value of production in the reference month against value of average monthly production in the base year (formulas specified in B.6 INDEX COMPILATION and B.6.3 WEIGHTING SYSTEM CONSTRUCTION). It is only feasible to calculate base year index for the first year of calculation (y=1). In such a case, both monthly indices to the base year (1.1) and monthly indices to the previous year (1.2) remain completely identical.

In all upcoming years and up to the change of the base year, it is possible to calculate all of the above mentioned types of monthly indices 1.1 to 1.8 (B.8.1 types of indices used in BiH) using base indices.

Monthly index of industrial production to previous year at any activity level (j) could be compiled using the following formula:

$$IPI_j^{m,y/y-1} = \frac{IPI_j^{m,y/0}}{IPI_{jsr}^{y-1/0}}$$

By definition the average monthly index of previous year (y-1) to the base year (0) is:

$$IPI_{jsr}^{y-1/0} = \frac{\sum_{m=1}^{12} IPI_j^{m,y-1/0}}{12} = \frac{\sum_{i \in j} q_i^{1,y-1} * P_i^0 + \sum_{i \in j} q_i^{2,y-1} * P_i^0 + \dots + \sum_{i \in j} q_i^{12,y-1} * P_i^0}{12 * \sum_{i \in j} Q_i^0 * P_i^0}$$

since:

$$\begin{aligned} & \frac{\sum_{i \in j} q_i^{1,y-1} * P_i^0 + \sum_{i \in j} q_i^{2,y-1} * P_i^0 + \dots + \sum_{i \in j} q_i^{12,y-1} * P_i^0}{12} = \\ & = \frac{(\sum_{i \in j} q_i^{1,y-1} + \sum_{i \in j} q_i^{2,y-1} + \dots + \sum_{i \in j} q_i^{12,y-1}) * \sum_{i \in j} Q_i^{y-1} * P_i^0}{12} = \sum_{i \in j} Q_i^{y-1} * P_i^0 \end{aligned}$$

it follows:

$$IPI_{jsr}^{y-1/0} = \frac{\sum_{i \in j} Q_i^{y-1} * P_i^0}{\sum_{i \in j} Q_i^0 * P_i^0}$$

and

$$\sum_{i \in j} Q_i^{y-1} * P_i^0 = IPI_{jsr}^{y-1/0} * \sum_{i \in j} Q_i^0 * P_i^0$$

By definition the index with reference to the previous year is:

$$IPI_j^{m,y/y-1} = \frac{IPI_j^{m,y/0}}{IPI_{jsr}^{y-1/0}}$$

or:

$$IPI_j^{m,y/y-1} = \frac{IPI_j^{m,y/0}}{IPI_{jsr}^{y-1/0}} = \frac{IPI_j^{m,y/0}}{IPI_{jsr}^{y-1/y-2} * IPI_{jsr}^{y-2/y-3} * \dots * IPI_{jsr}^{2/1} * IPI_{jsr}^{1/0}}$$

as:

$$IPI_{jsr}^{y/0} = IPI_{jsr}^{y-1/y-2} * IPI_{jsr}^{y-2/y-3} * \dots * IPI_{jsr}^{2/1} * IPI_{jsr}^{1/0}$$

where:

m is the reference month

y is the reference year

j is an activity aggregation level

$IPI_{jsr}^{y-1/0}$ (y-1) is an average monthly index of previous year to the base year (0)

$IPI_{jsr}^{y/y-1}, IPI_{jsr}^{y-1/y-2}, IPI_{jsr}^{y-2/y-3}, \dots, IPI_{jsr}^{2/1}, IPI_{jsr}^{1/0}$ is an average monthly index of any reference year (y) and any previous year (y-1, y-2,...1) to the previous year base year (0)

y, y-1, y-2,...1 is reference year (y) and all previous years

0 base year

Using monthly indices of reference (current) year to the base year and monthly indices of all previous years to the base year it is possible to obtain, through simple combinations, different types of industrial production volume index, such as:

Monthly index to the same month of previous year (production in reference month of current year against production in the same month of previous year) at any activity level (j) could be compiled using the following formula:

$$IPI_j^{m,y/m,y-1} = \frac{IPI_j^{m,y/0}}{IPI_j^{m,y-1/0}}$$

where:

m is the reference month in reference year (y) or in previous year (y-1)

Monthly index to the previous month of the same year: (production in the reference month against production of the previous month in the same year, i.e. in two consecutive months) could be compiled using the following formula:

$$IPI_j^{m,y/m-1,y} = \frac{IPI_j^{m,y/0}}{IPI_j^{m-1,y/0}}$$

where:

m is the reference month in the reference year (y)

m - 1 is the previous month in the reference year (y)

Level index of the reference month to the previous year: (total production up to the end of the reference month of the current year against total production up to the end of the same month in the previous year) at any activity level (j) could be compiled using the following formula:

$$IPI_j^{kx,y/kx,y-1} = \frac{\sum_{m=1}^x IPI_m^{y/0}}{\sum_{m=1}^x IPI_m^{y-1/0}}$$

where:

x is the reference month in current year (y) and the previous year (y-1)

kx is notation of cumulative (summary) data on production (from the first month up to the kth month of the year)

Average monthly index of the reference year i.e. annual index of the reference year to the base year at any activity level (j) could be compiled using the following formula:

$$IPI_{sr}^{y/0} \text{ (reference year/base year)} = \frac{\sum_{m=1}^{12} IPI_m^{y/0}}{12}$$

Average monthly index of the reference year i.e. annual index of the reference year to the previous year at any activity level (j) could be compiled using the following formula:

$$IPI_{sr}^{y/y-1} \text{ (reference year/previous year)} = \frac{\sum_{m=1}^{12} IPI_m^{m,y/y-1}}{12}$$

B.8.3 RATES OF CHANGE

In order to monitor and analyze time changes in the volume of industrial production and in addition to the above mentioned, we also use other indicators out of which the one most important refers to rates of change. Rates of change could be calculated in several ways/options and at the basis of previously calculated monthly indices to the base year and monthly indices to the previous year (see B.6.4 and B.8.2):

- a) Rate of change "reference month – previous month" for the same reference year (m,y)/(m-1),y)
- b) Rate of change "reference month – same month of the previous year" (m/m-12 i.e. m,y/m,y-1),

- c) Rate of change of the cumulative production "reference month – same month of the previous year" (cumulative km, y/ cumulative k(m-12),
- d) Annual rate of change of industrial production volume "reference year – any previous year" (average monthly index of reference year against annual monthly index of any previous year).

rRate of change of volume of industrial production for the same reference year (monthly and cumulative) at any activity level (j) is calculated by using the same method used to calculate indices to the base year or indices to the previous year, generating identical results:

$$\Delta IPI_{jrate}^{ref.period/base\ period} = \frac{IPI_j^{ref.period/0} - IPI_j^{base\ period/0}}{IPI_j^{base\ period/0}}$$

For monitoring the short-term movements of industrial production we suggest the presentation of month-to-previous month rates of change of relevant indices. These rates of change should be presented as original series as well as seasonally adjusted or working days adjusted series.

If annual or monthly growth indices are calculated compared to different years, then it is necessary to use appropriate indices to the base year.

Rate of change is calculated by applying previously calculated volume indices (base year indices or indices to the previous year) in a following way:

- a) Rate of change index "reference month – previous month" for the same reference year (m/m-1), by applying the following formula:

$$\Delta IPI_{jrate}^{m,y/(m-1),y} = \frac{IPI_j^{m,y/0} - IPI_j^{(m-1),y/0}}{IPI_j^{(m-1),y/0}} = \frac{IPI_j^{m,y/y-1} - IPI_j^{(m-1),y/y-1}}{IPI_j^{(m-1),y/y-1}}$$

- b) Rate of change index "**reference month – same month of the previous year**" (m/m-12) by applying the following formula:

$$\Delta IPI_{jrate}^{m,y/m,y-1} = \frac{IPI_j^{m,y/0} - IPI_j^{m,y-1/0}}{IPI_j^{m,y-1/0}} = \frac{IPI_j^{m,y/y-1} - IPI_j^{m,y-1/y-1}}{IPI_j^{m,y-1/y-1}}$$

- c) Rate of change index "**cumulative production up to the end of reference month of current year - cumulative production up to the end of the same month of previous year**" (cumulative m/ cumulative (m-12)),

$$\Delta IPI_{jrate}^{kx,y/kx,y-1} = \frac{\sum_{m=1}^x IPI_j^{m,y/0} - \sum_{m=1}^x IPI_j^{m,y-1/0}}{IPI_j^{m,y-1/0}} \quad \text{Annual rate of change index of}$$

industrial production (reference year/year of comparison) is calculated by applying the average annual values of volume index, using the following formula:

$$\Delta IPI_{j\text{grate}}^{y/b} = \frac{IPI_{jsr}^{y/0} - IPI_{jsr}^{b/0}}{IPI_{jsr}^{b/0}}$$

where b is the year of comparison

B.9. PUBLISHING OF THE RESULTS

Regular publishing of the following types of indices has been agreed:

- base year indices for reference month (to be published in raw, working day adjusted , and seasonally adjusted form);
- rate of change of the reference month (quarter) index with respect to the previous month (quarter) index; this rate of change is meaningful only when calculated on seasonally adjusted data;
- rate of change of reference month index with respect to the same month of previous year index (year-on-year rate of change) - the preferred form of the index to be used in the calculation of this rate of change is the working day adjusted one

The best practices at international and at European level consider publishing time series of industrial production indexes in original (raw) and in WDA and SA form. Moreover, rates of change of the series are normally presented using the following convention: month-on-month rates of change are strictly limited to seasonally adjusted indexes, while year-on-year rates of change are preferably calculated on WDA series but are largely used also on raw indexes.

Recommended publication strategy is:

- provisional index within EU timeliness requirements
- revised index one month later
- final figures after SBS and PRODCOM annual data became available

Publication strategy is based on the hypothesis that provisional indices at BiH level would be revised and finalised as result of close cooperation with FIS, RSIS and DB for data checking, compensation of non responses and coverage harmonization until the revised-final figures are published.

Indices for the following levels of detail will be published:

1. Subsection indices
2. Section indices
3. Total industry index
4. Main Industrial Groups (GIG/MIG) indices.

B.10. DATA REVISION POLICY (INPUT DATA AND OUTPUT DATA ALREADY PUBLISHED)

In small countries like Bosnia and Herzegovina industrial production is characterized not only by dynamic in volume and assortment of production but also by considerable changes in the process of production and given the market conditions. This significantly affects the structure of production, labour productivity and product competitiveness.

According to internationally adopted conventions the changes of this type are corrected with complete change of weighting system which happens every five years and is based on annual survey on production B.4.3 BASE YEARS AND BASE YEAR CHANGES.

In the period between two base years, the significant changes can still happen on the both, product and structure of production levels which should be somehow encompassed but trying to avoid overburdening the process of calculation of monthly indices with irrelevant details.

Appearance of new and disappearance of old products is a process that will apparently appear, gradually in stable economies and fairly rapid in unstable developing economies. This kind of changes is much easier to monitor and to collect the relevant information than the changes on structure of production. Data on changes in structure of production are collected through annual industry survey and at best, the first preliminary results become available no earlier than the 8 months after expiration of the observed year and could be potentially used for corrections to weights only 12 months after expiration of the reference year.

Therefore, the proposal is to introduce some corrections related to the appearance of new products and disappearance old products to the process of compilation of industrial production, in volume only, but changes in the structure of production would become corrected every 5 years, by application of a new system of weights

On a regular basis some tests on errors, outliers and non-response should be done and corrections accomplished strictly respecting the timetable. Also, annual or irregular corrections and revisions of data and already published indices should be done before a new cycle of surveys begin, primarily:

- once a year, normally in September, regular revision of estimates and imputed values for non responses and outliers (as well as upper and lower limits of the input or derived data allowed range)
- at the same time revisions to earlier years may be selectively allowed if they have a significant impact on the economic picture presented
- also at the same time monthly series may be reassessed for several back years to take into account, for example, re-estimated seasonal factors
- revision related to significant events in time (events that affect the way the indicator is compiled, causing a discontinuity at the point of change, such as changes in survey methodology, classification of activities i.e. business units, business register updates, change in population size ...)

Requirements regarding input data revisions are given in B.2.3.2

Requirements regarding index revisions are given in B.2.3.3

B.11. PREPARATION OF DATA TO BE TRANSMITTED TO EUROSTAT

Following the EU regulation on short-term statistics, reference number: 1165/98 member countries of EU have to provide data on industrial production volume index (variable 110) to Eurostat, prepared in a way to meet the following requirements:

- Coverage of statistical units of observation and representativeness of products observed must be structured in a way to imply that the resulting volume index of industrial production at all class levels in manufacturing industry covers at least 90% of value added for classes involved in the base year,

- Data have to be aggregated at the level of sub-sections, sections, main industrial groups and at the level of total industry,
- Data have to be corrected accordingly to a number of working days within the month, including the component of seasonality.
- Data have to be provided in accordance with positive requirements of the EU on confidentiality of statistical data,
- Data have to be provided to Eurostat in the electronic form, GESMES/TS format (protocol and format for exchange of data in time series of short-term statistics). Subject format is based on adopted list of statistical concepts, definitions of key structural elements, and interface of code lists and supported by appropriate guidelines/instructions.

Data should be published on an unadjusted form (all series), adjusted for working days (starting at least, from subsections at two letters level of KD BiH classification), and in a seasonally-adjusted form (total index, indices by MIGs, indices for subsections i.e. two letters level of KD BiH classification). The seasonal adjustment should be done using TRAMO-SEATS.

Special attention should be paid to the problem of different seasonal factors in BiH, FBiH and RS.

B.11.1 CONFIDENTIALITY

The following basic confidentiality rules have been defined by the BiH Law on Statistics (Article 26):

1. Statistical data of Bosnia and Herzegovina must not be disseminated to the users, if they contain or reveal Confidential Data. Aggregates shall comprise at least three units and the share of one unit in an aggregate must not exceed 85% of the total.
2. Derogation from paragraph (1) refers to information about the economic situation collected from enterprises, other economic agents and about the environmental situation. Such information may be disseminated even if the results do not meet the aggregate requirements set out in paragraph (1) hereof, in cases where this is determined necessary by the Agency in order to ensure significant basic information and provided that the Statistical Program foresees the dissemination of such information.

C. ANNEXES

C.1. ANNEX I – INTERNATIONAL REGULATIONS AND RECOMMENDATIONS

General Regulations:

- Council Regulation (EEC) No 696/93 of 15th March 1993 on statistical units for the observation and analysis of the production system in the Community (statistical units);
- Council Regulation (EEC) No 2186/93 of 22nd July 1993 on Community co-ordination in drawing up business register for statistical purpose;
- Council Regulation (EC) No 2223/96 of 25th June 1996 on European System of national and regional accounts in the Community (ESA 95), harmonized with UN System of National Accounts (SNA 93);
- Commission Regulation (EC) No 204/2002 of 19 December 2001, amending Council Regulation (EEC) No 3696/93 on the statistical classification of products by activity (CPA) in the European Economic Community (CPA) OJ L 36, 06.2.2002
- Statistical Compendium 2007- Eurostat, June 2007;
- Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006, establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains, OJ L 393, 30.12.2006, p. 1-39
- Commission Regulation (EC) No 831/2002 of 17. May 2002, implementing Council Regulation (EC) No 322/97 on Community Statistics, concerning access to confidential data for scientific purposes of 18.5.2002 and Commission Regulation (EC) No 1104/2006 of 18 July 2006,
- Commission Decision No 2004/452/EC of 29 April 2004, laying down a list of bodies whose researchers may access confidential data for scientific purposes, and subsequent Commission Decisions: No 2005/412/EC of 25 May 2005, No 2005/746/EC of 20 October 2005, No 2006/429/EC of 22 June 2006, No 2006/699/EC of 17 October 2006, No 2007/81/EC of 2 February 2007 and No 2007/229/EC of 11 April 2007
- Council Regulation (Euroatom, EC) No 1588/90 of 11th June 1990 on the transmission of data subject to statistical confidentiality to the Statistical Office of EC (Confidentiality) and complementary regulations;
- UN IRIS 2008 (Department of Economic and Social Affairs Statistics Division International Recommendations for Industrial Statistics 2008)
- Eurostat documents on Quality: Definition of quality [Eurostat 2003a] and Standard Quality Report [Eurostat 2003b], Quality measures for economic indicators (2005) and Quality Indicators (2005)
- Eurostat’s “Introductory guidelines - NACE Rev.1.1” and “Introductory guidelines - NACE Rev.2”

Structural Business Statistics:

- Council Regulation (EC, EUROATOM) No 58/97 (Annex 1 and Annex 2), of 20. December 1996 concerning structural business statistics (Annex 1 and Annex 2);
- Commission Regulation (EC) No 2700/98 and 2701/98 of 17th December 1998 concerning the definitions of variables and series of data to be produced for structural business statistics (amended by Council Regulation (EC) No 1670 and 1669/2003 of 1st September 2003, respectively);
- Commission Regulation (EC) No 1669/2003 and 1670/2003 of 1st September 2003, implementing Regulation No 58/97 concerning the series of data to be produced for

structural business statistics (Regulation No 2701/98) and definitions on SBS variables (Regulation No 2700/98);

- Commission Regulation (EC) No 1618/99 of 23. July 1999 concerning the criteria for the evaluation of quality of structural business statistics;
- Commission Regulation (EC) No 1614/2002 of 6th September 2002 adjusting Council Regulation (EC, Euratom) No 58/97 to economic and technical developments and amending Commission Regulations No 2700/98, 2701/98 i 2702/98

Short-term Statistics:

- Council Regulation (EC) No 1165/98 of 19th May 1998 concerning short-term statistics (STS Regulations - Annex A);
- Commission Regulation (EC) No 586/01 of 26th March 2001 concerning short-term statistics as regards the definition of Main Industrial Groupings;
- Commission Regulation (EC) No 588/01 of 26th March 2001 concerning short-term statistics as regards the definition of variables;
- Council Regulation (EC) and Regulation of the European Parliament No 1158/2005 of 6th July 2005 amending Council Regulation (EC) No 1165/98 concerning short-term statistics (STS Regulation);
- Methodology of Short-term Business Statistics, Interpretation and Guidelines (EC, Eurostat, 2002) Methodology of Short-term Business Statistics, Interpretation and Guidelines (EC, Eurostat, 2006)

Production statistics:

- Council Regulation (EC) No 3924/91 of 19th December 1991 on the establishment of Community survey of industrial production (PRODCOM Regulation);
- Commission Regulation (EC) No 912/2004 of 29th April 2004 implementing Council Regulation (EEC) No 3924/91;
- Commission Regulation (EC) No 317/2006 on establishment PRODCOM List 2005 and corresponding methodological introduction.

Main UN recommendations and methodological documents (studies) related to the system of industrial statistics:

- Index numbers of industrial production, Statistical Office of the UN, Department of Economic and Social affairs, New York 1950 (Studies in Methods, Series F No1);
- International Recommendations for Industrial Statistics, Statistical Office of the UN, Department of Economic and Social affairs, New York, 1953;
- Industrial Census and Related Enquiries, Statistical Office of the UN, Department of Economic and Social affairs, New York, 1953 (Series F, No 4);
- International Standards in Basic Industrial Statistics, Statistical Office of the UN, New York, 1953 (Series M, No 17);
- International Recommendations on the 1963 World Programme of Basic Industrial Statistics¹, United Nations Statistics Division, Department of Economic and Social affairs, New York, 1953 (Series M, No 17), New York, 1960;
- International Recommendations for Industrial Statistics, Statistical Office of the UN, Department of Economic and Social affairs, New York 1983, (Series M, No 48);

- Strategies for Measuring Industrial Structure and Growth, Statistical Office of the UN, Department for Economic and Social Information and Policy Analysis, New York, 1994, (Studies in Methods, Series F, No 65).

Table 2. ELEMENTS OF THE PRODUCTION ACCOUNT AND STRUCTURAL BUSINESS INDICATORS

(Value data in 1000 KM)

IND - 21

1	2	3	Enterprise (observation unit) TOTAL				Kind of activity units (local) - first four digits of the product code should be used (Table 1)											Non-industrial activities		
			0	0	0	0	4	5	6	7	8	9	10	11	9	9	9	9		
EXPENDITURES AND INDIRECT TAXES																				
3	TOTAL																			
4	Intermediate consumption	Raw and reproduction materials and services																		
		out of which: imported																		
5	Other intermediate consumption																			
6	Purchase value of the goods and services for resale																			
7	Taxes on	Total																		
8	products,	- Taxes on products and services																		
9	production and	- other taxes on production																		
10	imports	- customs fees and duties																		
11	Depreciation																			
INCOME																				
12	Income from	TOTAL																		
13	sales of own	out of which:																		
14	Income from capitalized production ¹⁾																			
15	Income from resale																			
16	Other income ²⁾																			
17	Subsidies and donations																			
STOCKS																				
18	Stocks of own finished products and works	01. 01. 2005.																		
19	in progress	31. 12. 2005.																		
20	Stocks of goods for resale	01. 01. 2005.																		
21		31. 12. 2005.																		
22	Stocks of raw and reproduction materials	01. 01. 2005.																		
23	and services	31. 12. 2005.																		
LABOR COSTS																				
24	Gross wages and salaries and other personnel costs ³⁾																			
25	Social insurance and social benefits on owner account																			
EMPLOYMENT																				
26	Employed persons, total number (annual average based on																			
27	Out of which the others ⁴⁾																			

1) Income gained through the use of own produced goods and services for own purposes (investment in fixed capital formation, non-material investments, payments in kind ...)

2) Income from rentals and leasing

3) Other personnel expenditures comprise: additional payments for site work outside the residential location, payments for separate living, transport to the work costs, compensations for vacancy period

4) Self employed persons, working and helping owner family members (not receiving payments i.e. Wages and salaries for their work)

C.4. ANNEX IV - DATA EDITING AND DATA CONTROL

C.4.1 DATA ENTRY, CHECKS AND CONTROL CRITERIA FOR THE MONTHLY SURVEY (IND 1)

C.4.1.1 Data entry and first level checks - micro data

This type of checks is performed during data entry and regarding micro data.

1. Conformity checks on the activity codes– data entry is enabled only for the codes already existing in address book for IND 1,
2. Conformity checks on the product codes - inserting product code is enabled (approved) only for existing product codes specified in the Nomenclature of industrial products NIP BiH. Product description and measuring unit will be filled in and displayed automatically,
3. Entering new enterprise: when entering ID of an enterprise not registered in the address book and acknowledgment of registration should be done and then the relevant data could be filled in the address book,
4. Entering activity code and ID number for enterprise registered in address book will be followed by automatic display of all data on enterprise, output products codes, measuring units and questionnaire data from the previous 12 months for each product.
5. Entering new product: when entering NIP code for a product or service having not been produced ever since by the enterprise and acknowledgment of registration should be done and then the proper code could be inserted in the relevant register using top – down method in searching NIP code (starting with KD BiH activity levels or CPA BiH subcategory levels)
6. Data on physical quantity, stocks or production value(K5 – K10) could not be negative
7. Type of production (K3) – it is possible to enter only: 0 or 1
8. In January data on current and cumulative production is the same ($K5 = K6$), while for any successive month the following relation should be checked: $K6$ of the current month = $K6$ of the previous month + $K5$ of the current month,
9. If there is data in K5, there should be also data in K3,
10. If there is data in K10, there should also be some data in K9 ($K9 \neq 0$), and vice versa
11. Data values in K6, K7, K9 and K10 of the current month should be higher or equal to the corresponding values of the previous month,
12. $K7$ of the previous month + $K8$ of the previous month + $K9$ of the previous month + $K5$ of the reporting month – $K7$ of the reporting month – $K8$ of the reporting month – $K9$ of the reporting month = 0.
13. Data entered for any current period K5 should be higher than the minimum figure that was observed for the same respondent unit and the same product during the last 48 months (we could start with 24 months)
14. Data entered for any current period should be lower than the maximum figure that was observed for the product during the last 48 months (we could start with 24 months)
15. Ratio between the monthly unit value ($K10/K9$) of each product of any individual unit in reference month and in any previous month of current year is used as derived control variable which should not be higher or lower than predefined threshold (for example higher than 3 or lower than 0,33). Two thresholds (minimum and maximum extremes of control variable) should be commonly agreed between BIH, entites and DB. The significant changes in the quality of products should be investigated, and related explanation note should be filled in.

16. Data for monthly unit value (K10/K9), if type of production is contracted production (outsourcing), should be less or equal to unit value of the same product of own production.
17. If there is data only on contracted production then market value of the product should be estimated to be used in index calculation
18. If there is data only on production and there is no data on sales, then market value of product should be estimated.
19. The current tendency variable, i.e. current month K5 data divided by corresponding 12-months earlier figure (same respondent unit, same product, t-12 period), should be higher than the lower limit of the allowed trend values range of the product. The lower limit of allowed range is the same for all data from units responding for a given product; the lower limit is about the 10th percentile of the distribution of tendency variable recorded for the same product in the same month (all responding units) over the last 4 years.
20. The current tendency variable, i.e. current month K5 data divided by corresponding 12-months earlier figure (same respondent unit, same product, t-12 period), should be lower than the upper limit of the allowed trend values range of the product. The upper limit of allowed range is the same for all data from units responding for a given product; the upper limit is about the 90th percentile of the distribution of tendency variable recorded for the same product in the same month (all responding units) over the last 4 years.

Incorrect data, refused in data entry process are treated in the same way as missing data. The process of micro data revision must be limited to strict deadlines.

C.4.1.2 The second level checks - macro data

This type of checks is performed on the aggregated data at various levels, starting with product data aggregates (PRODCOM product level, macro product elementary index level, class and higher activity level indices). The checks are similar to those of micro data and include:

1. Automatic identification of a new product (not existing in base year). If a new product belongs to the activity class that was active in the base year then current unit value (K10*1000/K9) should be used for index calculation (eventually deflated by depreciation index). If a new product belongs to the activity class that was inactive in the base year then the appropriate information should be displayed to operator and an interactive decision should be made.
2. Ratio between the average monthly unit value of each PRODCOM product in the reference month and any previous month of the current year should not be higher or lower than predefined threshold (higher than 3 or lower than 0,33).
3. The coverage of the total value of production of each class should be ≥ 80 %. If the coverage is not reached then data from some new respondent units should be entered (panel management) or important estimates should be rechecked
4. Ratio between the monthly value of production of each macro product in the reference month and any previous month of the current year should not be higher or lower than predefined threshold (for example, higher than 3 or lower than 0,33), if there were neither significant changes in the composition of macro product nor substantial seasonality in the production process.
5. Base year indices and rate of change (preliminary and revised) should be calculated for each level of aggregation. Index of each level (starting from the macro product elementary indices up to the total industry level) should be higher than its minimum value observed during the last 48 months (we could start with 24 months) Index of

each level should be lower than its maximum value observed during the last 48 months (we could start with 24 months)

6. Value of current trend variable i.e. the ratio between the current monthly index and the index of the same month in the previous year should be derived for each level of aggregation and any sustainable deviation from allowed range (3 and 0,33) should be explained.
7. Analysis of original time series, trend cycle components, working days adjusted series and seasonally adjusted series should be consistently done, followed by explanations of economic reasons for unexpected behavior or identification of errors. Analysis should cover division, subsection, and section and the total industry levels.
8. Trend cycle series should be generated and outliers identified and reported together with the relevant explanation.

EXPLANATION:

Columns in the Monthly survey on industry:

- K1 – product code,
- K2 – product description (name),
- K3 – type of production (own regular production or contracted production),
- K4 – measuring unit,
- K5 – production finished in the reporting month,
- K6 – production finished from the beginning of the year till the end of the reporting month,
- K7– volume of production spent for the further processing from the beginning of the year till the end of the reporting month,
- K8 – total volume of stocks at the end of the reporting month,
- K9 – volume of the product sales from the beginning of the year till the end of the reporting month,
- K10–value of the product sales in KM from the beginning of the year till the end of the reporting month.

C.5. ANNEX V – WEIGHTING SYSTEM 2005

1. Weights for index aggregation from class level to the group level

Identical three digits in product code characterize groups. By using such criterion, it is necessary to calculate VA_{cj} for each class and sum them up to get VAg of particular group, and compile aggregation (structural) weights of each class to the group:

$$W_{cj/g}^0 = \frac{\sum_{i \in cj} W_{MPi/total}^0}{\sum_{cj \in gi \in cj} \sum W_{MPi/total}^0} = \frac{VA_{cj}^0}{\sum_{cj \in g} VA_{cj}^0}$$

2. Weights for aggregation of indices from level of group to the level of divisions

Identical first 2 digits in product code characterize divisions. Accordingly to such criterion, it is necessary to calculate value of VA_{gj} for each group and sum them up to get VAo of particular division, and compile aggregation weights of each group to the division:

$$W_{gj/o}^0 = \frac{\sum_{i \in gj} W_{MPi/total}^0}{\sum_{gj \in oi \in gj} \sum W_{MPi/total}^0} = \frac{VA_{gj}^0}{\sum_{gj \in o} VA_{gj}^0}$$

Group 40.3 should be excluded from the division 40 in accordance with EU STS Regulation.

3. Weights for aggregation of indices from level of division to the level of subsection

Each subsections is characterized by specific divisions belonging to it:

Subsection CA comprises divisions: **10 do 12**

Subsection CB comprises divisions: **13 do 14**

Subsection DA comprises divisions: **15 do 16**

Subsection DB comprises divisions: **17 do 18**

Subsection DC comprises division: **19**

Subsection DD comprises division: **20**

Subsection DE comprises divisions: **21 do 22**

Subsection DF comprises division: **23**

Subsection DG comprises division: **24**

Subsection DH comprises division: **25**

Subsection DI comprises division: **26**

Subsection DJ comprises divisions: **27 do 28**

Subsection DK comprises division: **29**

Subsection DL comprises divisions: **30 do 33**

Subsection DM comprises divisions: **34 do 35**

Subsection DN comprises divisions: **36 do 37**

Accordingly to such criterion, it is necessary to calculate value of VA_{oj} for each division and sum them up to get VA_{pp} of particular subsection, and compile aggregation weights of each division to the subsection:

$$W_{oj/pp}^0 = \frac{\sum_{i \in oj} W_{MPi/total}^0}{\sum_{oj \in pp} \sum_{i \in oj} W_{MPi/total}^0} = \frac{VA_{oj}^0}{\sum_{oj \in pp} VA_{oj}^0}$$

It should be noted that index of division and index of subsection are identical in situation when only one division comprises the subsection (aggregation weight is 1).

4. Weights for aggregation of indices from level of subsection to the level of section

Each section is characterized by specific subsections/divisions belonging to it:

Section C comprises subsection: **CA and CB (divisions 10 do 14)**

Section D comprises subsection: **DA do DN (divisions 15 do 37)**

Section E comprises division: **40** (division 41 should be excluded from the section E in accordance with EU STS Regulation)

Accordingly to such criterion, it is necessary to calculate value of VA_{ppj} for each subsection and sum them up to get VA_p of particular section, and compile aggregation weights of each subsection to the section:

$$W_{ppj/p}^0 = \frac{\sum_{i \in ppj} W_{MPi/total}^0}{\sum_{ppj \in p} \sum_{i \in ppj} W_{MPi/total}^0} = \frac{VA_{ppj}^0}{\sum_{ppj \in p} VA_{ppj}^0}$$

The only exclusion from the abovementioned rule is section E having no subsections and consequently the weight is 1 (index of section E is identical to the index of division 40).

5. Weights for aggregation of indices from the level of section to the level of total industry

Total industry covers sections C, D and E.

It is necessary to calculate total value added of industry or sum up all VA_p of sections C, D and E and make a calculation of participation factor of each section within total value added of entire industry:

Accordingly to such criterion, it is necessary to calculate value of VA_{pj} for each section and sum them up to get VA_{total} of overall industry, and compile aggregation weights of each section to the overall industry:

$$W_{pj/total}^0 = \frac{\sum_{i \in pj} W_{MPi/total}^0}{\sum_{j \in total} \sum_{i \in pj} W_{MPi/total}^0} = \frac{VA_{pj}^0}{\sum_{j \in total} VA_{pj}^0}$$

6. Weights for aggregation of indices from division and group levels to the level of Main Industrial Groups (GIG/MIG).

Activity aggregation combines indices at the most detailed level of activity available using weights to produce indices at successively higher and higher levels of the activity classification. The one exception to this general practice is the calculation of indices for Main Industrial Groupings – MIGS (according to EU Regulation No. 586/2001) that are compiled directly from the 3-digit activity level of KD BiH.

There are 5 main industrial groupings, defined by final use of their products, produced within specific groups and divisions:

1. Industrial group of **Intermediate goods, except energy** covers following divisions: 13,14, 20, 21, 25, 26, 27, 37 and groups: 15.6, 15.7, 17.1 up to 17.3, 17.6, 24.1 to 24.3, 24.6, 24.7, 28.4 to 28.7, 31.2 to 31.6, 32.1,
2. Industrial group of Capital **goods** covers the following divisions: 30, 34 and groups: 28.1 up to 28.3, 29.1 to 29. 6, 31.1, 31.2, 33.1 to 33.3, 35.1 to 35.3,
3. Industrial group of **Consumer durables** covers following groups: 29.7, 32.3, 33.4, 33.5, 35.4, 35.5, 36.1 to 36.3,
4. Industrial group of Consumer **non-durables** covers following divisions: 16, 18, 19, 22 and groups: 15.1 to 15.5, 15.8, 15.9, 17.4, 17.5, 17.7, 24.4, 24.5, 36.4 to 36.6
5. Industrial group of **Energy** covers following divisions: 10, 11, 12, 23, and groups: 40.1, 40.2

Accordingly to such criterion, it is necessary to calculate value of VA_{gj} for each group and sum them up to get value added of particular MIG, and compile aggregation weights of each group to the MIG:

$$W_{gj/MIG}^0 = \frac{\sum_{i \in gj} w_{MPi/total}^0}{\sum_{gj \in MIG} \sum_{i \in gj} w_{MPi/total}^0} = \frac{VA_{gj}^0}{\sum_{gj \in MIG} VA_{gj}^0}$$

C.6. ANNEX VI – STANDARDS AND DEFINITIONS

C.6.1 ACTIVITY

The activity includes the combination of the resources such as equipment, work, production techniques, informational nets or products resulted in goods or services. Activity is determined by production input (goods and services), process of production and production output.

Majority of businesses, especially production units in reality perform several different activities, and due to that it is necessary to determine the category of each activity. There are three categories: principal, secondary and ancillary activity.

Principal activity

Principal activity is the activity that participates the most i.e. contributes in the construction of the total value added of the observed economic unit. Principal activity such determined does not need to cover 50% or more of the total value added of the observed economic unit. Details and the method for determining the principal activity is “*top-down*” method.

Secondary activity

Secondary activity is every other activity of the economic unit that as a result provides goods and services.

Ancillary activity

Ancillary activity is the activity that helps the operation of principal and/or secondary activity such as: accounting, transportation, warehousing, procurement, marketing, mending, and maintenance, etc. Ancillary activities are the activities that exist only to provide necessary support to the principal production activities of an economic unit procuring them with the **non-durable** i.e. expendable goods and services. Result of the principal and secondary activities are goods and services sold to third parties, while goods and services resulted from ancillary activities are neither delivered nor sold to third parties.

However, if principal and/or secondary activity of a business unit and belonging secondary activity (e.g. IT centre) operates in different geographic locations, it would be desirable to collect separate information on different local units, and particularly those data that has to be classified by geographic locations.

Secondary activity has to satisfy the following conditions:

- a) To serve the certain business unit only or the units to which the secondary activity is attached to and the goods and services are not allowed to be sold in the market;
- b) To operate similar activities, also in comparable range, in similar business units;
- c) To produce services or, exceptionally, **non-durable** goods not part of the output products of the business unit;
- d) To participate in current expenditure of the business unit, (does not generate gross fixed capital formation) i.e. not producing goods and services that are part of the fixed assets.

Following activities, in addition to the above mentioned definition, are not considered as secondary activities:

- a) Production of goods and work conducted which are the part of the fixed capital formation, regarding the cases linked to the construction activity for own purposes. It

is in line with the method used in the Classification of Economic Activities BiH (CEA) where the units conducting the construction activity for own purposes are classified, if data are available for such classification, in the area Construction;

- b) Production whose major part is sold even if a part of production is used for the principal activity;
- c) Production of goods that afterwards become the integral part of the output of principal or secondary activity – e.g. production of packaging boxes within the same factory but in different section;
- d) Production of energy (electric power plant or thermal power plant), even if complete production is used to conduct the principal or secondary activity of the main unit;
- e) Purchase of goods for resale (same condition as received);
- f) Research and development, whereas these activities do not provide services to be used in the current production.

C.6.2 STATISTICAL UNITS

Definition

Statistical units, given the business statistics are considered autonomous institutions or parts thereof performing some economic activities. Statistical units deal with economic transactions of goods and services engaging their own labor in the process of production of goods and services to be sold and lent without compensation or used for further production.

Basic characteristics

Autonomous units or parts thereof having inherent legal and organizational structure deal with economic activities. However, significant and fast changes regarding organizational types, ownership, production assortment, production processes, locations, merging and splitting up, etc. can occur very often. Likewise, analytical demands are different for different kind of statistical surveys and required results. In reality, majority of business units deal with many different activities. In order to have a complete statistical picture on industry and other economic activities many different information is needed, but advised organizational level for collecting and grouping information varies depending on the type of data and final purpose of data. Data on profit of a company, for example, are available only from one territorially centralized location, while data on selling may be available in each separate location. Legal and organizational structure of business units and their accounting practice usually are not organized in order to response the statistical needs and legislations.

Statistical unit in essence is a construction created by statisticians for their specific needs. It is used as an instrument to collect data and compile statistical results. As the overall objective of compilation of statistical results is aimed at reflecting real economic results as truly as possible such instruments have to faithfully reflect the elements of reality. In majority of cases this is not a problem and statistical unit corresponds to real business unit, i.e. legal, physical or institutional unit. Still, in some cases statisticians have to reorganize (group or split) the elements of a real world in order to create units able to satisfy specific demands and definitions of certain segments of statistics.

What concerns harmonization of different demands and ensuring collecting, processing, observation and analysis of statistical data in order to obtain data integrity comparable at the state and international level it is necessary to limit and standardize statistical units, i.e. to establish family of statistical units to be obligatory used in the statistical surveys and data processing. Standardization has to be applied on definitions and on classification of statistical units and their activities. Each statistical unit from this family is characterized by certain data

group pertaining to it. Selection of statistical unit, first of all depends on specific area of application. Statistical unit is a specific tool used to provide enough details for analysis of various aspects of economy as it provides an unique basis for comparisons.

Statistical units for which data are collected and compiled have to be, as much as possible, homogenous regarding to economic sector, activity and geographical region.

Second request for statistical units is availability of data on their activity.

Important characteristic of statistical units is their autonomous decision-making, i.e. ability to create financial obligations and to have in their possession fixed and intangible assets.

Statistical units by function

Statistical units by function are:

- **Units for statistical data compilation** (observation units and analytical units), and
- **Units for data collection** (responding units).

Observation units

Observation units are units for which statistical results are compiled in order to monitor their characteristics. The base limit imposed on the observation unit is its autonomy regarding financing and production process and accordingly an observation unit could, in majority of cases, be considered institutional unit. This results in **two types of observation units**:

1. **Totally autonomous units** relating to all functions of financing and production process (enterprise) which means that they:
 - o have to be linked to the market and to be able to set prices for their own products,
 - o have to be complete, i.e. have to control all the functions necessary for the operation of activities.
2. **Units that are autonomous only with regard to production process** (units belonging to the enterprise). Autonomy of decision-making means that such units have administrative records on all basic characteristics of the process.

Analytical units

Analytical units are usually formed by splitting or grouping of observation units where the splitting or grouping is based on the assessments or imputations in such way to ensure detailed and homogeneous compilation of statistical data that would not be possible by using only data on observation units. An example of analytical unit is a definition as “belonging unit” (establishment) in SNA 93.

Reporting units

Reporting units are units required to deliver data. They could be observation units by themselves or separate units such as accounting agencies filling in the questionnaires for their clients. In general, they are units, which deliver questionnaires.

Statistical units and international comparability of statistical data

International comparability of statistical data and comparability of results of different countries cannot be ensured if a joint list of standard statistical units that must be used in their statistical systems is not established. These standard statistical units are used, first of all, to establish the statistical business register which is the base and frame for the implementation of all statistical surveys in a country. Statistical business register represents the bond between organizational profiles of business units and standard structured statistical units where the statistical units are classified according to valid activity classification.

Selected statistical units are used in statistical surveys for data collection, processing, distribution, publishing and statistical analysis, grouped or classified according to different levels of the existing KD BiH.

International comparability is ensured by standard definitions of statistical units by EU Council's Regulation on statistical units for observation and analysis of production system EU, No 696/93. This regulation is based on the following basic assumptions:

- Number of statistical units to be used in the production system has to be rationally limited;
- Statistical units have to be directly linked to the definitions and descriptions given in the introduction of internationally recognized classifications of activity ISIC Rev. 3.1 and NACE Rev.1.1, and in the system of national accounts SNA 93, respectively ESA 95;
- Production system covers all units that are involved in the production process and all economic and financial transactions of such units.

Regulation on statistical units for observation and analysis of EU production system, so called *statistical units of the production system*, gives definition of the following standardized statistical units:

- Enterprise
- Institutional unit
- Group of enterprises
- Unit of the same activity
- Unit of the homogeneous production
- Local unit
- Local unit of the same activity
- Local unit of the homogeneous production

Relationship between different types of statistical units is illustrated in the following table:

Activity	Type of statistical unit	
	One or more locations	Only one location
One or more activities	Enterprise Institutional unit	Local unit
Only one activity	KAU UHP	Local KAU Local UHP

Statistical units for observation and analysis of economy of Bosnia and Herzegovina

Overall monitoring of the legality and regulations that rule market economy of BiH requires definition of statistical standards in BiH that will be mandatory in the process of identification of statistical units, collection, transmission and publishing of statistical data for BiH aimed at production of reliable and internationally comparable data also to be available to the

enterprises, financial institutions, governments and other subjects at the domestic market for analysis and other purposes. Therefore, for the purpose to obtain complete, reliable, prompt and detailed statistical information the use of common definitions of statistics. It is also important to classify the selected statistical units according to KD BiH for all statistical surveys.

In BiH, the standard statistical units, according to “Regulation on statistical units for observation and analysis of production system EU, No 696/93” for classifying activities into corresponding levels, keeping business and administrative registers, conducting of the statistical surveys and statistical analysis, should be used. Also, other regulations that define type of standard statistical units that must be used in specific statistical surveys (SBS Regulation, STS Regulation, PRODCOM Regulation, etc.) must be respected. Standard statistical units defined by these regulations will be gradually introduced in all surveys in BiH in order to identify units for statistical data collection, transmission, publishing and analysis and their aggregation in accordance with KD BiH.

C.6.3 TERMS

This glossary provides detailed explanation of terms used in KD BiH and in Methodology for statistical use of KD BiH. Glossary uses definitions taken from “Introduction to NACE Rev.1.1”, but in some cases, they are extended to definitions taken from “Introduction to ISIC Rev. 3”, and “SNA 93 Methodology”. This is an attempt to ensure the consistency of the terms and their definitions. It should be underlined that these definitions are valid only for this Methodological Manual. Glossary is only an additional tool to help users to correctly interpret and understand the KD BiH

Basic price

Basic price – (according to the SNA concept) is the price, i.e., amount receivable by the producer from the purchaser for a unit of good or service produced as output minus any tax payable on that unit as a consequence of its production or sale (i.e. taxes on products), plus and subsidy receivable on that unit as a consequence of its production or sale (i.e. subsidy on products). It includes any transport margins charged by the producer on the same invoice, even when they are included as a separate item on the invoice. However, it *excludes* any transport charges invoiced separately by the producer.

Gross capital stock – is the value of all fixed assets still in use, at the actual or estimated current purchaser’s prices for new assets of the same type, irrespective of the age of the assets.

Gross capital formation– is measured by the total value of the gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables (sold or delivered to the other units) for a unit or sector

Gross fixed capital formation or gross fixed investment is limited to the legal units of production sector; it is measured by the total value of producer’s acquisition, less disposals of fixed assets during the accounting period plus certain additions to the value of non-produced assets (such as subsoil assets or major improvements in the quantity, quality or productivity of land) realised by the productive activity of institutional units (e.g. enterprises).

Producer’s price – is the price i.e. amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any VAT (value added tax) or similar

deductible tax, invoiced to the purchaser; Producer's price excludes any transport charges invoiced separately by the producer.

Purchaser's price is the price i.e. amount paid by the purchaser, excluding any deductible VAT (value added tax) or similar deductible tax, in order to take delivery of a unit of a good or service at the time and place required by the purchaser; the purchaser's price of a good includes any transport changes paid separately by the purchaser to take delivery at the required time and place.

Value added – According to the concept of ESA and SNA, value added is defined as the value of output less the value of intermediate consumption (costs of material and costs of other intermediate inputs). Value added is a balancing item in a production account. It can be calculated gross or net i.e. before or after deducting consumption of fixed formation.

Gross value added – *is the value of output less the value of intermediate consumption (costs of material and costs of other intermediate inputs)*. Gross value added is a measure of the contribution to GDP made by an individual producer, industry or sector.

Gross value added at basic prices – is defined as output valued at basic prices less intermediate consumption valued at purchasers' prices. Although the outputs and inputs are valued using different sets of prices, for brevity the value added is described by the prices used to value the outputs. From the point of view of the producer, purchasers' prices for inputs and basic prices for outputs represent the prices actually paid and received. Their use leads to a measure of gross value added which is particularly relevant for the producer. The resulting measure has also some convenient properties for aggregation purposes as explained later, although there is no named aggregate in the system, which corresponds to the sum of the gross values added of all enterprises measured at basic prices.

Gross value added at producers' prices - is defined as output valued at producers' prices less intermediate consumption valued at purchasers' prices. As already explained, in the absence of VAT, the total value of the intermediate inputs consumed is the same whether they are valued at producers' or at purchasers' prices, in which case this measure of gross value added is the same as one which uses producers' prices to value both inputs and outputs. It is an economically meaningful measure that is equivalent to the traditional measure of gross value added at market prices. However, in the presence of VAT, the producer's price excludes invoiced VAT, and it would be inappropriate to describe this measure as being at "market" prices.

Net value added – is the value of output less the value of both intermediate consumption and consumption of fixed capital.

Goods – are physical objects for which a demand exists, over which ownership rights can be established and whose ownership can be transferred from one institutional unit to another by engaging in transactions on markets. They are in demand because they may be used to satisfy the needs or wants of households or the community or used to produce other goods or services. The production and exchange of goods are quite separate activities. Some goods may never be exchanged while others may be bought and sold numerous times. The separation of the production of a good from its subsequent sale or resale is an economically significant characteristic of a good that is not shared by a service.

Treatment – is a process that is carried out, inter alia, for the purpose of giving certain properties to certain products, for protecting them or preventing any harmful effect that might otherwise result from their use. Examples are the treatment of crops, wood, metals and waste.

Fixed assets – are assets produced as outputs from processes of production that are themselves used repeatedly or continuously in other processes of production for more than a year. Fixed assets are tangible, e.g. buildings, machinery and equipment, natural assets, i.e. cultivating land or intangible, e.g. exploration of minerals, software, authors' projects and similar.

Industrial process is a process of transformation (physical, chemical, manual or any other transformation) used in production of new products (for the purpose of direct, intermediate or consumption fixed capital), in recycling already used products or provision of services to the industry, as it is defined in Sections C (mining and quarrying), D (manufacturing), E (electricity, gas and water) and F (construction).

Capital goods - are all those goods, with exception of tangible inputs and fuels, which are used in producing other goods and/or services. It includes factory building and structures, machinery, locomotives, trucks and tractors. Land is usually not considered as capital goods.

Output

Production refers to process or processing and output represents result/outcome of that process. Output consists of those goods and services produced during referent period within the production boundary. According to SBS and ESA definitions, the production boundary includes:

- a) market output,
- b) output produced for own final use, i.e. for own final consumption of gross capital formation and
- c) other non-market output, i.e. all goods or services supplied free or at prices that are not economically significant to other institutional units.

The output is valued at basic prices, it is entered at the time the products are created and not when it is paid by the purchaser.

Consumption is an activity in which institutional units use up goods and services. There are two essentially different types of consumption: intermediate consumption and final consumption.

Intermediate consumption – consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets (buildings, machinery, equipment, land) whose consumption is recorded as consumption of fixed capital

Intermediate inputs are valued at purchasers' prices (excluding deductible VAT) for the similar goods and services at the time of entering into production process. It is recorded in the following way: goods are recorded when they are actually used up (and not when they are purchased or stored), and services are recorded at the time of purchase, excluding transporting charges in specific cases.

Final consumption – represents value of all goods and services used by individual households or the community to satisfy their individual or collective needs or wants.

Consumption of fixed capital – represents the reduction in the value of fixed assets used in production during the accounting period resulting from physical deterioration, normal obsolescence or normal accidental damage.

Product – is the outcome of industrial activity, which is defined as separate item in the nomenclature of industrial products. It is the generic term applied to goods that have physical characteristics and to services.

Finished product - is a product for which processing has been completed, i.e. each *product* that has undergone some processing and reached such a degree of transformation or treatment that it has become a new product and obtained a specific code and description listed in the nomenclature of industrial products. Such definition of finished product also covers all finishing works related to the specific product, such as cleaning, packing, quality testing, sorting and similar. The volumes of damaged and faulty products (“wastes”) are not considered as finished products.

Intermediate product – is a product that has undergone certain phases of processing but it has to be processed further before it is completed and ready to be used. Typical examples are rough metal castings sold for finishing elsewhere.

By - products

Exclusive by-product is a product technologically linked to the production of some other products in the same group of products, but which is not produced in any other group, (for example, molasses linked to the production of sugar). Exclusive by-products are used as inputs for the manufacture of other products.

Ordinary by-product – i.e. a by-product which is not exclusive to a single group, is a product technologically linked to the production of other products, but which is produced in several groups (e.g. hydrogen produced during petroleum refining is technologically linked to that produced in petrochemical manufacture and coal carbonisation and identical to that produced in group comprising other basic chemical products).

Semi-finished product – Products that have undergone the phase of processing but require further processing before they are ready for use. They may be sold to other manufacturers for further processing, and one of the typical examples includes rough metal castings sold for finishing elsewhere.

Production – is an activity resulting in a product. It is used with reference to the all-whole range of economic activities. The term is not reserved for the agricultural, mining or manufacturing sectors. It is also used in relation to the service sector (trade, tourism, banking and similar). More specific terms may be used to denote production: provision of services, processing, manufacturing, etc., depending on the branch of activity. Production may be measured in various ways either in physical terms or according to value.

Total production – is actual quantity of the single product, assigned a single code and description in the nomenclature of industrial products, produced during the reference period in the observation unit, irrespective of whether sold to the third parties in the country or abroad (exports), put into stock (intended for sale) or used for further internal processing, or combined.

Commodity – A commodity is a transportable good that may be exchanged. It may be one of a run from a production line, a unique item (artwork) or the material medium for a service (software diskette). This is the concept used for customs classifications.

Transformation – is a process that modifies the nature, composition or form of raw, semi-finished or finished products for the purpose of obtaining new products.

Services – are not separate entities over which ownership rights can be established. They cannot be traded (they can be exchanged) separately from their production. Services are heterogeneous outputs produced by order and which typically encompass changes in the conditions, i.e., characteristics of consuming units realized by the activities of producers at the demand of the consumers. By the time their production is completed they must have been provided to the consumers. The production of services must be confined to activities that are capable of being carried out by one unit for the benefit of another. Otherwise, service industries could not develop and there could be no markets for services.