COMMUNITY INNOVATION SURVEY 2016

SYNTHESIS QUALITY REPORT

Contents

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Abbreviations

Country code	Country Label
BE	Belgium
BG	Bulgaria
CZ	Czechia
DK	Denmark
DE	Germany
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
FR	France
HR	Croatia
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary
MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
NO	Norway
MK	North Macedonia
RS	Serbia
TR	Turkey

1   Introduction

The purpose of this synthesis report is to get an overview of the quality of the Community Innovation Survey for the reference period up to 2016 (CIS 2016) carried out in each Member State, EFTA, Candidate or Associated country. The present report is the synthesis of the national quality reports provided by the countries participating in the CIS 2016. The assessment and all the statements have been performed solely on the basis of these quality reports.

This synthesis document makes an overall assessment of the main aspects of quality reported on the 2016 data collection on innovation statistics. Eurostat received 31 national quality reports (the EU 27 Member States, Norway, Macedonia, Serbia and Turkey), which are summarised in the present synthesis. Results were reported for the reference period 2014-2016[1].

The synthesis report is organised as follows: Chapter 2 gives a methodological overview over the national 2016 innovation surveys. Chapter 3 provides a quality assessment of CIS 2016 statistics. Finally, Chapter 4 summarises the findings of this report.

2   Methodological overview of national surveys

The collection of the CIS 2016 statistics at national level was made following the Commission Regulation No 995/2012 laying down rules for the implementing of Decision No 1608/2003 concerning the production and development of Community statistics on science and technology. The Regulation lists the variables to be collected and specifies the sectors (Core NACE coverage) and the breakdowns by size class of enterprises. In addition, the methodological guidelines proposed by Eurostat provide specific information on the implementation of the CIS 2016, the computation of the indicators and the rules for the data transmission to Eurostat.

The target population for CIS 2016 was all enterprises in Core NACE coverage as described in Annex II of Commission Regulation 995/2012 (market activity enterprises with 10 or more employees, with activity on innovation statistics, sections B, C, D, E, H, J, K and divisions 46, 71, 72 and 73).

2.1   Survey methodology

The majority of the countries carried out a combination of a sample survey of the enterprises included in the frame population, and a census (i.e. full enumeration of a defined part of the frame population). Two countries (Bulgaria and Malta) used exclusively census. Where a combination of sampling with census was used, the employment size class was the main variable to define the threshold. Usually a census was taken for larger enterprises, while smaller enterprises where the population is particularly large, were sampled. Table 1 gives an overview for conducting census where the size class of enterprises is the main criterion.

Table 1. Criteria used in countries for conducting census

Size class of enterprises covered by census	Countries
≥ 20	CY
≥ 50	EE, IE, LU(³)(⁴), PL(¹), SI
≥ 100	DK(⁵), HU, RO
≥ 200	ES(²), SE(¹)
≥ 250	CZ(¹), FR, IT, LV(⁶), LT, AT, PT, SK, FI, MK, RS
≥ 500	DE, EL(²)
All	BG, MT
Other criteria	BE(³), NO(¹) (²)

(¹) Specific combination of NACE and size class
(²) R&D performers
(³) Less populated strata
(⁴) Enterprises having received or applied for grant
(⁵) R&D expenditure
(⁶) Enterprises with innovation activities

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[1] For some variables only the year 2016.

In accordance with Commission Regulation 995/2012, three size classes are included in the core target population: firstly of 10-49 employees, secondly of 50-249 employees and thirdly 250 or more employees. For two countries (Italy and Poland), the CIS 2016 size classes were defined for the number of persons employed and not by the number of employees.

Table 2 gives an overview of the survey type (and if it was mandatory), the target population, the sample size and in the case of combined survey's method (sample/census) the size of sampled and enumerated units. Moreover, the unweighted unit non-response rate for the CIS 2016 and CIS 2014 are presented, that allow to compare these last two surveys.

Table 2. CIS 2016 statistics, overview of survey type and other sampling and response characteristics

Countries	Survey type	Mandatory or Not	Target population	Sample	Sampling ratio (%)	Sampled units	Enumerated units	Un-weighted non response rate (%)	
								CIS2016	CIS2014
BE	Combination census/ sampling	N	14,097	7,736	55	3,949	3,769	41.0	44.0
BG	Census survey	Y	n.a.	14,663	~100	census	census	0.2	0.4
CZ	Combination census/ sampling	Y	25,103	6,638	26	5,142	1,496	8.0	12.8
DK	Combination census/ sampling	Y	13,779	4,522	33	2,630	1,892	3.0	3.0
DE	Combination census/ sampling	N	143,068	21,740	15	18,702	3,038	48.5	49.2
EE	Combination census/ sampling	Y	3,767	2,135	57	:	:	22.2	20.8
IE	Combination census/ sampling	Y	7,613	4,647	61	:	:	43.9	30.7
EL	Combination census/ sampling	Y	10,905	6,218	57	5,956	262	39.4	38.6
ES	Combination census/ sampling	Y	68,015	25,524	38	14,324	11,200	6.2	6.6
FR	Combination census/ sampling	Y	72,107	12,418	17	9,846	2,572	20.1	25.3
HR	Combination census/ sampling	Y	9,868	4,404	45	:	:	24.5	25.2
IT	Combination census/ sampling	Y	115,239	18,789	16	16,469	2,320	30.9	37.5
CY	Combination census/ sampling	Y	1,753	1,384	79	390	994	0.0	0.0
LV	Combination census/ sampling	Y	4,799	3,103	65	1,623	1,480	5.6	4.2
LT	Sample survey	Y	9,955	2,496	25	2,223	273	0.9	0.5
LU	Combination census/ sampling	Y	1,852	985	53	489	496	9.3	11.8
HU	Combination census/ sampling	Y	15,995	8,424	53	6,741	1,683	14.0	7.7
MT	Census survey	Y	1,888	census	~100	census	census	32.1	26.5
NL	Survey	Y	25,804	7,034	27	:	:	19.0	28.0
AT	Combination census/ sampling	N	16,914	5,600	33	4,802	798	48.8	47.0

Countries	Survey type	Mandatory or Not	Target population	Sample	Sampling ratio (%)	Sampled units	Enumerated units	Un-weighted non response rate (%)	
								CIS2016	CIS2014
PL	Combination census/ sampling	Y	62,903	21,300	34	12,446	9,161	17.3	20.8
PT	Combination census/ sampling	Y	20,223	8,859	44	9,601	905	16.8	15.7
RO	Combination census/ sampling	Y	n.a.	n.a.	:	:	:	6.8	6.6
SI	Combination census/ sampling	Y	4,507	2,802	62	1,808	994	15.5	17.8
SK	Combination census/ sampling	Y	7,634	3,667	48	:	:	18.0	21.2
FI	Combination census/ sampling	Y	8,626	3,516	41	3,166	350	30.7	25.7
SE	Combination census/ sampling	Y	36,039	9,297	26	7,885	1,412	16.0	11.7
NO	Combination census/ sampling	Y	9,389	3,999	43	1,681	2,318	1.4	3.1
MK	Combination census/ sampling	Y	3,114	1,515	49	842	673	35.8	25.9
RS	Combination census/ sampling	Y	16,957	3,587	21	2,940	647	22.6	22.6
TR	Combination census/ sampling	Y	105,659	13,190	12	10,449	2,741	16.5	20.6

Figure 1, presents the un-weighted unit non-response rate in the CIS 2014 and CIS 2016. It can be noticed that with a few exceptions (Ireland, Italy, Macedonia and Netherlands) there is no significant variations between the two CIS.

Figure 1. CIS 2014 and CIS 2016 - Un-weighted unit non-response rate (%)
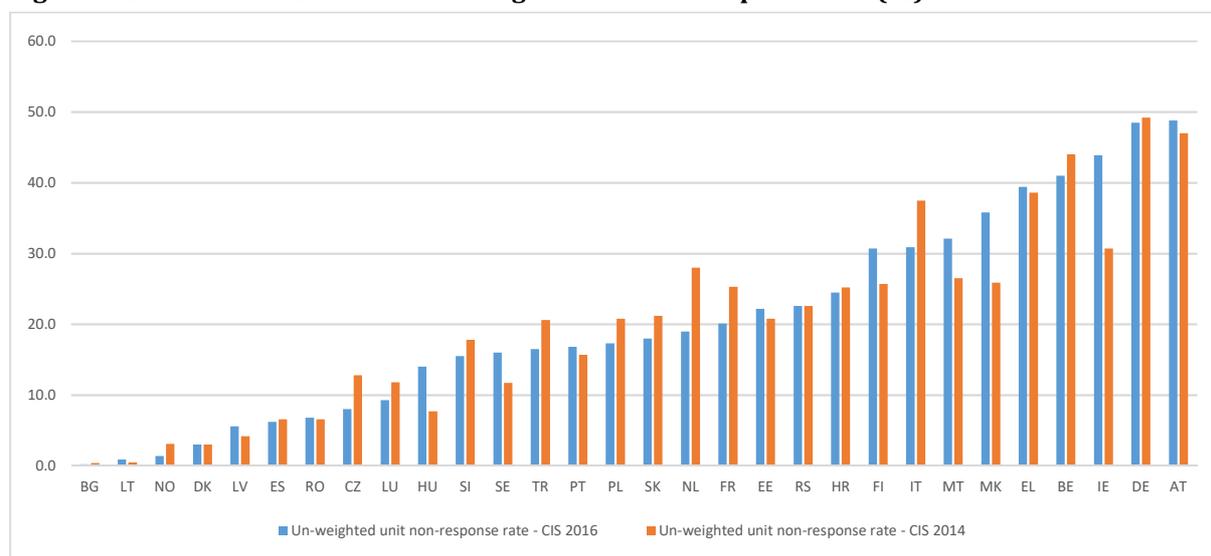
2.2 Data collection

CIS 2016 data were collected through an online survey mostly, where the web questionnaire was implemented as the only option of data reporting by the majority of countries. The survey was organised in this way in Bulgaria, Denmark, Estonia, Greece, Finland, Croatia, Hungary, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Slovakia and Turkey.

In several cases there was also the possibility of a paper questionnaire which could additionally be sent by postal mail, or even be used as a reminder to encourage survey participation (Austria, Belgium, Germany, Spain, France, Latvia, Macedonia, Portugal, Romania, Serbia, Sweden and Slovenia).

Only in Czechia and Malta, the postal survey (paper questionnaire) remained the only option for data collection.

In Cyprus, the CIS data collection was conducted exclusively via face-to-face interviews, while in some countries non-responding enterprises were also contacted by telephone (Belgium, Czechia, Germany and Greece). This mode served as a direct contact for replying to the survey for a limited number of correspondents.

Table 3 gives an overview of the data collection methods used in CIS 2016.

Table 3. CIS 2016 statistics, data collection methods

Data Collection Method	Number of countries	Countries
Only online survey	16	BG, DK, EE, EL, FI, HR, HU, IE, IT, LT, LU, NL, NO, PL, SK, TR
Postal and online survey	12	AT, BE, DE, ES, FR, LV, MK, PT, RO, RS, SE, SI
Only postal survey	2	CZ, MT
Face-to-Face interviews	1	CY

2.3 Evaluation of the CIS 2016 methodology

In general, positive opinions were given about the chosen survey methodology, highlighting the use of electronic forms for collecting data and the improvement of the methodological process, which resulted in a satisfying response rate. Some weaknesses seem to remain through, particularly regarding the definition of innovation where some countries commented that the definition of innovation was still not perfectly clear and that the given concept would make it difficult for enterprises to assess their own activities as innovative or not.

The main strengths and weaknesses of the CIS 2016 methodology, as reported by the countries in the national quality reports, are summarised as follows with the number of countries sharing the same opinion (a count of at least two countries was needed to include the item).

Highlighted strengths:

o Electronic form of collecting data (familiarity with the mode of collection, economical form, data control during fulfilling questionnaires, quicker collection, positive impact on the quality of the data) (13)

o High unit response rate (10 countries)

o Data checking through the introduction of filters and validation rules on the questionnaire (9)

o Good understanding of the questionnaire by the users (5)

o Coherence with SBS data (5)

o Collection of regional data (3)

o On-line manual and phone line available for respondents (2)

Highlighted weaknesses:

o Innovation concept (difficulties for the enterprises to assess their activities as innovative or not) (4)

o Quantification of the turnover from innovative products (goods or services) (2)

o The long length of the questionnaire (small enterprises) (2)

o No user satisfaction survey was undertaken (2)

3   Quality assessment of CIS 2016 statistics

The quality assessment of the national CIS-based innovation surveys focuses on non-response and imputation rates because they reflect the reliability and accuracy of the published data. Furthermore, the comparability has been evaluated (the deviations of national survey questionnaires from the harmonised questionnaire), and information on the accessibility and dissemination of survey results is presented.

3.1   Non-response rates for the national surveys

Non-response occurs when a survey fails to collect some of the required data, i.e. data on all survey variables from all the population units designated for data collection in a sample or complete enumeration.

There are two types of non-response:

- o   Unit non-response, which occurs when no data is collected (or so little as to be unusable) about a population unit designated for data collection
- o   Item non-response, which occurs when only data on some (but not all) survey data items is collected about a population unit designated for data collection

Figure 2, presents un-weighted and weighted unit non-response rates, defined as follows:

- o   Un-weighted unit non-response rate (%) = 100* (Number of units with no response or not usable response) / (Total number of in-scope (eligible) units in the sample)
- o   Weighted unit non-response rate (%) = 100* (Number of weighted units with no response or not usable response) / (Total number of in-scope (eligible) units in the sample)

In Cyprus with mandatory interviews the non-response rate is zero. In Bulgaria where census is conducted it is quasi null of 0.18. Eight other countries (LT, NO, DK, LV, ES, RO, CZ and LU) have un-weighted non-response rates in a range between 1% and 10%. In EL, BE, IE, DE and AT it high of around 40% or more. The high non-response rate in BE, DE and AT might be explained by the fact that the survey is voluntary.

Figure 2. CIS 2016 statistics, unit non-response rate (%)
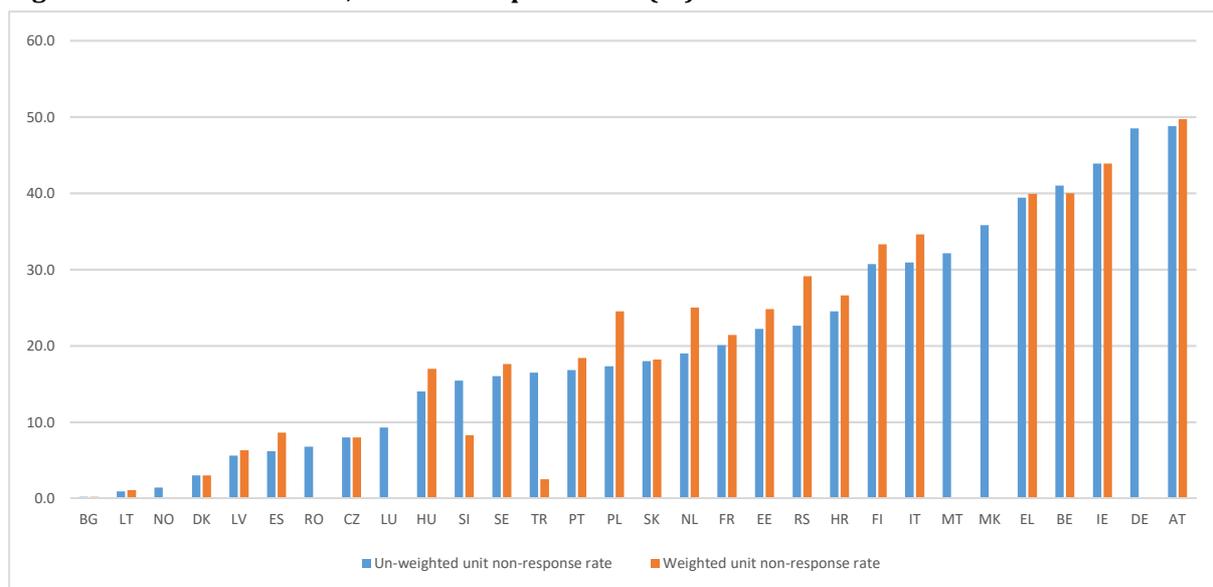
Following Eurostat's recommendations, a non-response survey should be performed when the non-response rate is above 30% (un-weighted). Austria, Belgium, Finland, Germany, Greece, Ireland, Italy, Malta and Macedonia reported non-response rates above this threshold, therefore a non-response survey was carried out to reduce the effect of the low response rate on the data collected. However, in Finland, Ireland, Italy, Malta and Macedonia non-response surveys were not conducted. Some countries pointed to the cost of the non-response survey, and some others to the need to improve survey's methodology to achieve better results.

According to the recommendations, a simple random sample of at least 10% of the non-respondents (excluding non-relevant enterprises) should be selected. In cases where non-response was not equally distributed across strata, a stratified non-response sample should be used. The questions suggested to be included in the non-response survey were also specified in methodological recommendations (cf. annex 2 of this report).

Non-response surveys provide valuable insights into the capacity and limitation of innovation surveys, and the impact of different designs and levels of obligation of respondents to reply. Therefore, this synthesis report contains a summary of the results of the non-response surveys carried out in four countries.

In **Austria** the post-enumeration-survey was started in February 2018 and 1,370 enterprises (50% of the non-responding enterprises) were sampled for the non-response survey. A broad stratification was chosen: 3 industries (B, C, D, E: NACE 05-39; wholesale trade: NACE 46; other services: NACE 49-71) and 3 size classes, i.e. altogether 9 strata. To the selected enterprises were sent the mini-questionnaire by postal mail and asked to answer the four "Yes/No" questions within one week's time. Enterprises were asked to return the questionnaire by mail (prepaid envelope was attached), by e-mail, or by fax. 36% of the enterprises (496 units) responded to the survey. 67% of all enterprises which sent in the mini-questionnaire declared having had at least one of the four types of innovation in the reference period. In the course of the regular survey, also 67% of all respondents were innovation active. The analysis showed that there was no significant difference between responding and non-responding firms in the CIS 2016. Therefore, weights were not recalibrated. However, given that non-response survey inevitably simplify complex issues, the quality of the results should generally be taken with caution.

In **Belgium** a non-response survey was conducted in the Brussels region and in the Flemish region. In the Brussels Region 10% of non-responding firms were randomly selected and called. It was asked to them whether they had introduced new products, new services, new processes, new organizational methods or new marketing methods and whether they had internal R&D (if so, how many). Given the lower level of reliability of the non-response survey is, results were not used to adjust the CIS 2016 results. The Flemish Region also conducted a non-response survey. As the overall (non-weighted) response rate for Flanders was still below 70% (it was 65%), a non-response survey was performed. A stratified random sample of roughly 10% of non-respondents was contacted by phone for an abbreviated non-response survey. The stratifying variables used were the same as those that were used for the original sampling. As the response rate was above 70% for large size firms, for firms with continuous R&D activities, for biotech, nanotech, spacecraft industry firms and for firms that had obtained funding for innovation activities recently, only the remaining small and medium size firms from the core industries for Eurostat reporting were included. The non-response survey contained all questions specified in Annex 6 of the CIS 2016 Methodological recommendations for the various aspects of process innovation in only one question rather than in three separate questions. The fairly high overall response rate obtained with the full survey form in CIS 2016 (65% compared to respectively 50% and 57% in CIS2012 and CIS2014) indicates that the limits of what can be achieved with a voluntary survey was reached. A significant effort was done to encourage firms to respond. Higher innovation rates were obtained in the non-response survey. It was decided not to use the results of this non-response survey to calculate non-response adjusted weights for the Flemish region. The overall response rate to the regular survey form was already fairly high (65%) and close to the 70% response rate to the abbreviated non-response survey form. This strongly suggests that responses to long and short form innovation surveys are not directly comparable. It was decided to

use the inverse sampling fractions for the weights and it was calculated to generalize the results to the targeted population.

In **Germany**, a stratified random sample (stratified by size class, sector and region) of non-responding firms was drawn out of the sample of non-responding firms. A total of 4,552 enterprises (within the Core NACE and the Core size classes of CIS 2016) were successfully interviewed using computer-assisted telephone interview technique. Particular attention was paid to minimise the non-response among the firms contacted in the non-response analysis. The non-response analysis collected information on the size of the non-responding enterprises (number of employees), the main product (in terms of sales volume) in order to check NACE class and information about whether the enterprise has introduced a product innovation, has introduced a process innovation, has ongoing or abandoned innovation activities or has performed in-house R&D in 2014-2016. The results of the non-response survey were used to correct weights for innovators and non-innovators.

In **Greece** a non-response survey was carried out to a simple random sample of around 15% of non-responding units. Since non-response was equally distributed across strata, there was no need for a stratified non-response sample. The non-response questionnaire included the questions proposed in the survey guidelines, including also one question for the reason of non-response. Enterprises were contacted by interviewers via telephone or via on-site visits and were asked to reply to the given questions. The non-response survey succeeded a high response rate (around 90%). The results of the non-response analysis showed that there were no statistically significant differences between non-respondents and respondents of the CIS 2016 survey.

3.2   Non-response rates for the new questions of CIS 2016 questionnaire

Concerning the adoption of the new questions which are related to the effect of legislation or regulations on innovations activities (section 11) and to innovations in logistics (section 14), not all NSOs included these questions in their national surveys (7/31 did not include them in national survey). The assessment of the quality of responses to the new questions is difficult because the information on non-response rate for the new questions is not always available. Fourteen countries out of 24 including the new questions reported the non-response rate to at least one of the new question (see Table 4).

Question 11.1, for example, which refers to the assessment of the effect of the legislation or regulations on enterprise's innovation activities, was not included by thirteen countries and the item non-response rate was not reported by ten countries.

Table 4. CIS 2016 statistics, item non-response rates for new questions

	11.1	11.2	14.1	14.2	14.3	14.4	14.5
BE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BG	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CZ	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DK	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DE	N/A	N/A	12.7%	25.7%	3.8%	N/A	N/A
EE	N/R	N/R	N/R	N/R	N/R	N/R	N/R
IE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ES	N/R	N/R	N/R	N/R	N/R	N/R	N/R
FR	N/A	N/A	0.5%	8.5%	2.5%	15%	26%/3.5%*
HR	N/R	N/R	N/R	N/R	N/R	N/R	N/R
IT	48%	51%	4.6%	18%	2.3%	2.5%	6.7%
CY	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LV	N/R	N/R	N/R	N/R	N/R	N/R	N/R

	11.1	11.2	14.1	14.2	14.3	14.4	14.5
LT	0.0%	N/A	0.0%	0.0%	0.0%	0.0%	N/A
LU	N/A	N/A	0%	4%	0.2%	0.5%	2%
HU	N/R	N/R	N/R	N/R	N/R	N/R	N/R
MT	N/R	N/R	N/R	N/R	N/R	N/R	N/R
NL	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AT	4.5%/7.7%**	N/A	N/A	N/A	N/A	N/A	N/A
PL	N/R	N/R	N/R	N/R	N/R	N/R	N/R
PT	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RO	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SI	N/A	N/A	0.0%	0.1%	74%	74%	0%
SK	N/A	N/A	0.0%	0.0%	0.0%	0.0%	0.0%
FI	0.0%	N/A	N/A	N/A	N/A	N/A	N/A
SE	N/A	N/A	8%	N/A	6.6%	N/A	65.6%
NO	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A
MK	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RS	N/R	N/R	N/R	N/R	N/R	N/R	N/R
TR	N/R	N/R	N/R	N/R	N/R	N/R	N/R

N/A = not included in national survey, N/R = not reported

* 26 % if it took into account enterprises with logistics innovation; 3.5% if it didn't take into account theses enterprises

** 4.5% - the whole block of the question was not answered; 7.7% - at least one legislation or regulation was not answered

3.3 Imputation rate

According to the recommendations, imputation can correct the remaining non-response rate, after every attempt to get the information from the enterprises concerned had been made. Table 4 shows the imputation rates (share of replaced values / total number of values for a given variable) for three metric CIS indicators: total turnover in the last year of the reference period (t); share of the turnover due to new or improved product in the total turnover for product innovative enterprises; and expenditure in intramural R&D. A weighted mean of each metric variable by NACE was calculated and applied as a ratio to the enterprises with the missing values, within the stratum concerned. For expenditure in intramural R&D, the highest imputation rates were recorded in Belgium, Germany, Estonia, France and Austria. Respectively, the imputation of the turnover due to new/improved products in the total turnover for product innovative enterprises had the highest rates in Belgium and Germany.

Table 5 shows the results from those countries that have provided information on the subject in the quality reports transmitted to Eurostat.

Table 5. CIS 2016 statistics, imputation rates (%) for 3 metric variables

Countries	TOTAL TURNOVER in the last year of the reference period (t) (TURN t/TOTAL) [%]		Share of the TURNOVER due to NEW OR IMPROVED PRODUCT in the total turnover for product innovative enterprises (NEWMAR_TURN/INPDT)[%]		EXPENDITURE in intramural R&D (RRDINX/INNOACT) [%]	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
BE	7.0	10.0	18.0	19.0	10.0	11.0
BG	0.0	0.0	0.0	0.0	0.0	0.0
CZ	(*)	(*)	0.0	0.0	0.0	0.0
DE	0.0	0.0	10.8	42.1	22.7	8.3
EE	0	0	0.0	0.0	16.2	11.7

Countries	TOTAL TURNOVER in the last year of the reference period (t) (TURN t/TOTAL) [%]		Share of the TURNOVER due to NEW OR IMPROVED PRODUCT in the total turnover for product innovative enterprises (NEWMAR_TURN/INPDT)[%]		EXPENDITURE in intramural R&D (RRDINX/INNOACT) [%]	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
EL	2.5	2.3	1.5	0.5	7.3	2.9
ES	0.1	0.04	2.1	2.1	0.4	0.3
FR	12.3	14.1	8.3	6.8	11.4	10.9
IT	0.7	0.3	2.0	0.6	3.1	1.3
CY	<0.3	<0.3	0.0	0.0	0.0	0.0
LT	0.0	0.0	0.0	0.0	0.0	0.0
LU	Not imputed. admin. source		2.3	4.4	0.8	0.8
AT	Does not apply		4.9	0.6	8.6	11.6
PL	0.01	0.01	0.1	0.1	Expenditures were not imputed	
PT	0.9	1.2	2.5	2.3	2.4	2.6
SI	0.0	0.0	0.0	0.0	0.0	0.1
SK	0.0	0.0	0.0	0.0	0.0	0.0
SE			2.7	3.3	0.04	0.1

(*) Data from SBS

3.4 Comparability

In this section assesses the comparability of national CIS 2016 statistics. For ensuring comparability across countries, the CIS 2016 uses the Harmonised Data Collection template developed by the CIS 2016 Task Force and adopted by the EU Member States. The questionnaire covers the main themes listed in the Oslo Manual (third edition of 2005).

3.4.1 Deviations from the questionnaire

Table 6 presents deviations (or not) concerning the questions included in the national questionnaires in comparison with the agreed harmonised questionnaire.

Table 6. CIS 2016 statistics, alterations in the harmonised questionnaire

Deviations	Nb. of countries	Added/ Omitted Questions
NONE	7	BG, CY, IE, LV, MT, RS, TR
YES	15	✓ Questions omitted of the national questionnaire (included in the harmonised questionnaire) AT, BE, CZ, EE, ES, FI, FR, HU, LT, LU, MK, NL, NO, SE, SK
	21	✓ Questions added in the national questionnaire (not included in the harmonised questionnaire/ for further information please see annex 1) AT, BE, CZ, DE, DK, EE, EL, ES, FI, FR, HR, IT, LT, LU, NL, NO, PL, PT, RO, SE, SI

3.4.2 Deviations from the target population

No serious deviations were reported regarding the coverage of the NACE sectors, the size classes and the statistical unit. Some countries covered additional categories of NACE and size classes but all the countries have provided data corresponding to the recommendations.

3.5 Accessibility and dissemination

Accessibility of data and dissemination of results are important factors for the quality assessment. Accessibility is evaluated through the different means used by the countries for the dissemination of the CIS statistics to users (researchers in majority). Table 7 shows the available means in the CIS 2016, the level of access and the countries provided each mean of dissemination.

It can be concluded that the majority of countries had a press release, a paper publication and also published the survey's results on their website. An online database was also available to users in most cases. Finally, the dissemination of microdata has been increased and was permitted in several cases via a limited, controlled way as a signed contract, a specific approval or via working in a safe terminal.

Table 7. CIS 2016 statistics, accessibility and dissemination

Means of access		Number of countries	Countries
Press release	Yes (free of charge)	21	AT, BG, CY, CZ, DE, DK, EL, ES, FI, HR, IE, IT, MT, NL, NO, PT, RO, RS, SE, SI, MK
	No	8	BE, EE, FR, HU, LU, LV, PL, SK
Paper publication	Yes (free of charge)	17	AT, BE ,BG, CY, CZ, DE, EL, HR, HU, LT, LU, NL, NO, PL, RO, RS, SK
	Yes (paid)	1	LT
	No	13	DK, EE, ES, FI, FR, IE, IT, LV, MK, MT, PT, SE, SI
Online publication	Yes	26	AT, BE, CY, CZ, DE, DK, EL, ES, FI, FR, HR, HU, IE, IT, LT, LU, LV, NL, NO, PL, PT, RO, RS, SE, SI, SK
	No	4	BG, EE, MK, MT
Online database	Yes	26	AT, BE, BG, CZ, DE, DK, EE, EL, ES, FI, FR, HU, IE, IT, LT, LV, MK, MT, NL, NO, PL, RO, SE, SI, SK, RS
	No	4	CY, HR, LU, PT
Microdata access	Yes (approval/ contract required, or via safe terminal)	22	BE, BG, DE, EE, EL, ES, FI, FR, HR, HU, IT, LT, LU, MK, NL, NO, PT, RO, SE, SI, SK, RS
	No	8	AT, CY, CZ, DK, IE, LV, MT, PL
Anonymised microdata*	Yes	10	BE, BG, DE, HR, IT, LT, NO, RO, SI, SK
	No	20	AT, CY, CZ, DK, EE, EL, ES, FI, FR, IE, HU, LU, LV, MK, MT, NL, PL, PT, SE, RS

*Microdata partially anonymised (e.g. NACE sector or enterprise size class provided at aggregated level)

According to national reports, data was usually accompanied by comprehensive methodological notes that provided information on the scope of the survey, the related concepts and definitions and the data collection method. Moreover, many countries provided guidelines to users for the interpretation of the indicators published and the feedback received from users on the clarity of CIS statistics was considered highly positive.

4   Conclusions

The recommended target population of the CIS 2016 was the total population of enterprises in Core NACE Rev. 2 sections & divisions B-C-D-E-46-H-J-K-71-72-73. These sections include most market activities. On a voluntary basis, some countries covered additionally some "non-core" economic activities. The reference period covered by the survey was 2014-2016 inclusive i.e. the three-year period from January 1st 2014 to December 31st 2016. Data was collected through a census or sample survey or mostly through a combination of both. The CIS 2016 was mainly based on online surveys. Some countries also used other data collection methods as mailed questionnaire or even telephone contacts combined with online surveys. Throughout the processing cycle, there was a systematic and sustained follow up with the responding enterprises to make sure that the data provided is of good quality and data quality checks were performed at the micro and macro-level. In cases of low overall response rates (the un-weighted percentage of unit nonresponse exceeded 30%) non-response surveys were conducted in four (out of a total of 9) countries in order to investigate potential non-response biases. Where there was item non-response, imputations were made in most cases. In fourteen countries, there was an imputation of turnover based on SBS (survey data) or administrative sources.

The main strengths of CIS 2016 reported by the countries are i) the electronic form of collecting data and ii) the high response rate. The electronic form facilitated data collection, was less expensive and time consuming, allowed data controls during processing and resulted in a positive impact on data quality. A better understanding of the questionnaire and coherence with SBS data was also underlined in several cases. However, the innovation concept and the questions related to the turnover from innovative products still need to be better clarification.

Concerning the results of the national surveys, these are mainly available in the website of national statistical institutions (online publications) and at the same time in paper publications, which are free of charge. Moreover, in the majority of countries a database has been created and microdata can also be accessed for research use under specific conditions.

ANNEX 1: List of questions included in the national questionnaire and not included in the harmonised questionnaire

The national quality reports revealed the following interesting, additional questions:

o In Q7.3 "All other countries" were distinguished into "USA", "China/India", "Other" **(AT)**

o After Q9.1 two questions on "Innovation and public procurement" **(AT)**

o In Q13.1 two categories were added: a) lead time advantage before competitors b) complexity of goods or services **(AT)**

o Percentages of turnover coming from Mareur and Maroth, rather than yes/no questions **(BE)**

o It was split the question on product innovations only new to your enterprise, into 2 subcomponents:
   • New products, only new to your enterprise;
   • Significantly improved products, only new to your enterprise **(BE)**

o Only asked for world first products, "inpdfw" **(BE)**

o Enterprises with process innovations were asked whether these process innovation resulted in reduced costs **(BE)**

o Separate question on contract research and clinical trials, to the question on ongoing and abandoned innovation activities **(BE)**

o Separate questions for innovation expenditure for training, for marketing, for design and for any other activities conducted for innovation **(BE)**

o Question on headcounts and FTE for R&D in 2015 **(BE)**

o Asked whether any of the R&D performed in 2014-2016 was in biotech or nanotech **(BE)**

o Questions on public financial support from local government, national government or from EU into more detailed questions **(BE)**

o Follow-up question to the question on public funding for innovation, asking whether the public funding involved cooperation with higher education or with government, or with other partners **(BE)**

o Asked for mergers and acquisitions, as well as for any other organizational innovations, followed by an open text field, in the question on organizational innovation **(BE)**

o Asked for seasonal changes, as well as for any other marketing innovations, followed by an open text field, in the question on marketing innovation **(BE)**

o Question on hampering factors that both innovators and non-innovators had to respond **(BE)**

o Two questions on public procurement, that asked for presence of public procurement, as well as whether this involved innovation, and if so, by contract, or not **(BE)**

o Impacts/results of the introduction of product/process innovations. Request for introduction of product/process innovations **(CZ)**

o No. of employees and turnover in 2015 **(DE)**

o Share of employees with a higher education degree in 2015 **(DE)**

o The enterprise's market share in the main product market in 2014 and 2016 **(DE)**

o Whether the enterprise implemented innovations in the field logistics between 2014 and 2016 and - if yes - which were the reasons for doing it **(DE)**

o 8 items on the market environment (characteristics of competition), measured on a 4-point Likert scale **(DE)**

o 5 items on the competition strategies, measured on a 4-point Likert scale **(DE)**

o Introduction of product innovations that extend an enterprise's product range, share in total sales of these product innovations **(DE)**

o Introduction of process innovations that led to a reduction in unit costs, share of unit cost reduction **(DE)**

o Introduction of process innovations that led to an increase in the quality of products, increase in sales due to this increase in quality **(DE)**

o Planned innovation activities for 2017 and 2018 **(DE)**

o Amount of innovation expenditures planned for 2017 and 2018 **(DE)**

o No. of innovation projects conducted during 2014 to 2016 (total projects, completed projects, abandoned projects, ongoing projects, newls started projects) **(DE)**

- Obstacles to innovation (14 items, following the format of the obstacles question in CIS 3) **(DE)**
- Financial data: expenditure for wages and salaries, expenditure for material and services, expenditure for energy, expenditure for further education, expenditure for marketing and advertising, expenditure for software, capital expenditure, volume of tangible assets, profit margin **(DE)**
- Question about foreign equity and division of market for CIS countries and other countries **(EE)**
- Which enterprise's innovation activities contributed the most, providing a list of areas/fields of special interest (Agro-food, Biosciences, ICT, Energy, etc.) **(EL)**
- Ad-hoc module on "Public sector contracts and innovation" **(EL)**
- Questions related to global value chains **(EL)**
- Is your company located in a Scientist or Technological Park? If yes, what is the full name of the Scientist or Technological Park? What is the year of the incorporation to the Scientist or Technological Park? **(ES)**
- Does your company do activities based on science and technology applicate to living organisms or compounds get through them, to obtain knowledge, goods or services? If yes, complete the personnel table in FTE **(ES)**
- Expenses on internal R&D and other innovation activities, by Autonomous Community **(ES)**
- In 2016, did the company carry out any technological innovation activities that contain free software? If yes, do you use it for R&D activities? **(ES)**
- Brief description of the most important product/process innovation **(ES)**
- If you tick H or I, indicate if it is: an Public Research Organisms, Technological Centres and Research centres of health entities **(ES)**
- Indicate the formula for cooperation used with each type of partner **(ES)**
- What type of cooperation partner do you think it has been the most valued for innovation activities of your company? **(ES)**
- Objectives of technological innovation during the 2014-2016 period **(ES)**
- Intellectual and industrial property rights **(ES)**
- Question on utilisation of big data and public sector open data, a question on utilisation of digitalisation, four questions on cooperation and connections between universities and enterprises (question for cooperation yes/no, question for importance of different types of results from cooperation, question for recent changes in cooperation and question on expectations for next years' cooperation yes/no) **(FI)**
- Were your process innovation not implemented by your competitors **(FR)**
- Item for tax credit for R&D and innovation activities (CIR, CII) **(FR)**
- Most important innovation cooperation partner **(FR)**
- Item for 'improve distribution delay' **(FR)**
- A question about the respondent burden **(FR)**
- A question for comments **(FR)**
- Detailed information on design expenditures **(IT)**
- How much did your enterprise spend on each of the following innovation activities in 2016 only? **(LT)**
- During the three years 2014 to 2016, did your enterprise receive any public financial support for innovation activities from the following levels of government? **(LT)**
- During the three years 2014 to 2016, did your enterprise introduce a product (good or service), process, organisational or marketing innovation with any of the following environmental benefits? **(LT)**
- Does your enterprise have procedures in place to regularly identify and reduce your enterprise's environmental impacts? **(LT)**
- During the three years 2014 to 2016, how would you describe the competitive environment on the main market you were operating in? **(LU)**
- To what extent do the following factors describe the competitive environment on the main market? **(LU)**

- Please provide a short description of the new or significantly improved goods or services **(LU)**
- Please provide a short description of the new or significantly improved processes or methods **(LU)**
- Did the process innovations introduced during the three years 2014 to 2016 lead to a decrease in the production cost per unit in 2016? **(LU)**
- Were any of your process innovations introduced during the three years 2014 to 2016 new to your market? **(NL)**
- Did your enterprise undertake any innovation activities as part of a contract to provide goods or services to a public sector organisation? **(NL)**
- Question on "Objectives for your product and process innovations". Expanded co-operation partners location list for direct comparability with previous Norwegian surveys **(NO)**
- Turnover from sales of goods (total and new or significantly improved) **(PL)**
- Expenditures on innovation activities more detailed - by kinds of innovation activity and source of funds **(PL)**
- Public support is additionally surveyed by type of programme **(PL)**
- Cooperation within cluster initiatives **(PL)**
- Intellectual property protection **(PL)**
- Technology transfer **(PL)**
- Module with user innovation questions **(PT)**

ANNEX 2: List of questions in case of non-response survey

1. During the three years 2014 to 2016, did your enterprise introduce any of the following types of innovations? Please answer yes or no.

		Yes	No
1.	New or significantly improved **goods or services**	☐	☐
2.	New or significantly improved methods of manufacturing or producing goods or services	☐	☐
3.	New or significantly improved **logistics, delivery or distribution methods** for your inputs, goods or services.	☐	☐
4.	New or significantly improved **supporting activities for your processes,** such as maintenance systems or operations for purchasing, accounting or computing.	☐	☐
5.	New or significantly improved **organisational methods**. These involve changes to your enterprise's business practices, organisation of work responsibilities, or external relations with other enterprises or public institutions.	☐	☐
6.	New or significantly improved **marketing methods**. These involve the implementation of new marketing concepts or strategies that differ significantly from your enterprise's existing marketing methods and which have not been used before.	☐	☐

2. At some time during the three years 2014 to 2016, did your enterprise perform R&D to develop or improve goods, services, or processes?

Yes ☐
No ☐

[Only ask the next question if there are one or more positive responses to questions 1.1 or 1.2]

3. During the three years 2014 to 2016, did your enterprise **acquire advanced machinery, equipment or software** in order to produce new or significantly improved goods or services or as part of new or improved processes?

Yes ☐
No ☐