CIS 2006 synthesis Quality Reports

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1 Introduction

The present report is a synthesis quality report of the Fifth Community Innovation Survey (CIS 2006). It aims to provide an overview of the quality of the survey and is the result of the synthesis of national quality reports on CIS2006 that have been received by 20 countries (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Germany, Estonia, Finland, Croatia, Hungary, Luxembourg, Latvia, Malta, Norway, Poland, Portugal, Romania, Sweden and Slovakia).

The report is organised as follows: chapter 2 gives a short methodological overview of the production of national CIS 2006 statistics. Chapter 3 makes an assessment of the quality of the innovation statistics according to the six quality dimensions defined by Eurostat and chapter 4 presents the conclusions of the assessment.

2 Methodological overview

The CIS 2006 was carried out in EU-27 Member States, Candidate Countries and Norway during the period 2004 – 2006, with 2006 being the reference year. It aims to cover information on innovation within the enterprises but with few modifications compared to CIS4. Specifically, in CIS 2006 variables on a) innovation expenditure, b) number of innovation active enterprises that indicated highly important effects of innovation, c) number of innovation active enterprises that indicated highly important sources of information for innovation and d) number of enterprises facing important hampering factors were optional.

Moreover, some pilot questions were added to expand coverage on marketing and organizational innovation while additional breakdowns were used for NACE, size class and R&D status of the firm. In the latter breakdown, the R&D status is defined as whether the firm performs R&D or not.

Most countries conform with the Com. Reg. 1450/2004 to include all enterprises with more than 10 employees in the target population. (Positive) exceptions exist with Germany, Denmark, Norway and Portugal which include enterprises with less than 10 employees while additional NACE activities were included in Belgium, Germany and Portugal.

Regarding the sampling design, most countries used a combination of census and stratified random sampling or either of the two while the national Business Register was used as the sampling frame.

Data was collected mainly through a postal survey while in some cases a combination of mail and electronic survey was used. Face-to-face interviews were carried out in Cyprus and Luxembourg, while Norway, Finland and Portugal offered the option to respond online.

Most countries used Eurostat's quality control rules during data processing while re-contact of the enterprises, imputation and non-response analysis was carried out to eliminate unit and/or item non-response.

3 Quality assessment

This chapter includes an overall assessment of the quality of the Community Innovation Survey 2006 (CIS 2006). It uses the six following dimensions of quality as defined in the Eurostat standard statistical quality framework:

1. Relevance: it is the degree to which statistics meet current and potential users' needs. It includes the production of all needed statistics and the extent to which concepts used (definitions, classifications etc.) reflect user needs.
2. Accuracy: it denotes the closeness of computations or estimates to the exact or true values.
3. Timeliness and punctuality: they refer to time and dates, but in a different manner: the timeliness of statistics reflects the length of time between their availability and the event or phenomenon they describe. Punctuality refers to the time lag between the release date of the data and the target date on which they should have been delivered, with reference to dates announced in the official release calendar.

4. Accessibility and clarity: they refer to the simplicity and ease for users to access statistics using simple and user-friendly procedures, obtaining them in an expected form and within an acceptable time period, with the appropriate user information and assistance.
5. Comparability: it aims at measuring the impact of differences in applied statistical concepts and definitions on the comparison of statistics between geographical areas, non-geographical domains or over time. It is the extent to which differences between statistics are attributable to differences between the true values of the statistical characteristics.
6. Coherence: the extent to which statistics are in agreement with relevant or related statistics originating from different statistical procedures.

3.1 Relevance

3.1.1 User groups, user needs, user satisfaction

Although, a user satisfaction survey is not generally carried out, there is an ongoing process to meet users' needs with the majority of users expressing their satisfaction for the CIS 2006 survey and the quality of the statistics produced. Exceptions are Cyprus and Romania, where a relevant monitoring of user satisfaction was carried out. However, the innovation statistics were classified under a miscellaneous category 'other' and any reference to them was limited resulting to inadequate conclusions. The National Statistics Institute of Romania on the other hand carried out a user satisfaction survey for all statistical fields and with some core questions addressed to the main users. Moreover, some users in Germany expressed their interest for more detailed data at NACE 3-digit level.

In general, the CIS 2006 is considered of good data quality by most countries with main strengths being the high response rate, the familiarity with the survey and its questionnaire, the easiness to contact the enterprises due to previously established contacts and the accuracy of the results.

On the other hand, difficulties in understanding fully the concept of innovation, the length of survey as well as some unmet users' needs for regional innovation statistics are the main weak points of the CIS 2006 as reported by few countries.

3.1.2 Completeness

According to article 5 of the Com. Reg. 1450/2004, two types of data are to be transmitted to Eurostat. The first set of data refers to aggregated statistics that will be transmitted on a compulsory basis while the second one refers to individual data records that could be transmitted on a voluntary basis. As CIS 2006 was a light survey, according to section 3 of the regulation 1450/2004, five out of nine variables are reported on a compulsory basis.

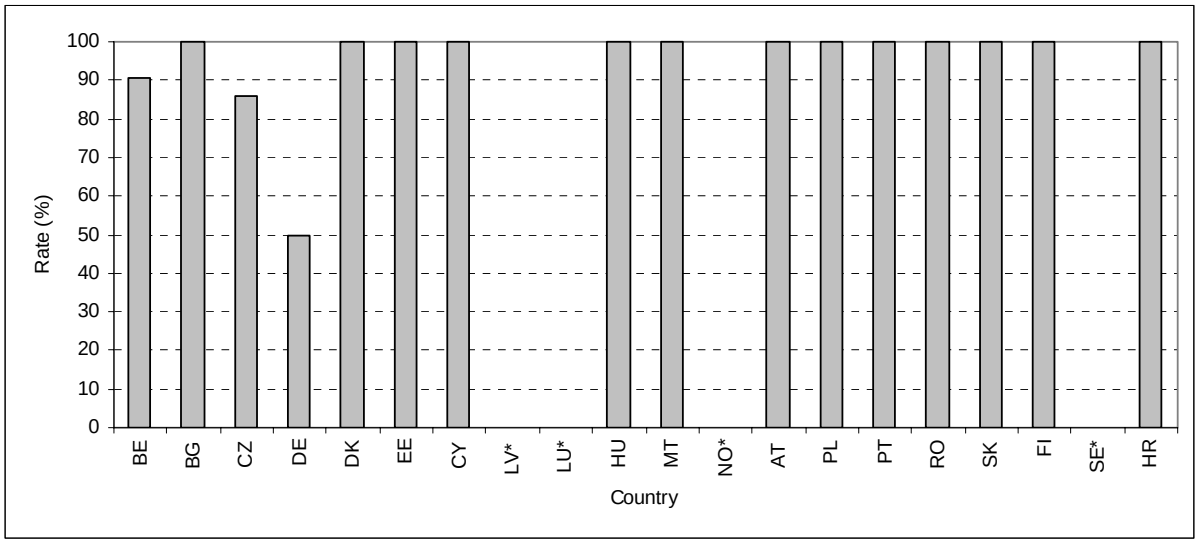
Hence, the mandatory variables for the reference year 2006 are a) the number of innovation active enterprises, b) the number of innovating enterprises that introduced new or significantly improved products new to the market, c) turnover from innovation, related to new or significantly improved products, new to the market, d) turnover from innovation related to new or significantly improved products new to the firm but not new to the market and e) number of innovation active enterprises involved in innovation cooperation.

The completeness of national statistics is assessed with a comparison between the number of compulsory cells which should be transmitted to Eurostat and the number of cells actually transmitted. for reference year 2006.

The following chart shows the rate of transmitted statistics by country. The rate is the ratio:

$$\frac{\text{Number of transmitted cells}}{\text{Number of required cells}} \cdot 100$$

Figure 3.1. Rate (%) of transmitted CIS 2006 statistics.



Source: national quality reports.
Notes: Asterisks indicate that relevant information was not provided in the national quality report.

As it can be seen from the above table, almost all countries transmit all the compulsory aggregated statistics on innovation. The relatively lower, compared to the other countries, rates reported by Belgium, Czech Republic and Germany were due to missing cells on

- the number of enterprises and turnover in 2006 for new or significantly improved products which were new to the firm and new to the market and turnover in 2006 for new or significantly improved products which were new to the firm but not new to the market
- the number of enterprises with any type of innovation cooperation and by type of innovation cooperation partner

As reported by Belgium, there were no firms at all for some cells on the above variables and consistently on sectors NACE 11 – 13 as well as for 'more than 250 employees' of NACE C.

3.2 Accuracy

Accuracy of statistics is the outcome of many factors which makes very difficult its quantification with precision. In this quality report we resort to an indirect assessment and we present information on sampling and non-sampling errors which affect CIS statistics.

Two particular points in the information presented below are causes of concern: the under-coverage of innovation activities in small enterprises and the large non-response rates. However, each of these problems is evident in very few countries. The information given in the quality reports does not allow us to firmly assess how seriously these problems degrade accuracy. They should be further investigated by the countries concerned.

The overall picture however is that all countries make considerable efforts to reduce errors or at least to identify and correct them. Interviewer training and provision of assistance to respondents are used during data collection. Comprehensive data validation is the norm during and after data collection. Re-contacting of enterprises is the primary option for correcting errors and the use of imputation is therefore less needed. All these factors point to high quality of the innovation statistics.

3.2.1 Coverage error

Very few coverage problems were reported. More specifically under-coverage was reported in four countries (BE, EE, SK and RO). However, this was quite small due to missing contact information for some enterprises. These enterprises were then withdrawn and the sample was readjusted.

Countries were also asked to provide the misclassification rates of their frames, i.e. the percentage of enterprises which were found to belong in a different stratum than indicated by the frame. These are given in Table 3.2.

Table 3.2. CIS statistics, 2006. Frame misclassification rate (%) by size class.

Country	Small [10-49]	Medium [50-249]	Large [>249]	TOTAL
BE	1.04	3.8	5.9	1.7
BG	0.0	0.0	0.0	0.0
CZ	4.64	8.61	0.68	4.93
DE	14.8	19.9	12.8	15.8
DK	0.02	0.03	0.03	0.03
EE	0.06	0.05	0.04	0.06
CY	0.0	0.0	0.0	0.0
LV	7.9	4.5	1.8	7.1
LU	0.05	0.09	0.06	0.07
HU	4.0	8.86	8.78	6.23
MT	1.0	0.0	27.0	0.0
NO	0.24	0.61	0.27	0.37
AT	0.0	0.0	0.0	0.0
PL	0.04	0.02	0.02	0.03
PT	1.9	8.02	6.35	4.04
RO	0.09	0.11	0.08	0.09
SE	---	---	---	---
SK	5.1	9.9	7.8	7.5
FI	0.0	0.0	0.0	0.0
HR	7.38	14.32	7.59	9.96

Source: national quality reports.

The misclassification rates are quite high in some countries. However, as long as the misclassification is cleared when compiling innovation statistics and when estimating the coefficient of variation and the latter is small, this is not a major issue. It could become a serious problem only if it distorts severely the representation of small strata in the sample but no such problem has been reported.

3.2.2 Processing error

No country raised concerns about processing errors. Although they may exist they are most often detected during data validation and are corrected, usually by checking the consistency with data from previous innovation surveys and / or re-contacting the respondents.

3.2.3 Non-response

Non-response is evident in the CIS surveys of several countries. No special measures or incentives for boosting up response were reported except for the use of reminders and repeated attempts to contact non-respondents. The number of reminders ranges from two to five with additional phone calls made in several countries.

In the table below we present both un-weighted and weighted response rates, defined as follows:

- Un-weighted Unit Response Rate= 100*(Number of units with a response) / (Total number of eligible and unknown eligibility units in the sample)
- Weighted Unit Response Rate = 100*(Weighted number of responding units) / (Weighted number of eligible and unknown eligibility units in the sample)

The weighting is with the same weights used for estimation of population statistics with sample data. Therefore the weighted response rate is an estimate of the proportion of population units which would respond, had a census been used. When a country uses a census un-weighted and weighted response rates coincide.

Table 3.3 shows both rates for each country, where these are available. We see that five countries (BE, DE, DK, AT, SE) have response rates below 70% and twelve have response rates above 80%.

Table 3.3. CIS statistics, 2006. Unit response rate (%).

Country	NACE	[1]	[2]	[3]	[4]
BE	Total	3261	8503	38.3	37.4
BG	Total	12845	14976	85.7	85.7
CZ	Total	6799	8465	80.3	76.2
DE	Total	4001	18955	21.1	19.4
DK	Total	1682	2727	62.0	55.0
EE	Total	1924	2311	83.3	80.3
CY	Total	1232	1232	100	100
LV	Total	1117	1185	95.5	94.1
LU	Total	573	645	89.0	
HU	Total	4947	6047	81.8	77.8
MT	Total	840	1207	70.0	70.0
NO	Total	6440	6946	92.7	
AT	Total	3513	5412	65.5	
PL	Total	15875	19525	86.0	79.0
PT	Total	4721	6373	74.0	72.0
RO	Total	10015	12078	82.9	75.5
SK	Total	2678	3207	84.0	78.0
FI	Total	2563	3398	75.4	
SE	Total	3262	5127	63.6	59.9
HR	Total	3093	3818	81.0	80.1

Source: national quality reports.

[1] = Number of units with a response in the realised sample
[2] = Total number of units in the sample
[3] = Un-weighted unit response rate
[4] = Weighted unit response rate

As for the item non-response, questions on innovation expenditures, total turnover, total personnel and turnover's shares from product innovations (especially that from products new to the market) reported to have the highest non-response rate. Some of the reasons for not reporting them are confidentiality constraints (especially for the small enterprises), the time and effort needed (especially for the larger-sized enterprises) to provide such information as well as conceptual difficulties of the respondents.

Non-response surveys were carried out by four countries (AT, BE, DE, DK).

3.2.4 Use of imputation

National authorities try to correct errors in the data by re-contacting the enterprises concerned. Only if this is not possible they resort to imputation for automatic correction. The imputation rates, i.e. proportion of enterprises for which imputation was used, are shown in table 3.4.

Table 3.4. CIS statistics, 2006. Imputation rates (%) for five key indicators.

Country	NACE	Turn [1]	TurnIn [2]	TurnMar [3]	RrdInX [4]	Rtot [5]
BE	Total	11.5	55.5	55.9	6.6	6.2
BG	Total	0.13	9.51	7.18	14.27	14.27
CZ	Total	0.85	0.0	0.0	0.0	0.03
DE	Total	0.0	11.0	7.0		16.0
DK	Total	0.08	0.05	0.05	0.0	0.02
EE	Total	0.0	0.0	0.0	0.0	0.0
CY	Total	2.3	0.0	0.0	0.0	0.0
LV	Total	0.0	0.0	0.0	0.0	0.0
LU	Total	0.0	11.1	10.99	23.97	20.32
AT	Total	100	3.8	2.7		
PT	Total	0.42	9.91	5.86	4.2	7.23
RO	Total	0.0	0.83	0.93	0.0	0.0
SK	Total	0.0	0.0	0.0	1.6	1.6

Source: national quality reports.
[1] = Total turnover in 2006.
[2] = Turnover due to new or improved product (Share).
[3] = Share of new or improved products to market.
[4] = Expenditure in intramural RD.
[5] = Total innovation expenditure.
Note: In Austria total turnover was not asked in CIS 2006 but taken from SBS. Countries not reported did not provide the relevant information

Belgium had considerable high imputation rates especially for share of turnover due to new or improved product and share of new or improved products to market. This could be related either to a

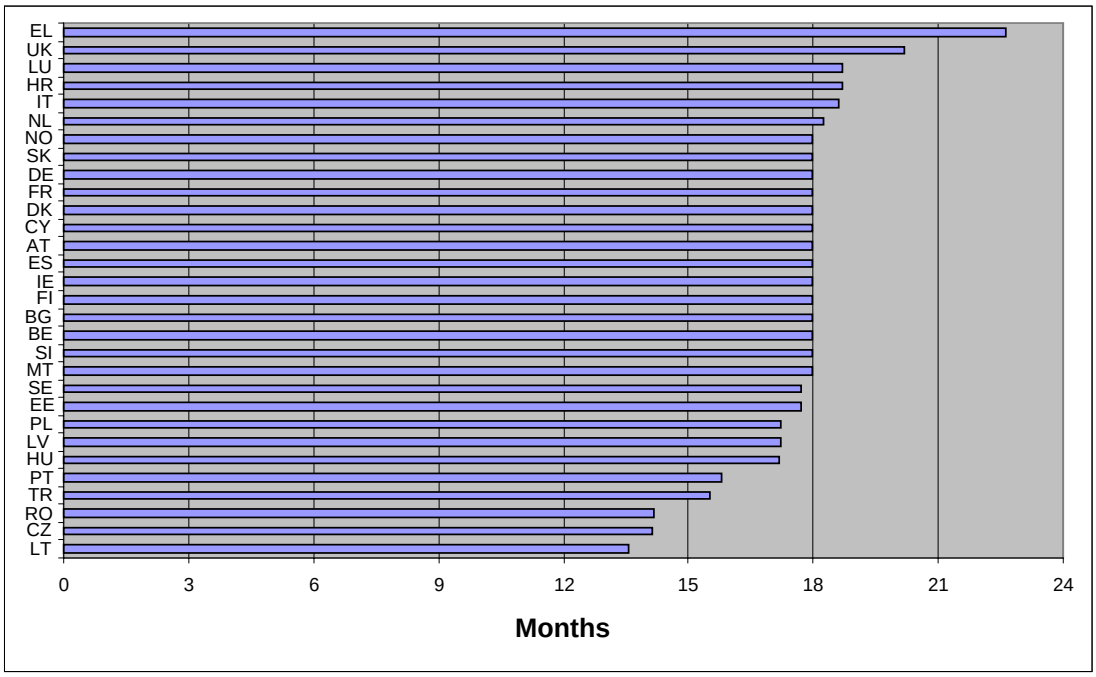
low response rate of approximately 40% observed in this country or to non-availability of firms on those two variables as reported in section 3.1.2.

Some countries reported the use of Eurostat's control rules for imputation of missing values while others used additional information from other sources such as the national Business Register and SBS.

3.3 Timeliness and punctuality

In Figure 3.2 below, we display graphically the difference in time between the end of the reference period and the time of transmission of the data to Eurostat. It ranges between 14 (Czech Republic, Lithuania and Romania) and 23 months (Greece).

Figure 3.2. Timeliness of CIS 2006 statistics by country



According to Com. Reg. 1450/2004 national CIS statistics must be delivered to Eurostat within 18 months from the end of the reference year.

Most countries conform with the regulation and they delivered the data on the requested date. The only exceptions were Italy, Luxembourg and Croatia (1 month delay), UK (2 months delay) and Greece (5 months delay).

3.4 Accessibility and clarity

CIS statistics are available for free at national level. All the usual means of dissemination are reported by the countries:

- Press releases / press conferences
- Internet: main results available on the national statistical authority's website
- Paper publications (Statistical Yearbooks, annual reports, articles)
- CD-ROMs
- Data prepared for individual ad hoc requests

Moreover national authorities try to make the statistics as usable as possible by the following means:

- Users can request from the national statistical authority assistance in better understanding and interpreting the statistics (by phone, mail, e-mail, etc).

- Definitions are added to the publications and the main publications contain methodological information.
- Methodological reports are available on the authority's website.

Most countries consider that their users are satisfied with the disseminated data and that they meet their requirements. Moreover the accompanying methodological documentation is understandable by users.

3.5 Comparability

In this section we assess the comparability of national CIS 2006 statistics. The factors which affect the comparability of statistics may be grouped into two major categories: (a) concepts and (b) measurement / estimation methodology. In this section we deal with each category and subsequently also report the comparability of national statistics over time.

3.5.1 Comparability of survey concepts

Com. Reg. 1450/2004 provides detailed recommendations about the compilation of innovation statistics which can be considered as an international standard in this domain. Moreover it provides in accordance with the Oslo manual, those harmonised concepts and definitions that Member States should apply for the statistics to be compiled.

Table 3.5 presents key concepts and the number of countries which adopt the recommendation. When the recommendation is not adopted the respective national practices are also presented.

Table 3.5. CIS statistics, 2006. Agreement of national concepts with Oslo Manual and Com. Reg. 1540/2004 recommendations

CONCEPT / ISSUE	Number of countries adopting the recommendation	Number of countries not following the recommendation	Comment on differences
QUESTIONNAIRE			
Deviation from the harmonised CIS 2006 questionnaire	16	4	In DE questions on information sources, innovation cooperation, effects of innovation, intellectual property rights and on effects of organisation innovation were not asked. Moreover, questions on general information about the enterprise, innovation expenditure and on hampering factors were phrased differently, while a large number of additional variables were used at national level. In DK questions on innovation activities and expenditures on intramural and extramural R&D were asked separately to be able to retrieve necessary information on R&D personnel etc. Moreover experimental modules including national pilot modules were asked instead of questions on public financial support, information sources and hampering factors. In LU the extended CIS module on marketing and organisational innovation was used together with an extended Knowledge Management module and some additional questions on competition on market, results of innovation planned innovation activities etc. In NO, the sequence of some questions is different while there were some additional questions on organisational and market innovation.
National data collection period	20	-	
Deviation from the sampling frame	20	-	
TARGET POPULATION			
NACE sectors covered	17	3	NACE 73 was also covered in BE. In PT NACE 45, 52, 55, 73 and 74.1 to 74.8 were also covered, while in DE NACE 73, 74.1, 74.4-74.8, 90, 92.1, 92.2 were also covered

CONCEPT / ISSUE	Number of countries adopting the recommendation	Number of countries not following the recommendation	Comment on differences
Size classes	16	4	Enterprises with 2-9 employees were included in the DK questionnaire. In NO, DE and PT enterprises with 5-9 employees were also included
Statistical unit	20	-	
SURVEY METHODOLOGY SAMPLING FRAME			
Sampling frame	19	1	DE used the enterprise register of the largest credit rating agency in Germany which is comparable to official business registers
Date of business register extraction	19	-	
DATA COLLECTION			
Survey method	20	-	
Mail survey	18	2	Face-to-face interviews in CY and LU. NO, FI and PT offer the option to respond online
Reminders	18	2	More than 2 reminders in PT. No reminder in CY
STRATIFICATION OF THE SAMPLE			
NACE	16	3	Some additional NACE activities and regions at NUTS1-level were included in LV and LU. In DK some NACE activities were merged
Size	17	2	LV and DK used a different classification breakdown (with more classes) for the size of the enterprises
SAMPLING	19	-	
SAMPLE ALLOCATION	18	1	In DK a PPS-modified allocation method is used
PRECISION	18	-	
NON-RESPONSE SURVEY	4	-	
DATA PROCESSING	20	-	

Source: national quality reports.

As demonstrated in Table 3.5 very few countries reported deviations from the harmonised CIS 2006 questionnaire. Specifically, Denmark included some national pilot modules instead of questions on public funding, information sources and hampering factors. These questions are not mandatory in the CIS 2006 and therefore their replacement by other national questions should not affect comparability between countries significantly as the main innovation indicators remain the same.

The same holds for countries that include additional questions on organisation and market innovation (Luxembourg and Norway) and those that change the sequence of some questions (Norway), i.e. the comparability is not affected significantly as long as the main innovation indicators remain the same.

In Germany the mandatory question on innovation cooperation was not included in the national CIS 2006 questionnaire but collected through an additional telephone survey. Had this survey cover the same enterprises as the CIS 2006 there should not be a problem of comparability.

Small deviations from the target population were reported by three countries (Belgium, Germany and Portugal) that included additional NACE sectors, while four countries (Denmark, Germany, Norway and Portugal) cover enterprises with less than 10 employees.

Most countries carried out a postal survey except from Cyprus and Luxembourg where face-to-face interviewing took place. Moreover, two reminders were sent for the follow-up of the respondents by most countries and only Portugal and Cyprus send more than 2 and no reminders respectively. Non-response survey was carried out by three countries where a low response rate was reported.

The recommended stratification by NACE, enterprise size and region was used by most countries that carried out a sample survey. Deviations were reported by very few countries in which some additional NACE activities were either included or merged while in other cases additional size classes for the number of employees were used and NUTS1 regions were included.

The table moreover testifies to the acceptance of the Oslo Manual as a standard for the measurement of innovation.

3.5.2 Comparability of measurement / estimation methodology

The Oslo manual and Com. Reg. 1450/2004 leave great freedom of choice regarding measurement and estimation methodology to producers of innovation statistics. It is correct to say that, if the concepts are comparable, scientifically sound measurement and estimation methods produce comparable statistics; on the other hand, the methods may introduce effects which reduce comparability. For example, if one country's innovation statistics are biased and the direction and size of the bias are not known the comparisons with other countries will be of reduced reliability.

In the tables that follow we present the sample designs (Table 3.6), as well as the data collection methods and processing national practices (Table 3.7) and comment on their comparability.

Sampling

Table 3.6. CIS statistics, 2006. Overview of national sampling schemes

Country	Sampling method	Sample size	Sampling fraction
BE	Stratified sampling	-	95% for Brussels 64% for Walloon 50% for Flanders
BG	Census	NA	NA
CZ	Census and stratified random sampling	-	-
DE	Stratified sampling	NA	NA
DK	Census and stratified random sampling	-	
EE	Census and stratified random sampling	231	57.4%
CY	Census and stratified random sampling	-	-
LV	Census and stratified random sampling	1185	22.1%
LU	Census and stratified random sampling	-	43.2%
HU	Census and stratified random sampling	-	31.5%
MT	Census	NA	NA
NO	Census and stratified random sampling	-	-
AT	Census and stratified random sampling	5412	34.0%
PL	Census and stratified random sampling	-	39.0%
PT	Census and stratified random sampling	-	-
RO	Stratified random sampling	-	-
SK	Stratified random sampling	-	38.6%
FI	Census and stratified random sampling	-	43.5%

Country	Sampling method	Sample size	Sampling fraction
SE	Stratified random sampling	-	-
HR	Census and stratified random sampling	3998	49.9%

Source: National quality reports.

Most countries used a combination of census and stratified random sampling, others use a stratified random sampling while two of them (Bulgaria and Malta) use a census. In the latter case the census refers either to known / supposed innovation performers or to enterprises beyond a certain size.

Data collection, processing and analysis

Table 3.7. CIS statistics, 2006. Overview of national data collection and processing schemes

Country	Data collection method	Data processing	Treatment of non-response	Data weighting
BE	Combination of mail and electronic survey 2 reminders	Use of Eurostat quality control rules	Non-response survey (partially), re-contacting the enterprises, imputation	The basic weights were adjusted for non-response using calibration for the Flemish region
BG	Main and electronic survey 2 reminders + phone calls	Use of Eurostat quality control rules (additional controls and checks were also used)	Re-contacting the enterprises, imputation	
CZ	Mail survey 2 reminders	Use of Eurostat quality control rules		CALMAR (calibration of margins) was used
DE	Mail survey 2 reminders	Use of Eurostat quality control rules	Non-response survey (partially), re-contacting the enterprises, imputation	The inverse of the sampling fraction was used as weight
DK	Mail survey 2 reminders	Use of Eurostat quality control rules (additional controls and checks were also used)	Non-response survey, re-contacting the enterprises, imputation	CALMAR (calibration of margins) was used
EE	Mail survey 2 reminders	Use of Eurostat quality control rules	Re-contacting the enterprises	The inverse of the sampling fraction was used as weight
CY	Face-to-face interviews No reminders	Use of Eurostat quality control rules (additional controls and checks were also used)	Re-contacting the enterprises, imputation	The inverse of the sampling fraction was used as weight
LV	Mail survey 2 reminders	Use of Eurostat quality control rules	Re-contacting the enterprises	The inverse of the sampling fraction was used as weight
LU	Face-to-face interviews 2 reminders	Use of Eurostat and some additional controls have been carried out	Imputation	CALMAR calibration was used based on number of enterprises and number of employees per sector
HU	Mail survey 2 reminders	Use of Eurostat quality control rules	Re-contacting the enterprises	No calibration was made
MT	Mail survey 2 reminders	Use of Eurostat quality control rules	Imputation	
NO	Combination of mail and electronic survey 2 reminders	Use of Eurostat quality control rules (Partly)	Re-contacting the enterprises	Weights were based on SAS-commands developed by the country
AT	Mail survey 2 reminders	Use of Eurostat quality control rules	Non-response survey, re-contacting the enterprises, imputation	Results were re-weighted
PL	Mail survey 2 reminders (or more reminders if needed)	Use of Eurostat quality control rules	Re-contacting the enterprises	Results were re-weighted
PT	Electronic and mail survey 9 reminders	Use of Eurostat quality control rules	Re-contacting the enterprises , imputation	The inverse of the sampling fraction was used as weight

Country	Data collection method	Data processing	Treatment of non-response	Data weighting
RO	Mail survey and face-to-face interviews 2 reminders	Use of Eurostat quality control rules	Imputation	CLAN calibration was used
SK	Mail survey 2 reminders	Use of Eurostat quality control rules	Re-contacting the enterprises, imputation	Reweighing after exclusion of non-active enterprises from the frame and non-active and non-responded enterprises from the sample.
FI	Combination of mail and electronic survey 2 reminders + phone calls	Use of Eurostat quality control rules	Re-contacting the enterprises, imputation	
SE	Mail survey 2 reminders	Use of Eurostat quality control rules	Re-contacting the enterprises	CLAN calibration was used
HR	Mail survey 2 reminders	Use of Eurostat quality control rules	Re-contacting the enterprises	The inverse of the sampling fraction was used as weight

Source: National quality reports

Many of the gaps in the Table 3.5 might be due to the countries not understanding what information should be reported under the relevant headers. The reported practices are very similar between countries because they represent good survey practice in general. Interviewers are trained and the questionnaire is tested before implementation. Postal surveys and in some cases a combination of postal and electronic surveys were reported. Most national authorities use Eurostat's quality control rules during data processing while results were re-weighted when a non-response survey is applied. In several cases, Eurostat's recommended calibration methods were used to derive the weights.

3.5.3 Comparability over time

Comparability over time, i.e. between the statistics published by each country across the years is important. The national statistical authorities reported relative difference in the time series of national innovation statistics for the following key variables: a) Proportion of enterprises with innovation activity (Inn_Ent), b) enterprises with co-operation arrangements (Co_N), c) total innovation expenditure as a % of total turnover for enterprises with innovation activity (RTOT), d) turnover from all new products as a % of total turnover, for enterprises with innovation activity (Turnnew_all), e) turnover from new products new to the market as a % of total turnover, for enterprises with innovation activity (Turnnew_mkt).

Table 3.8 presents the percentage relative differences between aggregated CIS4 and CIS 2006 data for each of the above mentioned indicators.

Table 3.8. Comparison between CIS4 and CIS 2006 data (relative difference: (CIS4/CIS2006)*100).

Country	Inn_Ent%	Co_N%	RTOT%	Turnnew_all%	Turnnew_mkt%
BE	73.7	100.3	97.9	88.8	76.2
BG	79.7	103.7	97.8	138.9	143.9
CZ	107.4	105.6	142.4	97.6	96.5
DE	104	95	102	92	73
DK	113	123	119	106	102
EE	101	88	44	93	106
CY	116.8	53.7	121.4	44.4	35.4
LU	107.7	90.9	83	139.9	108.9
MT	73	135	70	68	52
NO	103.8	122.9	99.7	99.5	105.9
AT	103.8	44.7	-	77.9	78.8
PL	115	88	129	131	143
PT	101.5	108.5	99.9	77.9	66.2
RO	95	99	127	93	155
FI	84	77	-	100	95
HU	103.5	94.4	130.3	79.8	67.1
SK	89.5	88.6	108.2	109.5	157.2

Source: National quality reports.

Note: Countries not presented did not provide the relevant information.

The above table shows that the relative differences were mainly observed on:

i. Enterprises with co-operation arrangements as reported by AT, CY, MT, DK, FI and NO.
ii. turnover (either from all new products or new to the market products) as a % of total turnover for innovative enterprises as reported by BG, CY, DE, MT, PT, LU, HU, RO and SK
iii. total innovation expenditure as a % of total turnover for innovative enterprises as reported by EE, CZ, HU, MT, PL and RO.

Austria reported a reformulation of the definition for 'innovation cooperation' as compared to that used in CIS4 as a reason for higher percentage of enterprises with innovation cooperation (Co_N). In Estonia the significant discrepancies in the total innovation expenditure (RTOT) were due to big investments of innovation in NACE 61 (Water transport) while in Germany the significant increase in the share of sales from new-to-the-market products (Turnnew_mkt) was the result of the rapidly increasing new innovations in the market in 2006 compared to 2004.

3.5.4 Overall assessment of comparability

The information which has become available through the quality reports and the metadata of the countries demonstrates their efforts to increase agreement with the Com. Reg. 1450/2004 and the Oslo manual standards.

This can be seen in Table 3.5 where most countries adopt the regulation. Some deviations from the regulation concern mainly the harmonised CIS 2006 questionnaire which should not affect the comparability between countries substantially as long as the same innovation indicators are produced.

On the other hand there was an effort to expand the target population as Germany, Denmark, Norway and Portugal use enterprises with less than 10 employees while some additional NACE activities are covered in Germany, Belgium and Portugal. However, even in such cases there is no serious impact on the comparability, since the countries can easily filter out the extra NACE and/or size classes and provide data only for the enterprises covered by the target population.

Table 3.7 provides a comparison of data collection and processing practices between countries. Most countries conform to Eurostat's recommendations on means of data collection and they carry out a mail survey and in some cases a combination of postal and electronic survey. As for data processing, Eurostat's control rules are used by almost all countries while Eurostat's recommended methods are used for weighting. Moreover, a non-response survey was carried out in the case of low unit response rate while re-contacting of the enterprises and imputation were also used for treating unit and/or item non-response.

Although comparability over time showed some relatively big differences between aggregated CIS 2006 and CIS4 data on a number of key innovation indicators this does not necessarily imply the presence of comparability problems. Such discrepancies may be due to a 'normal' trend evolution of CIS statistics over time. .

3.6 Coherence

3.6.1 Coherence with Structural Business Statistics

Table 3.9 below shows the relative differences between aggregated CIS 2006 data and SBS data from 2005* for the following five key variables: a) Proportion of total turnover in 2006 (Turn), b) Proportion of total number of employees in 2006 (Emp), c) Proportion of number of enterprises by NACE (NbEnt), d) Proportion of expenditure in intramural RD (RrdInx), e) Proportion of total turnover in 2006 per employee (TurnEmp).

Table 3.9. Comparison between SBS and CIS 2006 data (relative differences: (SBS/CIS2006)*100)

Country	Turn%	Emp%	NbEnt%	RrdInx%	TurnEmp%
DK	100	100	100		100
EE	97	100	100	94	100
CY	101.7	116.5	128.2	119.1	87.3
CZ	94	98.1	104.7	124.7	95.9

MT	102	106	105	95	107
NO	102.8	88.5	101		101.7
AT	103.1	94.3	103.8		109.3
RO	99.7	100.2	103.3	4.6	99
FI	86	84	93		102

Source: National quality reports.
Note: Countries not presented have either taken their results directly from SBS or there are no SBS results to compare with.

* Except from CZ and MT where the comparison was done with SBS 2006

As it can be seen from the above table, the proportion of total turnover in 2006 per employee and the proportion of expenditure in intramural R&D were those two variables with the largest discrepancies between the two surveys.

4 Conclusions

Here we present the conclusions of the assessment on the six quality dimensions: relevance and completeness, accuracy, timeliness and punctuality, accessibility and clarity, comparability and coherence.

Regarding the first dimension, users are generally satisfied with the statistics produced. Moreover, most countries transmit all compulsory aggregated statistics on innovation to Eurostat. However, information on enterprises and turnover in 2006 for new or significantly improved products which were new to the firm and new to the market and turnover in 2006 for new or significantly improved products which were new to the firm but not new to the market as well as information on enterprises with innovation cooperation are sometimes not transmitted either due to confidentiality constraints or to non availability of data.

A high degree of harmonisation in concepts and methods has been achieved through the adoption of Commission Regulation 1450/2004 and the Oslo manual for the compilation of innovation statistics. As shown earlier few countries deviate from the harmonised CIS 2006 questionnaire by introducing additional questions and/or modifying the existing ones in order to satisfy specific user needs. This shows that there is an effort to improve the CIS questionnaire at least at national level

The methods used for the compilation of innovation statistics reflect good survey practice. All countries report that they make great efforts to prevent the appearance of errors in the data and that they carry out rigorous data validation to detect errors. In postal and telephone surveys, interviewers of high quality are selected and a lot of assistance is offered to respondents during data collection. Moreover, missing and erroneous data are re-checked in the majority of cases by re-contacting the respondents. It is therefore a general impression among countries that the accuracy of statistics is very good.

The coherence between CIS 2006 and SBS statistics is satisfactory in most key variables. Nevertheless, methodological and conceptual differences between the two surveys may have a significant impact on the differences of the statistics produced.

The large majority of countries are very punctual in the delivery of their statistics to Eurostat while dissemination at national level follows standard practices and is accompanied by methodological documentation, reference metadata and facilities for offering clarifications to interested users.