European Agency for Safety and Health at Work

ESENER 3: Technical Report

Final version (03.12.2019)

European Agency for Safety and Health at Work

Safety and health at work is everyone's concern. It's good for you. It's good for business.

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Table 1: List of abbreviations

Abbreviation	Full name/explanation
b2b survey	**B**usiness **to b**usiness survey, i.e. survey among organisations (be it at the company/enterprise or at the establishment/local unit level)
CATI	**C**omputer **A**ssissted **T**elephone **I**nterviewing
CAWI	**C**omputer **A**ssissted **W**eb **I**nterviewing (online interviews)
DK	**D**on't **K**now (Answer category in the questionnaire)
ESENER	**E**uropean **S**urvey of **E**nterprises on **N**ew and **E**merging **R**isks
EU-OSHA	**E**uropean **A**gency **for S**afety and **H**ealth at **W**ork
LFS	**L**abour **F**orce **S**urvey
NA	**N**o **A**nswer (answer category in the questionnaire)
OSH	**O**ccupational **S**afety and **H**ealth (also called "Health and Safety at Work")
PSR	**P**sycho-**s**ocial **r**isks (at work)
SBR	**S**tructural **B**usiness **R**egister (register of business addresses compiled by each EU member state under coordination of EUROSTAT
SBS	**S**tructural **B**usiness **S**tatistics (statistics compiled by the national statistical offices on base of the SBR)
TP	**T**arget **P**erson
TripleC	Kantar coordination centre for multi-country telephone surveys

Country abbreviations (in alphabetical order)			
AT	Austria	IT	Italy
BE	Belgium	LT	Lithuania
BG	Bulgaria	LU	Luxembourg
CH	Switzerland	LV	Latvia
CY	Cyprus	MK	North Macedonia
CZ	Czech Republic	MT	Malta
DE	Germany	NL	Netherlands
DK	Denmark	NO	Norway
EE	Estonia	PL	Poland
EL	Greece	PT	Portugal
ES	Spain	RO	Romania
FI	Finland	RS	Serbia
FR	France	SE	Sweden
HR	Croatia	SI	Slovenia
HU	Hungary	SK	Slovakia
IE	Ireland	UK	United Kingdom
IS	Iceland		

1 Introduction

1.1 The survey in brief

ESENER, the *European Survey of Enterprises on New and Emerging Risks*, is a large-scale multinational survey among organisations conducted on behalf of the European Agency for Safety and Health at Work (EU-OSHA) located in Bilbao, Spain. The aim of the survey is to collect information on how health and safety is organized at workplaces across Europe.

ESENER-3 is the third wave of this survey conducted so far. It covers 33 European countries – the European Member States (EU28) plus Iceland, the Republic of North Macedonia, Norway, Serbia and Switzerland. ESENER-3 includes both private and public establishments with 5 or more employees from almost all sectors of activity (see chapter 5.1 for more details on the survey universe). Within each establishment, the targeted respondent was defined as *"the person who knows best about health and safety in this establishment"*. In total, 45.420 establishments were interviewed for ESENER-3.

Though the survey was primarily conducted as a telephone survey using the CATI technology (CATI = Computer Assisted Telephone Interviewing), there is also a small number of interviews that were conducted online as CAWI interviews (CAWI = Computer Assisted Web Interviewing). CAWI interviewing was however restricted to respondents who refused to take part in the telephone interview but were willing to complete an online version of the survey.

Interviews were carried out from April to August 2019. In all countries, the same methodology was applied. All national language versions of the survey questionnaire were strictly harmonized, thus allowing for full comparability between the countries.

Further methodological details can be found in the following chapters of this report.

1.2 History and aims of the project

ESENER-3 is the third European-wide Enterprise survey on Health and Safety at Work commissioned by EU-OSHA. The first survey of this kind, ESENER-1, was conducted in the year 2009 in 31 countries (the then EU-27 plus Croatia, Turkey, Norway and Switzerland). The second one, ESENER-2, was conducted in 2014. It included 36 countries, covering the then 28 EU member states plus Albania, Iceland, Montenegro, North Macedonia and Serbia.

In terms of methodology, the three survey waves share many common features, but have also a number of important differences that need to be taken into account for any comparisons of figures from ESENER-1 (2009), ESENER-2 (2014) and ESENER-3 (2019). The most important methodological differences are changes in the definition of respondents and the definition of the universe from ESENER-1 to ESENER-2:

- While ESENER-1 covered establishments with 10 or more employees only, ESENER-2 and ESENER-3 cover establishments with 5 or more employees. The additional inclusion of the size-class '5 to 9 employees' from ESENER-2 onwards has a considerable impact on the overall results because establishments of this size make up for a large share of the universe of establishments with 5 or more employees.

- Whereas ESENER-1 was confined to the NACE Rev. 2 sectors of activity B to S, ESENER-2 and ESENER-3 cover sectors A to S, i.e. they additionally include establishments of sector A "Agriculture, Forestry and Fishing". Since NACE A is a very small sector within the defined universe, the impact its inclusion has on the overall results is in most countries very limited.

- For ESENER-1, in each establishment two types of interviews were meant to be conducted: One with the management (the highest ranking person in charge of coordinating health and safety at the establishment) and one with an employee representative in charge of health and safety (where existent). In ESENER-2 and ESENER-3, only one type of interview had to be conducted, namely with *"the person who knows best about health and safety in the establishment"*. This is not necessarily a representative of the management.

- In ESENER-2 and ESENER-3, participating countries had the chance to top up the size of their net samples by ordering national boost samples, financed from national means. In ESENER-2, Spain, Slovenia and the United Kingdom made use of this opportunity. For ESENER-3, Ireland, Norway and Slovenia ordered national boost samples.

The topics dealt with in the three survey waves are largely the same. Due to reformulations in almost all questions, results from ESENER-1 are however not directly comparable to those from ESENER-2 or ESENER-3. ESENER-3 in turn includes a number of key questions that were asked in an identical way in ESENER-2 (trend questions).

In ESENER-3, countries ordering national sample boosts had the possibility to add up to four national questions at the end of the international master questionnaire set up by EU-OSHA (and its research partners). Data on these questions are available for the boost countries only.

1.3 Overview over the documentation available on ESENER-3

This **Technical Report is the main source of technical information on the ESENER-3 survey**. It provides detailed descriptions on central steps in the preparation and execution of fieldwork for the main survey. In addition, the Technical Report contains short summaries on the pre-testing done for ESENER-3 and on the translation process. These steps are dealt with more in detail in additional specific reports:

- Pre-test Report (cognitive pre-testing)
- Pilot Survey Report
- Translation Report

In addition to the Technical Report, a Quality Report is available. The Quality Report analyses different aspects of possible survey error and other quality aspects, hereby using Eurostat's *"ESS Standard for Quality Reports"* (Eurostat Luxembourg, 2009). The Quality Report is not based on any external evaluation of the survey.

2 Survey Organisation

2.1 Responsibilities

On part of the European Agency for Safety and Health at Work, ESENER-3 was managed by Xabier Irastorza and Marine Cavet.

On the contractor's side, the overall coordination of the survey was with Kantar, business unit Public Division, in Munich (Arnold Riedmann and Alexandra Strauss). While Kantar Public Division held the overall responsibility for the project, several steps of the preparation and fieldwork phase were done in cooperation with further institutes:

- In the questionnaire preparation and pre-test phase, experts from health and safety research institutions from Latvia (IOSEH) and the Netherlands (TNO) supported EU-OSHA and the Kantar team in the revision of the survey instrument and in the cognitive pre-testing of the questionnaire (see chapter 3.1 for more details on the expert group).

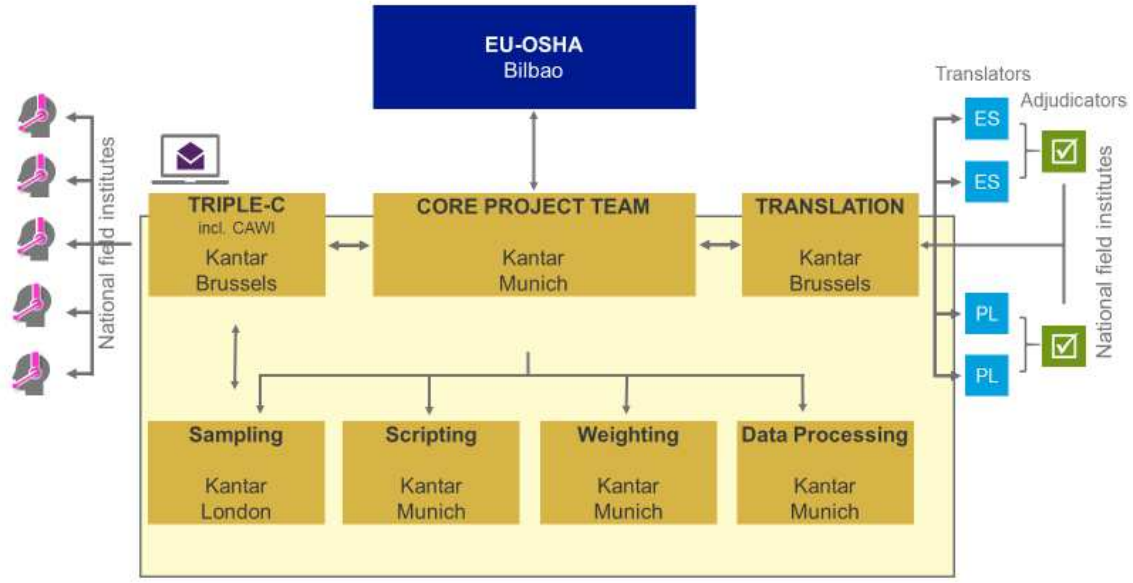
- For the elaboration of national questionnaire versions, Kantar Public Division in Munich cooperated with the translation team of Kantar in Brussels, a team specialized in the organisation of translation and verification services for cross-national surveys on political and social research topics.

- On a day-to-day basis, fieldwork was coordinated by the Kantar TripleC team. This team, located partly in Brussels and partly in Prague, is specialized in the coordination of fieldwork for multi-country telephone surveys. TripleC stands for "Connected Call Centre", a technology linking local CATI studios to a central server on which all national language questionnaire versions are made available and where all data – including para-data and contact information - are centrally stored. Data-management and the international fieldwork monitoring are totally centralized within this system whereas interviewing itself is done and supervised by local teams from partner institutes located in the respective countries. For ESENER-3, all countries used the TripleC platform.

- Sampling was done centrally by the central statistical unit of Kantar UK in London, in close cooperation with the team at Kantar Public Division in Munich.

- The scripting and central weighting of the survey were done at Kantar in Munich, in the central service units "Data processing" respectively "Analytics Practice".

Figure 1: Institutes involved in ESENER-3 and sharing of work between them



2.2 Local fieldwork institutes

Fieldwork itself was carried out locally, in cooperation with the following national fieldwork institutes:

Table 2: Local fieldwork institutes in charge of fieldwork for ESENER-3

Country	Agency
AT	Kantar TNS Info Research Austria
BE	Kantar Belgium
BG	Balkan British Social Surveys AD
CH	M.I.S. Trend
CY	CYMAR Market Research Ltd
CZ	Kantar CZ s.r.o.
DE	Telquest GmbH
DK	Kantar Gallup A/S
EE	Kantar Emor, AS Emor
EL	Kantar Greece S.A.
ES	TNS Investigación de Mercados y Opinión S.L.
FI	Kantar TNS Oy
FR	Kantar TNS
HR	Hendal d.o.o.
HU	Millward Brown
IE	Kantar UK
IS	GI rannsóknir ehf.

Country	Agency
IT	Kantar Italia Srl
LT	TNS LT, UAB
LU	TNS ILRES S.A.
LV	TNS Latvia SIA
MK	Kantar TNS BRIMA LLC
MT	MISCO International Limited
NL	Kantar Netherlands BV
NO	Kantar TNS AS / Norsk Gallup
PL	IMAS International sp. z o.o.
PT	Marktest – Marketing, Organização e Formação, Lda
RO	Kantar TNS CSOP SRL
RS	TNS Medium Gallup
SE	Kantar SIFO AB
SI	MEDIANA D.O.O.
SK	Kantar Slovakia s.r.o
UK	Kantar UK

Among the 32 local fieldwork partners for ESENER-3, 21 are part of the Kantar group and four further institutes are affiliated to it. With several of the remaining seven institutes, long-established cooperation experiences in European-wide surveys (e.g. Eurobarometer and ESENER-2) exist.

3 Development of the survey instrument

3.1 Development of the master questionnaire

The questionnaire for ESENER-3 is based on the questionnaire used for the preceding survey wave ESENER-2 conducted in 2014.

The development of the ESENER-3 questionnaire was done in close cooperation between EU-OSHA, Kantar Public Division Munich and researchers from the IOSEH institute at the Stradins University in Riga/Latvia (Asoc. Prof. Ivars Vanadzins) and from TNO in Leiden/Netherlands (Irene Houtman).

The draft questionnaire version elaborated by this group was then subject to several steps of testing:

a) A cognitive pre-test carried out in 3 countries, with a total of 36 in-depth face-to-face interviews
b) A translatability assessment of the new and substantially modified questions in the English master questionnaire version
c) A pilot field test with 30-40 pilot interviews in each country

The main aim of the cognitive pre-test carried out in August and September 2018 in Latvia, the Netherlands and Germany was to test the master questionnaire on content-related aspects. The cognitive pre-test was coordinated by Kantar Public Division. Interviews were conducted face-to-face by researchers of the questionnaire development group (Kantar Public Division, IOSEH and TNO). In the cognitive pre-test, questions were checked for clarity, understandability and potential differences in interpretation (between countries, types of establishments and respondent types). The cognitive test led to a number of modifications to the questionnaire. The design of the cognitive pre-test and its findings are documented in the Pre-test Report, available from EU-OSHA on request.

The questionnaire version resulting from the revisions done on base of the cognitive pre-test findings was subsequently further refined in a round of discussions between EU-OSHA and the Kantar Public Division team. Once considered final, it was sent to the Kantar Public Translation team in Brussels. There, a professional translatability assessment was done. In its course, experienced translators from three different language families[1] elaborated rough translations of the draft master questionnaire with the aim to identify any potential ambiguities or other difficulties for translation. Where such issues were identified, translators made proposals for alternative formulations and the master version was revised accordingly.

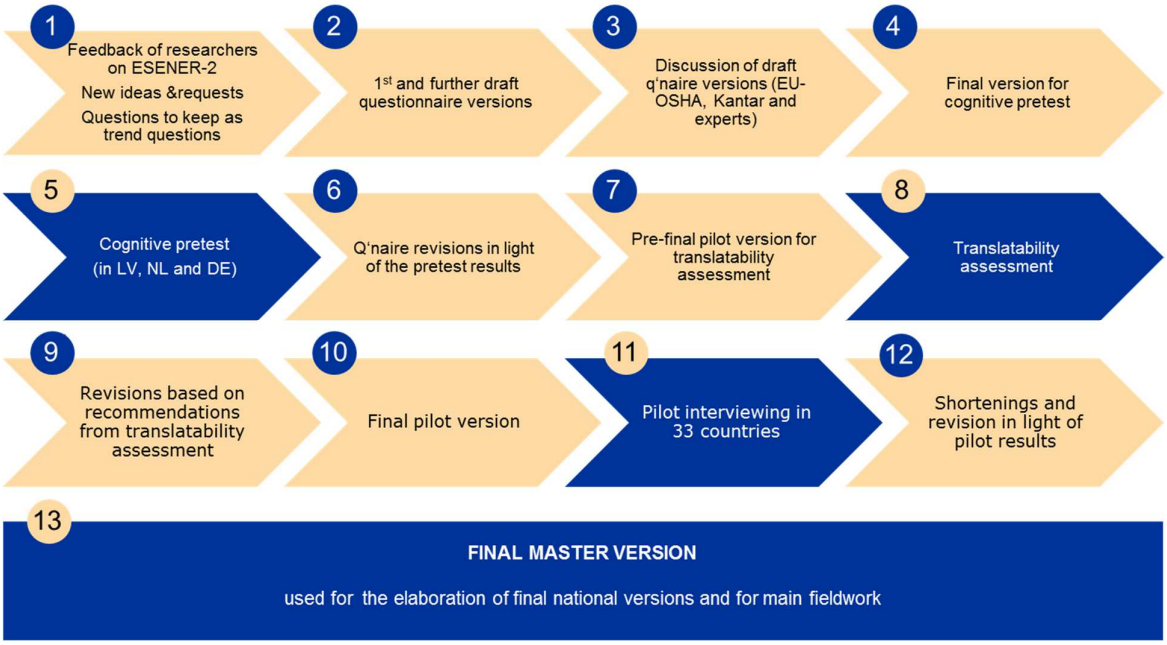
As third testing step, a pilot field test was carried out in all 33 countries, with 30 to 40 interviews per country[2]. This pilot test was done in the CATI (and CAWI) mode and used the same infrastructure as the later main survey. The aims of the pilot field test were manifold:

- Test of the success in obtaining access to the correct respondent
- Test of the modified screening procedure (for countries where no establishment-level address register is available)
- Check of the general understanding of the questions in the national language versions, by both interviewers and interviewees
- Technical tests of the programmed CATI and CAWI scripts and the entire data collection infrastructure for both telephone and online interviewing
- Test of the centralized fieldwork organisation and sampling for the survey
- Assessment of the usefulness of the interviewer instructions and support
- Check of the average interview duration for each national version

[1] The three languages chosen for the translatability assessment were Swedish (for the Germanic languages), French (for the Romanic languages) and Polish (for the Slavic languages).

[2] Countries using just one national language version of the questionnaire did 30 pilot interviews, those using two or more language versions conducted+ 40 interviews.

Figure 2: Summary of the questionnaire development process



The pilot field test resulted in a few small modifications to the master questionnaire and to individual national questionnaire versions. The main consequence of the pilot was that the questionnaire had to be shortened since the interview duration in the pilot turned out to be too long. Due to the changes done to the questionnaire, the data from the 1.059 pilot interviews were not integrated to the main survey data-set but used for test purposes only.

In the development of the master questionnaire, care has been taken to keep a series of questions from ESENER-2 without any changes in the wording. Survey results based on these trend questions are directly comparable between ESENER-2 (2014) and ESENER-3 (2019). For a few questions, however, corrections of the national wording were considered necessary in individual national language versions. Where such changes were required, these may have had an impact on the measurements.

3.2 Development of national language versions (translation process)

For the translation process, Kantar Public Division Munich made use of the services of the translation team and the translators network of its sister company Kantar Brussels. For all national translations, the TRAPD team translation model was applied. TRAPD (Translation, Review, Adjudication, Pretesting, and Documentation) is currently widely considered as best practice approach to survey translations (Harkness et al. 2010: 128ff.).

In detail, the translation process as applied to ESENER-3 consisted of the following steps:

(1) **Elaboration of two independent translations by professional translators**, all of them being native speakers of the target language. These were not in contact with each other while producing their translation.

(2) **Review of the two translations by an adjudicator**, an expert in both survey research and in translation. The adjudicators were employees of the network of local fieldwork partners established for ESENER-3, with excellent command of the English language and broad experience in the translation and/or adjudication of survey questionnaires. The adjudicators compared both translated versions and selected the best parts of each of them for a new, third version (reviewed version). Hereby, each choice was justified and annotated as base for discussions with the two original translators.

(3) **Check of the adjudicated versions by experts from the Focal Point network of EU-OSHA.** Each reviewed national version was sent to a national health and safety expert from EU-OSHA's Focal Point network for checking. The national OSH experts were advised to focus their attention on all new and modified questions and on the OSH terminology used in the questions, including the terminology for national bodies of employee representation in OSH matters.

(4) **Check and integration of the expert feedback:** In this next step, the translators critically reviewed the comments of the experts and annotated them in preparation of the discussions with the two original translators in the review meetings.

(5) **Review meetings:** In these meetings, mostly held as web-based telephone conferences, the adjudicator and the two translators jointly discussed the best solution for each question, hereby considering all different variants produced so far - the two initial translations, the version as reviewed by the adjudicator and the proposals for changes from part of the Focal Point expert. The discussions concerned the choices adjudicators had made among the versions of the two initial translators and the suggestions from the experts of EU-OSHAs network. Commonly, they agreed on the best final translation for each question. All participants were instructed that formulations in trend questions should be revised only if the former translation was considered really wrong, misleading or not well understandable. The version resulting from this step was implemented and the reasons for the decisions documented.

In total, 43 different national language versions of the questionnaire were produced. For each of these language versions, an Excel file containing the full documentation of the translation process has been prepared. In addition, the final national questionnaires as used for fieldwork are available as more reader friendly pdf-versions based on WORD documents.

Table 3 provides an overview of all national versions produced for ESENER-3. For languages shared by two or more countries, different national versions were elaborated that took into account national language peculiarities and national differences in the OSH terminology used at workplaces. More details on the translation process can be found in the Translation Report.

Table 3: National language versions of the questionnaire

Country	Languages
AT	German*
BE	Flemish(*), French*
BG	Bulgarian
CH	French*, German*, Italian*
CY	Greek*
CZ	Czech
DE	German*
DK	Danish
EE	Estonian, Russian*
EL	Greek*
ES	Spanish
FI	Finnish, Swedish*
FR	French*
HR	Croatian
HU	Hungarian
IE	English*
IS	Icelandic

Country	Languages
IT	Italian*
LT	Lithuanian, Russian*
LU	French*, German*, Luxembourgish
LV	Latvian, Russian*
MK	Macedonian
MT	Maltese, English*
NL	Dutch(*)
NO	Norwegian
PL	Polish
PT	Portuguese
RO	Romanian
RS	Serbian
SE	Swedish*
SI	Slovene
SK	Slovak
UK	English*

**: Languages shared by two or more countries*

Table 4 shows how often each language version was finally used. The Russian version for Lithuania was not used at all, it could therefore be considered not to offer it any more in a future survey wave. All other languages were used by a notable number of respondents.

Table 4: Usage of language versions

Country	Language version	Number of interviews	in %
AT	German	1.503	100%
BE	Dutch	1.091	72%
	French	415	28%
	Total	1.506	100%
BG	Bulgarian	755	100%
CH	French	367	24%
	German	1.021	68%
	Italian	114	8%
	Total	1.502	100%
CY	Greek	757	100%
CZ	Czech	1.552	100%
DE	German	2.264	100%
DK	Danish	1.513	100%
EE	Estonian	676	89%
	Russian	82	11%
	Total	758	100%
EL	Greek	1.501	100%
ES	Spanish	2.266	100%
FI	Finnish	1.478	98%
	Swedish	27	2%
	Total	1.505	100%
FR	French	2.251	100%
HR	Croatian	740	100%
HU	Hungarian	1.504	100%
IE	English	1.999	100%
IS	Icelandic	753	100%

Country	Language version	Number of interviews	in %
IT	Italian	2.251	100%
LT	Lithuanian	754	100%
	Russian	0	0%
	Total	754	100%
LU	French	431	56%
	German	76	10%
	Luxembourgish	266	34%
	Total	773	100%
LV	Latvian	649	86%
	Russian	107	14%
	Total	756	100%
MK	Macedonian	752	100%
MT	English	320	71%
	Maltese	133	29%
	Total	453	100%
NL	Dutch	1.521	100%
NO	Norwegian	1.951	100%
PL	Polish	2.250	100%
PT	Portuguese	1.493	100%
RO	Romanian	1.500	100%
RS	Serbian	751	100%
SE	Swedish	1.512	100%
SI	Slovenian	1.067	100%
SK	Slovak	756	100%
UK	English	2.251	100%

3.3 Programming

Programming for the ESENER-3 survey was **done centrally for all countries** at Kantar GmbH in Munich, using the NIPO ODIN software platform.

The first step in the programming process was to enter the new questionnaire version into the Qlib format, a specific software developed at Kantar for handling survey questionnaires. On this base, the CATI script was then programmed.

From Qlib, the master questionnaire was exported to Excel, the format used throughout the translation process for the various national language versions. For each language version, a separate Excel sheet was prepared. This process was largely automatized so that it was guaranteed that all Excels had exactly the same structure and could thus be fed back easily and without the danger of copying errors into the questionnaire script after finalisation of all national language checks and revisions.

The master script was tested by the programmer and by the project team at Kantar Public Division. In addition to manual tests of all questions and filters, dummy data were fed into the program so that the output could be checked again for any eventually remaining filtering mistakes and for a correct storage of the data.

In the various national versions produced on base of the central script, all questions with country specific filterings and country-specific terminology (e.g. Q350 on employee representation) were checked for the correct display of the texts. The scripts for the boost countries (Ireland, Norway, Slovenia) were additionally checked for the correct display of the national boost questions.

Once the CATI script versions were finalised and tested, the CAWI versions were produced on their basis, using the same NIPO ODIN platform. For the CAWI version, the introduction and the data protection hints were modified. Interviewer hints were either deleted (where not relevant for a CAWI respondent) or formulated as direct hints to the respondent.

When the questionnaire programming and testing in Munich was finalised, the script was sent to the TripleC unit where it was implemented on the TripleC platform. At this stage, several adaptations had to be made in order to make the CATI script compatible with the TripleC sample management system. Also, the CAWI option had to be installed in the TripleC environment and linked with the CATI script in order to take over the email address information collected during the CATI contact.

4 Interviewers and supervisors: Selection and training

4.1 National interviewer teams

Overall, 820 interviewers worked on ESENER-3, the majority hereof (72%) being female interviewers.

The national interviewer teams working on ESENER-3 were composed of the most experienced and successful b2b (= business to business) CATI interviewers. In some countries with large sample sizes and/or relatively small CATI studios with limited business in CATI b2b projects, nevertheless also some interviewers with a more limited record of b2b interviewing experience had to be included in the teams. All interviewers had however previously collected experience in CATI interviews and were selected for ESENER-3 for their good performance on these surveys[3].

The national fieldwork partners established an exchange of good practices among the members of their teams, in particular between the more and the less experienced interviewers. This type of exchange was in some cases additionally practiced across countries, e.g. between the German and the Austrian teams and between the very successful team in the United Kingdom and the teams in Slovakia and the Czech Republic.

In the definition and selection of the interviewer teams, care was taken to have relatively small and stable teams working on the project. This helps to get a constantly good interviewing quality. With the exceptions of Slovakia and the Czech Republic, in all national teams on average at least 30 interviews per interviewer were done. Interviewers who turned out to be less successful with this particular project than anticipated were replaced during fieldwork in order to have the best possible teams working on the project.

At the same time, it was ensured that interviewer teams had a certain minimum size in order to minimize interviewer effects on the data. The smallest national team of interviewers actually working on ESENER-3 consisted of 6 interviewers (Serbia). There was no strict upper limit applied for the number of interviews to be made by an interviewer as the constant surveillance of interviewers in the CATI studios ensures a minimization of interviewer effects. It was agreed not to cut off the work of very successful interviewers by establishing an upper limit of the number or share of interviews to be made.

[3] An exception to this rule is the situation in Slovakia. In this country, fieldwork progress was very slow from the beginning, with a very low share of establishments being willing to cooperate in the interview. In order to be able to finalise fieldwork in time and with the targeted number of interviews, many additional interviewers were put on the project in the final fieldwork phase, partly with little previous CATI experience.

Table 5. Interviewer teams, by country

Country	Number of interviewers working on the project*			Average number of interviews per interviewer***	Average number of interviews per interviewer***	Average years of experience with telephone surveys	Average years of experience with surveys among organisations
	female	male	total	Base: CATI	Base: CATI & CAWI		
be	10	4	14	102	108	7,1	6,6
bg	19	0	19	38	40	1,6	1,2
ch	19	14	33	44	46	5,9	4,2
cy	11	3	14	52	54	2,8	2,4
cz	49	12	61	17	25	4,7	4,2
de	35	20	55	40	41	10,3	8,3
dk	8	10	18	77	84	2,0	1,9
ee	7	0	7	102	108	11,1	10,9
el	22	11	33	45	45	7,7	6,5
es	28	9	37	58	61	6,4	5,1
fi	12	10	22	66	68	3,5	2,4
fr	35	13	48	46	47	4,1	3,4
hr	15	5	20	36	37	3,5	3,1
hu	13	3	16	92	94	4,6	4,4
ie**	19	17	36	55	56	1,3	1,3
is	6	1	7	106	108	7,3	6,3
it	20	2	22	101	102	8,0	7,0
lt	10	0	10	73	75	2,1	1,6
lu	7	4	11	55	70	9,1	8,7
lv	9	1	10	73	76	8,3	7,7
mk	8	0	8	93	94	4,8	4,5
mt	13	5	18	24	25	5,6	3,4
nl	38	2	40	31	38	10,9	10,1
no	15	9	24	80	81	5,3	4,6
pl	18	5	23	97	98	5,3	5,3
pt	12	14	26	56	57	3,7	3,4
ro	38	10	48	31	31	1,9	1,8
rs	6	0	6	124	125	4,5	3,8
se	13	5	18	79	84	4,3	3,5
si	7	3	10	99	107	3,0	2,6
sk	47	17	64	11	12	0,8	0,8
uk**	20	20	40	56	56	1,3	1,3
TOTAL	589	231	820	53	55	4,8	4,2

*all interviewer who made at least 1 contact were taken into account
**34 interviewers worked in the teams for Ireland and the UK. They are listed for both countries but are only counted once for TOTA
***only validated interviews

4.2 Preparation and initial training measures

All CATI interviewers in the network of Kantar and its cooperation partners for ESENER-3 have received extensive initial training on basic issues of telephone interviewing. This includes methods to avoid refusals in surveys among organisations and other quality relevant aspects. This type of training is

regularly being refreshed and updated in the local institutes. Thus, the interviewers working for ESENER-3 had a solid knowledge of CATI interviewing techniques[4].

For ESENER-3, additional project specific training was provided in order to prepare the interviewers for the specific challenges of this survey, including the high demands as regards the achievement of good response rates and the avoidance of any interviewing bias. This training was provided to interviewers in person by the local fieldwork managers and/or CATI supervisors. These had been prepared for their role as "multipliers" in various ways:

- Before the launch of the pilot survey, local fieldwork managers and CATI supervisors were trained on the specific challenges of the ESENER-3 survey in a 2-day seminar taking place on 22nd/23rd November 2018 in Munich at the premises of Kantar. Each country was represented with a minimum of one person. From the broad majority of local fieldwork centres, even two persons participated in this seminar (the local project manager and the local supervisor in charge of ESENER-3). Issues dealt with in the seminar were e.g. information about the client institution and the survey aims as well as information about the sampling, the quality requirements and hints on specific questions in the questionnaire.
- For supervisors and interviewers, a paper handout was prepared and provided in each local language used for the survey. This script contained hints on issues such as the selection of the appropriate respondents, the differentiation between companies and establishments or further explanations on particular questions.
- Shortly before the launch of the main survey, local fieldwork managers and supervisors from all countries took part in another 2-day training seminar. The seminar took place in Munich on 18th/19th March 2019. In this seminar, the focus was mainly on two issues: (1) Sharing and discussing experiences from the pilot survey and how these had been taken up in modifications to the survey concept and questionnaire and (2) Training on an efficient survey organization and on techniques for raising cooperation rates. Further topics dealt with at this seminar were specific hints on questions modified after the pilot survey and further training on new survey features such as the sector coding tool and the modified screening procedure. The seminar also included an exchange of best practices among the participants.

The local ESENER-3 training sessions for the interviewers took place immediately before the launch of the survey. These trainings mostly took between 2 and 4 hours. Differences in the duration were largely owed to different local training cultures: While the trainings in all countries included the familiarization of interviewers with the programmed questionnaire and the chance to ask questions during and after that, in some countries also first attempts to do live interviews were made and analyzed during that training.

4.3 Control measures and further training measures

In each local fieldwork center, the supervisors in charge of the project were meant to do spot checks to at least 10% of all ESENER-3 interviews. To this end, they listened live to running interviews and interview attempts[5]. The local supervisors also regularly checked the success rate of all interviewers on the project. Interviewers not performing well on this project were re-trained or removed from the project team.

As Table 6 shows, there are four countries with slightly less than 10% of interviews being controlled (8% to 9% in France, Iceland, Ireland, the United Kingdom). For Ireland and the United Kingdom, the large amount of interviews to be done (4.250 interviews by the team of Kantar in the UK) ensured nevertheless

[4] This holds only partly for Slovakia, see previous footnote.

[5] In some countries, the listening-ins were done on base of records made during the interviews.

that from each interviewer, a substantial number of interviews was controlled. This similarly holds for Iceland where a very experienced small team of 7 interviewer did all CATI interviews.

Members of the EU-OSHA team performed two fieldwork visits for control purposes:

- The first visit took place on 17 April 2019 in Luxembourg at the telephone studio of TNS Ilres. Hereby, additionally also a member of the European Commission, DG Employment, and the Luxembourgish Focal Point expert participated.
- The second visit took place on 07 May 2019 at the CATI studio of Kantar UK in the United Kingdom. A representative of the client of the Irish sample boost joined in the latter visit.

Measures taken during both control visits were the listening in on running interviews and contact phases, conversations with supervisors and individual interviewers and the discussion of issues that became apparent during the visits. No major issues have come up during these visits.

Table 6: Number and share of controlled CATI interviews, by country

Country	Number of CATI interviews achieved	Number of monitorings	Percentage of all CATI interviews monitored***
at	1.457	254	17%
be	1.428	197	14%
bg	730	70	10%
ch	1.448	146	10%
cy	724	79	11%
cz	1.016	252	25%
de	2.184	354	16%
dk	1.392	151	11%
ee	713	81	11%
el	1.498	417	28%
es	2.163	220	10%
fi	1.460	197	13%
fr	2.211	196	9%
hr	722	194	27%
hu	1.475	301	20%
ie	1.986	155	8%
is	739	70	9%
it	2.231	338	15%
lt	733	75	10%
lu	604	80	13%
lv	734	75	10%
mk	741	135	18%
mt	439	43	10%
nl	1.226	143	12%
no	1.922	196	10%
pl	2.237	237	11%
pt	1.454	172	12%
ro	1.494	174	12%
rs	742	251	34%
se	1.424	156	11%
si	988	430	44%
sk	692	72	10%
uk	2.247	171	8%
TOTAL	**43.254**	**6.082**	**14%**

5 Sampling

5.1 Definition of the universe

Interviews for ESENER-3 were conducted in **establishments with 5 or more employees** from **all sectors of activity except for NACE Rev. 2 T** (Activities of households) **and NACE Rev. 2 U** (Activities of extraterritorial organisations and bodies). The latter two sectors are very small and were excluded for practical reasons (sectors not included in most sampling frames). The survey covered establishments of all **different types of ownership** - private establishments as well as public institutions or non-profit organisations.

In this report the sector group consisting of NACE sections O (Public Administration), P (Education) and Q (Human health and social work activities) are sometimes referred to as "public and social services". This reference is related to all establishments in these three sectors, regardless of the ownership – especially in NACE P and Q, there are also many privately owned establishments, depending on the national education and health care systems. Likewise, one or the other publicly owned establishment may be found in the other, largely private sectors respectively sector groups. Information about the type of ownership (public vs. non-public) was collected from respondents within the questionnaire (Q111) and is available for analyses.

Table 7: NACE Rev. 2 sectors covered by ESENER-3

NACE Rev. 2 Section	NACE Rev. 2 Divisions	Description
A	01-03	Agriculture, forestry and fishing
B	05-09	Mining and quarrying
C	10-33	Manufacturing
D	35	Electricity, gas, steam and air conditioning supply
E	36-39	Water supply, sewerage, waste management and remediation activities
F	41-43	Construction
G	45-47	Wholesale and retail trade, repair of motor vehicles and motor cycles
H	49-53	Transportation and storage
I	55-56	Accomodation and food service activities
J	58-63	Information and communication
K	64-66	Financial and insurance activities
L	68	Real estate activities
M	69-75	Professional, scientific and technical activities
N	77-82	Administrative and support service activities
O	84	Public administration and defence, compulsory social security
P	85	Education
Q	86-88	Human health and social work activities
R	90-93	Arts, entertainment and recreation
S	94-96	Other service activities

5.2 Size of the universe

Official statistical figures on the universe of establishments with 5 or more employees are available for part of the surveyed countries only. For many countries, in particular for most Eastern and Central European countries, the figures on the universe of establishments had to be estimated on base of the statistics available for the number and distribution of companies or (particularly for NACE O, P and Q) on base of data from the Labour Force Survey. The general principles applied for the estimates and the sources used for these are explained in Chapter 9.6.

All in all, the universe is estimated to comprise about 6,4 million establishments and roughly 181 million employees in the 33 countries covered by the survey.

Taking only the currently 28 EU-countries into consideration, the estimated size of the universe is ca. 6,0 million establishments and ca. 172 million employees. The universe in an EU27 without the United Kingdom would be about 5,1 million establishments and 146 million employees.

Table 8: Universe of establishments and employees, by country

Country	Establishments with 5+ employees in NACE Rev.2 A-S (in '000)	Employees in establishments with 5+ employees in NACE Rev.2 A-S (in '000)	Country	Establishments with 5+ employees in NACE Rev.2 A-S (in '000)	Employees in establishments with 5+ employees in NACE Rev.2 A-S (in '000)
AT	134	3.308	IT	674	13.892
BE*	115	3.684	LT*	42	1.071
BG	82	2.204	LU*	12	343
CH	176	4.330	LV	33	756
CY*	14	251	MK*	18	489
CZ*	108	4.048	MT*	8	170
DE	1.206	37.477	NL	171	5.523
DK	96	2.418	NO	102	2.222
EE*	18	530	PL	333	12.037
EL*	119	2.037	PT*	137	3.256
ES	458	12.106	RO*	157	6.090
FI	70	1.815	RS*	47	1.369
FR	682	19.979	SE	143	3.903
HR*	42	1.111	SI*	21	711
HU*	109	3.648	SK*	59	1.886
IE(*)	68	1.524	UK	904	26.676
IS*	6	148	Total	6.365	181.012

**Countries with an estimated universe of establishments*

5.3 Respondent definition and identification

The appropriate respondent for the ESENER-3 survey was generally defined as “the person who knows best about health and safety in the establishment”. This definition is identical with the definition chosen for ESENER-2, but different from ESENER-1 where “the most senior manager who coordinates safety and health activities in this establishment” was targeted.

In order to help gatekeepers[6] in identifying the most appropriate contact person more quickly, the approach in the introduction of the interview varied by the size and sector of the contacted establishment:

For establishments with 5 to 9 employees, it was assumed that the person who knows best about health and safety is the owner or general manager, this person was thus directly addressed:

"For our interview I would like to speak with the owner, managing director or branch manager of this establishment."

The text for all establishments with 10 or more employees started with the general hint "For our interview I would like to speak with the person who knows best about health and safety in this establishment", plus the indication of possible titles or functions of these persons, differentiated by size and/or sector:

For establishments with 10 to 49 establishments (all sectors):

"Often this person is the owner, managing director or branch manager."

For establishments with 50 or more establishments in NACE A to F (agriculture, producing industries, construction):

"Often this person is the technical director, the personnel manager or a dedicated health and safety officer."

For establishments with 50 or more establishments in NACE G to S (public and private services):

"Often this person is the personnel manager or a dedicated health and safety officer."

To gain further insight into the type of respondents selected by this way, respondents were at the beginning of the interview (Q113) asked to categorize their function within the establishment. In Table 9, the results of this multi-punch question are summarized into single-punch categories, according to a pre-established hierarchy for cases with multiple answers.

The analysis shows that with 40,9%, owners, managing directors or site managers are clearly the group that answered the survey most often. Other frequently named groups of respondents are managers without specific OSH tasks (17,3%; e.g. Human Resources managers with just a coordinating function in Health and Safety) and the group of other employees (without managerial functions) in charge of the subject (16,7%).

As in ESENER-2, the type of respondents differs largely by the size of the establishment: In small establishments, most often the owners, managing directors or site managers answered the questionnaire personally (59,4% in size-class 5 to 9) while in large establishments most often a person specialised in health and safety tasks without any direct managerial function was interviewed (46% in size-class 250+).

[6] In survey research, the term "gatekeeper" is used for the first contact answering the phone when calling the telephone number under which an organisation is listed in the address file. In large organisations, this is often personnel at the switchboard, in smaller ones these tend to be personal assistants to the owner or manager and in very small units, the telephone is often attended directly by the owner or manager.

Table 9: Respondents by function (in summarized single-punch analysis, unweighted)

Q113 (E2=Q100rev) Function in this establishment		Size class (Q102)				Total
		5-9	10-49	50-249	250+	
1 **Owner of a firm, managing director, site manager** (Q113_1,2=1)	n	8.590	8.193	1.510	270	18.563
	in %	59,4%	42,9%	19,2%	6,7%	40,9%
2 **Manager without specific OSH tasks** (Q113_3=1 and Q113_1,2,4,5,6,7 not 1)	n	2.022	3.582	1.666	604	7.874
	in %	14,0%	18,8%	21,2%	15,1%	17,3%
3 **Manager with specific OSH tasks** (Q113_3=1 and Q113_4,5,6=1 and Q113_1,2,7 not 1)	n	392	1.089	700	355	2.536
	in %	2,7%	5,7%	8,9%	8,9%	5,6%
4 **OSH specialist without managerial function** (Q113_4=1 and Q113_1,2,3,5,7 not 1)	n	567	1.522	1.876	1.842	5.807
	in %	3,9%	8,0%	23,8%	46,0%	12,8%
5 **Employee representative in charge of OSH** (Q113_5=1 and Q113_1,2,3,7 not 1)	n	377	1.126	628	324	2.455
	in %	2,6%	5,9%	8,0%	8,1%	5,4%
6 **Another employee in charge of the subject** (Q113_6=1 and Q113_1,2,3,4,5,7 not 1)	n	2.284	3.352	1.398	543	7.577
	in %	15,8%	17,6%	17,7%	13,6%	16,7%
7 **External OSH consultant** (Q113_7=1 and Q113_1,2,3,4,5,6 not 1)	n	36	48	38	35	157
	in %	0,2%	0,3%	0,5%	0,9%	0,3%
9 **No answer** (Q113_9=1)	n	191	170	61	29	451
	in %	1,3%	0,9%	0,8%	0,7%	1,0%
Total	**n**	**14.459**	**19.082**	**7.877**	**4.002**	**45.420**
	in %	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**

Comparing the structure of respondents with that from ESENER-2 (see following table), the main difference is a higher share of the group of owners, managing directors etc., with an increase of 6,8 percentage points. To a large degree, this is owed to the shift of the targeted net sample structures towards the smaller units, at the expense of the larger ones (see chapter 5.5). There are however a few countries where the increase in this respondent type goes clearly beyond what one would expect in view of the modified sample structures. This is particularly the case for Poland (+24 percentage points) and North Macedonia (+20 percentage points).

Table 10: Comparison of the respondent structure in ESENER-2 and ESENER-3

Q113 (E2=Q100rev) Function in this establishment		ESENER-2	ESENER-3	Difference
1 **Owner of a firm, managing director, site manager** (Q113_1,2=1)	n	16.814	18.563	
	in %	34,1%	40,9%	6,8%
2 **Manager without specific OSH tasks** (Q113_3=1 and Q113_1,2,4,5,6,7 not 1)	n	8.993	7.874	
	in %	18,2%	17,3%	-0,9%
3 **Manager with specific OSH tasks** (Q113_3=1 and Q113_4,5,6=1 and Q113_1,2,7 not 1)	n	3.197	2.536	
	in %	6,5%	5,6%	-0,9%
4 **OSH specialist without managerial function** (Q113_4=1 and Q113_1,2,3,5,7 not 1)	n	8.022	5.807	
	in %	16,3%	12,8%	-3,5%
5 **Employee representative in charge of OSH** (Q113_5=1 and Q113_1,2,3,7 not 1)	n	2.819	2.455	
	in %	5,7%	5,4%	-0,3%
6 **Another employee in charge of the subject** (Q113_6=1 and Q113_1,2,3,4,5,7 not 1)	n	8.890	7.577	
	in %	18,0%	16,7%	-1,3%
7 **External OSH consultant** (Q113_7=1 and Q113_1,2,3,4,5,6 not 1)	n	175	157	
	in %	0,4%	0,3%	0,0%
9 **No answer** (Q113_9=1)	n	410	451	
	in %	0,8%	1,0%	0,2%
Total	**n**	**49.320**	**45.420**	
	in %	**100,0%**	**100,0%**	

5.4 Sampling unit and statistical unit

Surveys can generally be carried out either at the level of companies/enterprises or at the level of the single establishments/local units. The choice between the company and the establishment level largely depends on the aim and subject of the survey. For an internationally comparable survey it is in any case important that the same level is chosen for interviewing in all countries.

For ESENER, both the **sampling unit and the statistical unit** (also called unit of enquiry or unit of analysis) were defined as **the "establishment" or "local unit"** rather than the enterprise or company. The establishment level has been considered as the more relevant level since this allows collecting information at the local level of the single workplace. In multi-site organisations, the situation at a particular local unit may be different from the situation in the headquarters or from the situation at other local units of the organisation, e.g. due to different types of work to be performed.

Following the recommendations of EUROSTAT[7], the term "establishment" was defined for the survey as "*…(a)n enterprise or part of an enterprise that is situated in a single location and in which only a single productive activity is carried out or in which the principal productive activity accounts for most of*

[7] See https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Establishment

the value added [8]*."* In this report, the terms "establishment" and "local unit" are being used synonymously. Likewise, the terms "company", "enterprise" or "organisation" are also used synonymously.

In terms of sampling, the main difference between a company/enterprise survey and a survey among establishments/local units is the coverage of subsidiaries: While a strictly company/enterprise-based sampling frame lists only one address for each company (usually the national headquarters)[9], an establishment/local unit-based sampling frame additionally lists the addresses of all subsidiaries (in case of multi-site organisations).

For organisations consisting of only one production or service unit in the country (single-site organisations), the differentiation between establishment/local unit and enterprise/company is thus irrelevant, they are equally listed in both types of registers. But for all organisations consisting of more than one (legally dependent) unit in the country, the differentiation does matter: While in a genuine enterprise-based survey the headquarters would be surveyed and asked about the situation in the whole enterprise, in an establishment-based survey all units (the headquarters as well as the subsidiaries) ideally have an equal chance to be selected and interviewed. Multi-site organisations may thus be represented with various interviews in the net sample.

In interviews with multi-site organisations, care was taken to instruct respondents to actually refer answers only to their local unit. To this aim, specific text elements were programmed that were shown for the units that had been identified earlier in the questionnaire (Q050/Q100) as parts of a multi-site organisation. In addition, interviewers were trained on the importance of a clear reference to the local unit throughout the questionnaire.

Experience does however show that the distinction between enterprise/company on the one hand and establishment/local unit on the other hand is not always easy for respondents. The differentiation is particularly difficult for entities of the public sector (e.g. schools or police stations) and in countries where there is no widely used term for "establishment".

5.5 Sampling principles and sampling matrix

Samples for ESENER-3 were drawn in a multi-stratified random sampling procedure, using a sampling matrix with a sector and size differentiation to divide the universe into 76 cells defined by the 19 relevant NACE sections and 4 size-classes. For each cell of this matrix, targets were set as regards the number of interviews to be achieved.

Table 11: 76-cell sampling and weighting matrix applied for ESENER-3

NACE Rev.2	Size size class (Q102)			
Division	1 5-9	2 10-49	3 50-249	4 250+
1 A	cell 1	cell 2	cell 3	cell 4
2 B	cell 5	cell 6	cell 7	cell 8
3 C	cell 9	cell 10	cell 11	cell 12
4 D	cell 13	cell 14	cell 15	cell 16
5 E	cell 17	cell 18	cell 19	cell 20
6 F	cell 21	cell 22	cell 23	cell 24
7 G	cell 25	cell 26	cell 27	cell 28
8 H	cell 29	cell 30	cell 31	cell 32
9 I	cell 33	cell 34	cell 35	cell 36
10 J	cell 37	cell 38	cell 39	cell 40
11 K	cell 41	cell 42	cell 43	cell 44
12 L	cell 45	cell 46	cell 47	cell 48
13 M	cell 49	cell 50	cell 51	cell 52
14 N	cell 53	cell 54	cell 55	cell 56
15 O	cell 57	cell 58	cell 59	cell 60
16 P	cell 61	cell 62	cell 63	cell 64
17 Q	cell 65	cell 66	cell 67	cell 68
18 R	cell 69	cell 70	cell 71	cell 72
19 S	cell 73	cell 74	cell 75	cell 76

8 In practice, definitions used in the national address registers and in the statistical figures for local units may differ between countries. Differences may particularly appear with regard to the criterion whether a unit at a geographically different place is to be considered as a dependent part of an organisation or as an independent company/institution of its own.

9 The size indication in these frames usually refers to the sum of employees in all local units (headquarters plus subsidiaries) the organisation has within the country.

For the sampling by size, a deliberately disproportional sample design was chosen. The definition of the targets by size reflects a mix of establishment- and employee-proportionality. A strict establishment-proportional design would result in only very few interviews in the largest size classes since most establishments within the defined universe are rather small. Within such a design, statistically robust analyses would hardly be possible for the largest size class(es). A strictly employee-proportional sample, in turn, would be hard to put into practice in view of the limited absolute number of large establishments. Moreover, it would lead to very high establishment-proportional weighting factors because only a relatively small share of the small establishments would be included in the sample. The mixture between establishment- and employee-proportionality keeps the weighting factors for the establishment- and employee-proportional weighting relatively homogenous.

Though for both ESENER-2 and ESENER-3 such a mixture between establishment and employee proportionality was applied for the definition of the net sample structures, the sample design used for ESENER-3 differs in so far as it has a larger focus on the establishment-proportional perspective: In ESENER-2, the percentage share of the universe of establishments and the universe of employees in each cell were added up and divided by 2[10]. In ESENER-3, the percentage share of the universe of establishments was multiplied by 2, added to the percentage share of the universe of employees and then divided by 3, thus shifting the size distribution of the net sample from a "weighted average" of 50:50 (establishment vs. employee proportionality) to 66:33 ratio, and thus more towards smaller establishments.

In terms of sectors, within each of the four size-classes, the targets were set proportionally to the real structure of the universe, with the sole exceptions of Ireland where two sectors (NACE I and Q) were deliberately over-represented in the national boost samples.

Within each cell of the applied sampling matrix, addresses were drawn at random from the selected address sources. The strictly randomized selection of addresses from representative address sources within each cell of the sampling matrix classifies it as a multi-stratified probability sampling procedure with a disproportionate stratification.

5.6 The matrix used for steering fieldwork

While for the drawing of the initial samples and the preparation of any further replicate samples the 76-cell matrix described in the previous chapter was used, for controlling the national samples during fieldwork, a 32-cell matrix was applied in order to keep the everyday fieldwork monitoring manageable[11]. The 32 cells of this matrix were defined by 4 size-classes and 8 sectors respectively sector groups.

[10] An example for illustration: In country x, the universe of small establishments (5-9 employees) in the Industry sector (NACE C) accounts for 3% of the total universe of establishments 5+ and the universe of employees in small establishments of the same sector accounts for 1% of all employees in the defined universe. The share of the sample allocated to this cell was then calculated as 3% * 2 + 1% * 1 = 7%/3 = 2,3% (whereas in ESENER-2 the calculation was 3% * 1 + 1% * 1 = 4%/2 = 2%).

[11] With the applied 32-cell fieldwork matrix, in total 32 * 33 = 1.056 cells had to be monitored during the fieldwork as for each country a separate matrix was used. This is already a very large number of cells to be regularly monitored.

Table 12: 32-cell matrix used for steering fieldwork of ESENER-3

NACE Rev. 2 section(s)	NACE Rev. 2 division(s)	Sector group description	5 to 9 employees	10 to 49 employees	50 to 249 employees	250 or more employees
A	01-03	Agriculture, forestry and fishing				
C	10-33	Manufacturing				
B, D, E, F	05-09; 35-43	Construction, waste management, water and electricity supply				
G, H, I, R	45-56; 90-93	Trade, transport, food/ accomodation and recreation activities				
J, K, L, M, N, S	58-82; 94-96	IT, finance, real estate and other technical, scientific or personal service activities				
O	84	Public administration				
P	85	Education				
Q	86-88	Human health and social work activities				

The definition of the cells of this matrix was developed in close cooperation with EU-OSHA. Hereby, the following content-related and statistical aspects were taken into account:

- As far as possible, groups for which sampling difficulties were anticipated were handled as separate sector groups in order to be able to adequately control these subsamples when drawing the sample and monitoring fieldwork. Particular sampling difficulties were expected for NACE A, O, P and Q. While NACE A and O are generally difficult to sample due to their poor coverage or even non-coverage in many address registers, for NACE P and Q in some countries the non-coverage or under-representation of addresses for units in public ownership is the main difficulty.

- For the remaining sector groups, care was taken to summarize activities with a presumably similar OSH risk profile within a group:
  - B, D, E and F are characterized by many outdoor workplaces and workplaces at external sites (construction sites etc.)
  - J, K, L, M, N and S are sectors dominated by typical office workplaces
  - G, H, I and R are service activities in which a good part of the workplaces is not office-related, but often characterized by direct contact with end clients (shops, hotels, restaurants, transport services etc.)

5.7 Handling of the gross samples

Inan effort to maximise response rates, it was agreed with EU-OSHA to limit the gross samples made available to the countries for fieldwork and to provide additional sample only once after sufficient exploitation of the previously released sample. The release of gross samples was administered centrally. This allowed a better control over the samples, particularly in countries where the local institutes have limited experience with high-quality b2b surveys.

In detail, the sampling process was organized in the following way:

- The acquisition of addresses for ESENER-3 was the task of each local fieldwork partner. Fieldwork partners were provided with a recommendation for the sampling frame to be bought (see chapter 6 for more information on the selection of frames).

- In case of any known weaknesses of the chosen sampling frame, e.g. the non-coverage or clear under-coverage of certain segments of the universe, additional sources had to be used for compensating the weaknesses and achieving fully representative national samples[12].

- These samples had then to be formatted in accordance with a template to be used uniformly by all countries. The formatted samples were sent to the central sampling unit at Kantar UK in London where they were checked on aspects such as the total number of addresses[13] in the frame and in the provided sample, the completeness in terms of the required information (existence of telephone numbers, NACE codes, size indications etc.) and the completeness in terms of sector and size coverage. National samples not complying with the provided template structures or samples not meeting any of the other criteria were sent back to the national institute for correction or completion[14].

- The revised samples were checked again by the central sampling unit. Once acknowledged, the initial samples were drawn from them at random. The finalised initial samples were transmitted to the TripleC centre where they were uploaded for fieldwork (see chapter 5.8).

- New, additional samples were released for fieldwork only after the previous sample had been exhausted as far as possible in order to put pressure on the national fieldwork partners to fully exploit all activated addresses. All additional sample releases were also administered centrally.

5.8 Size and structure of the initial samples

In ESENER-2, it had been decided to start the survey with a gross sample of the ratio 5:1, i.e. of five times the expected net sample size. This magnitude was considered as a good compromise between the necessity to strive for high response rates on one hand and the practical restrictions of having to finalise fieldwork within the given time-frame on the other hand. In the end, many countries needed more than 5:1 addresses to finalise the survey. But it also turned out that for a number of countries, less than 5 addresses per net interview would have been sufficient.

For ESENER-3, an adaptive sampling design was chosen. Hereby, the size of the initial sample was calculated individually for each country, taking into account the number of addresses needed in ESENER-2.For this, first an analysis of the individual response rates achieved in ESENER-2 for each cell of the 76-cell sampling matrix was made. For cells with a high response rate in ESENER-3, the initial gross sample was dimensioned considerably smaller than for cells with a rather low response rate. The calculation of the initial samples also took stratum jumpers into account, allocating more addresses

[12] In case of the usage of more than one frame for a specific sector of activity, a de-duplication took place before the merger of the frames.

[13] National fieldwork partners were free to define the absolute size of the sample they acquired, taking into account local experiences with similar studies. The central checks on the size of the provided gross samples were meant to ensure that for all countries sufficient sample units would be available to complete the survey in the desired stratification and without delay.

[14] The absence of telephone numbers or size information was not always a reason for rejecting a sample delivery since in several frames used for the survey, not all addresses have telephone numbers, some frames do not have telephone numbers available at all. If the unavailability of telephone numbers was confirmed, these were added from other sources (e.g. Yellow Pages) as far as possible. Likewise, in some cases (particularly in NACE O,P and Q) addresses without size indication had to be used due the lack of addresses with size indication.

to cells that lost interviews to other cells (sectors and/or size-classes) of the sampling matrix, and accordingly less to those that "profited" from interviews originally made for other cells (but with corrections of the size or sector during the interview).

The idea was that by adjusting the initial sample to the results of the previous survey wave in that way, both the net sample structures and the response rates could be further improved. This method does however assume that the response behaviour by size and sector has not changed over time and that it is independent of the local teams carrying out fieldwork.

In order to account for possible positive developments regarding the willingness to participate in the survey, for changes related to the local fieldwork partner or for a change of the sampling frame used in a country, initial samples did not include the full number of addresses calculated to be necessary on base of the ESENER-2 outcome. Instead, at first usually only 80% of this amount was released in order to allow for improvements in terms of the response rates. For countries where a new national fieldwork cooperation partner or a new sampling frame was used, the initial sample was further reduced.

For very small countries with relatively high targets set for the largest size-class 250+ employees, the size of the initial sample was not reduced in view of the very limited universe within these size-classes. For these countries, it was obvious that all addresses available in the larger size-classes would be needed and should thus be made available from the beginning in order to ensure the maximum possible success.

As Table 13 shows, the calculated ratio of gross addresses needed per targeted net interview, as derived from the ESENER-2 experiences, was on average 7,0 addresses per interview. Fieldwork was then actually launched with an initial total sample size considerably below these calculations, with a ratio of 4,5 addresses per net interview. This average ratio is only slightly smaller than the initial gross sample issued for ESENER-2, but it varies largely between countries: While in 8 countries (EE, EL, IS, MK, MT, PT, RS, SI) less than 3 addresses per net interview were initially released, in 8 countries (the size of the initial sample included 6 or more addresses per targeted net interview (CY, CZ, DE, ES, NL, PL, RO, SK).

In most countries, the issued initial sample turned out to be insufficient for completing the survey (in time). Therefore, additional samples had to be issued[15]. All additional sample releases had to be acknowledged by the coordination team at Kantar Public Division in Munich and to be agreed with EU-OSHA. Local institutes were advised to first exhaust the sample already in field as far as possible before requesting the release of additional gross sample. The release of new sample was granted only after the existing sample had been worked with extensively.

[15] In the end, the initial sample release was sufficient for completing the ESENER-3 survey in Switzerland only. In all other countries, additional sample had to be released. For 5 further countries, the number of addresses finally needed was lower than the calculated sample size, for the remaining 27 countries the calculated sample size was not sufficient for completing the survey. See chapter 7.5 for more information on fieldwork results.

Table 13: Size of the initial samples issued for fieldwork start, by country, in % of calculated sample

Achieved net sample	Calculated sample (adaptive design, base ESENER-2)	Calculated sample: ratio gross/net addresses	Initial sample actually released	Initial sample release: ratio gross/net addresses	Number of addresses finally used/needed	Addresses needed per achieved net interview
1.503	10.097	6,7	7.048	4,7	16.147	10,7
1.506	7.025	4,7	5.211	3,5	9.177	6,1
755	3.575	4,8	2.771	3,7	7.384	9,8
1.502	12.600	8,4	7.193	4,8	6.153	4,1
757	7.873	10,5	5.438	7,3	7.016	9,3
1.552	12.391	8,3	8.212	5,5	51.806	33,4
2.264	28.607	12,7	19.448	8,6	49.832	22,0
1.513	6.364	4,2	4.960	3,3	8.881	5,9
758	2.447	3,3	1.997	2,7	2.439	3,2
1.501	5.005	3,3	3.218	2,1	10.691	7,1
2.266	18.624	8,3	13.872	6,2	38.277	16,9
1.505	6.217	4,1	4.628	3,1	6.993	4,6
2.251	11.162	5,0	8.961	4,0	16.184	7,2
740	3.227	4,3	2.418	3,2	7.114	9,6
1.504	17.718	11,8	5.205	3,5	15.791	10,5
1.999	13.169	6,6	9.071	4,5	9.288	4,6
753	2.531	3,4	1.657	2,2	2.693	3,6
2.251	16.216	7,2	8.750	3,9	16.765	7,4
754	3.009	4,0	2.420	3,2	3.507	4,7
773	3.592	4,8	2.632	3,5	4.647	6,0
756	3.205	4,3	2.579	3,4	3.557	4,7
752	2.349	3,1	1.202	1,6	1.563	2,1
453	1.644	3,7	989	2,2	3.257	7,2
1.521	10.242	6,8	8.153	5,4	16.655	11,0
1.951	14.895	7,6	8.858	4,5	19.565	10,0
2.250	41.995	18,7	22.472	10,0	29.163	13,0
1.493	4.478	3,0	3.483	2,3	9.239	6,2
1.500	16.179	10,8	8.008	5,3	18.894	12,6
751	3.035	4,0	1.901	2,5	3.373	4,5
1.512	7.049	4,7	5.663	3,8	8.396	5,6
1.067	3.707	3,5	2.825	2,7	4.658	4,4
756	6.207	8,3	4.942	6,6	24.401	32,3
2.251	10.905	4,8	8.107	3,6	13.389	5,9
45.420	**317.339**	**7,0**	**204.292**	**4,5**	**446.895**	**9,8**

5.9 The screening procedure (for countries with a company-level sample source)

Screening countries

As explained in chapter 5.1, data for ESENER-3 had to be collected at the level of establishments (not companies/enterprises) in all countries involved. In 17 of the 33 countries (see Table 14 for the concerned countries), sampling frames listing business addresses at the establishment level and with appropriate sector and size information are not available. In order to get establishment level interviews also for these countries, the available company-based sampling frames were used and a screening procedure was applied.

In this screening procedure, interviewers first checked whether the contacted address belongs to a single-site or to a multi-site organisation (Q050). For any unit indicating to be part of a multi-site organisation, efforts were made to get an interview from the contacted unit (usually the headquarters) and additional interviews from up to two of its subsidiaries with 5 or more employees.

Table 14: Screening and non-screening countries

Country	Establishment level sampling frames available	Only company level sampling frames available (screening required)
AT	x	
BE	x	
BG		x
CH	x	
CY		x
CZ		x
DE	x	
DK	x	
EE		x
EL		x
ES	x	
FI	x	
FR	x	
HR		x
HU		x
IE	x	
IS		x
IT	x	
LT		x
LU	x	
LV		x
MK		x
MT		x
NL	x	
NO	x	
PL	x	
PT		x
RO		x
RS		x
SE	x	
SI		x
SK		x
UK	x	
TOTAL:	16	17

The screening procedure

The screening procedure applied to ESENER-3 deviated in some aspects from the screening as applied to the former ESENER-2 survey of the year 2014[16]:

- In ESENER-3, respondents of multi-site organisations were asked for more detailed information on the size and structure of their organisation:
  - An additional question at the beginning of the screening process asked about the number of employees their company has in total in the country (Q051).
  - While in ESENER-2 respondents had to indicate only the total number of establishments/local units the organisation had within the defined universe, ESENER-3 respondents were additionally asked for the number of units per size-class[17] in order to have more control over the selection process.
- The selection criteria were modified for ESENER-3 in an effort to reduce the influence of the respondent on the selection: In ESENER-2, the respondent was asked to select one of the establishments for interview (the establishment located farthest away from the own location). In ESENER-3, a 2-step selection process was applied: First, the script programme randomly selected one of the size-classes for interview. If there was more than one establishment in this size-class, the interviewer asked for the smallest one within the size-class (respectively for the smallest and the largest one in case that two additional interviews were meant to be made).
- Whereas in ESENER-2 a maximum of two units were meant to be interviewed per multi-site organisations, it was up to three units in ESENER-3:

[16] The modification of the screening procedure was driven by the wish to get more interviews with subsidiaries in the multi-site organisations of screening countries.

[17] The size-classes were 5-9, 10-49, 50-249 and 250+ employees, employees being defined as the people on the payroll of the establishment.

- If the total number of establishments with 5 or more employees was “1”, this one unit with 5 or more employees was meant to be interviewed. In most of these cases, this was the already contacted unit (usually the headquarters). In some cases, the address of the unit with 5+ employees had to be enquired from the respondents and to be contacted afterwards.
- If the total number of establishments within the universe was “2”, then both were meant to be interviewed. In most cases, one of the two eligible units was the contacted unit (usually the headquarters) so that only one additional address had to be taken up. Where the contacted unit had less than 5 employees, two addresses had to be taken up.
- In organisations with 3 to 5 units within the defined universe, also two units were meant to be interviewed in total. This was usually the contacted unit plus one other, randomly selected unit of the same organisation. If the unit firstly contacted did not surpass the 5 employee threshold, two additional addresses had to be taken up.
- If the organisation had 6 or more units within the defined universe, three interviews were meant to be made: One interview with the firstly contacted unit (if eligible) plus two with further units 5+ of the same organisation. Three interviews were however meant to be made only if the firstly contacted address had 5 or more employees. Where this was not the case, only two interviews were made in the organisation because it was considered as too much of a burden to provide three additional addresses.

The respondents of the interviews made at the firstly contacted address were asked to provide the name of the local unit(s), their location and telephone number and the name of a contact person(s) for the interview. This information was usually taken up during the interview. Where the respondent had to investigate the address(es), a further call was scheduled to record the investigated addresses.

Process and success of the take-up of additional addresses

In order to get addresses for the additional interviews from as many of the contacted multi-site organisations as possible, the address take-up question was asked twice if necessary:

- Firstly to all in the screening part of the first interview within the organisation and thus still before the main interview started.
- At the very end of the interview, the question was repeated for those who first wanted to know the questionnaire before taking a decision on the provision of additional addresses for further interviews.

In total, 1.647 multi-site organisations were asked to provide additional addresses for interviews in other units of their organisations. When being asked about this before the main interview, 372 (23%) organisations provided valid additional addresses for further interviews. 41 of these however withdrew their allowance to contact these at the end of the interview so that 331 (20%) usable interviews remain from this first step of asking for the address.

576 (35%) organisations refused to provide any addresses when being asked at this stage and 659 (40%) wanted to decide on this later again, at the end of the interview. Of the 659 organisations asked again at the end of the interview, 144 (22%) provided one or more valid addresses while 515 refused to do so, 245 hereof saying that the health and safety situation at the other establishment is the same anyway.

In sum, thus 331 + 144 = 475 multi-site organisations from the net sample provided one or two addresses for further interviews at local units of the organisation. That is just 29% of all eligible multi-site organisations asked about additional addresses.

The gross data[18] file shows 566 second and 110 third addresses, that means 91 multi-site organisations more that provided addresses compared to the figures from the ESENER-3 (main) dataset. The

[18] Whereas the net data-set includes only the (validated) interviews, the gross data-file delivered for the survey includes all addresses “touched” for the survey, i.e. also those that were dialled once or more, but did not result in an interview. In the gross data-file, all contact attempts are documented, with information on the contact time, the interviewer in charge and the result of the contact (interview, refusal, not reached etc.). In case of a multi-site organisation in a screening country, the

difference is from cases where the interview at the first address was not completed for one or the other reason, but where the addresses were already taken up. For these, data on the screening process are not available.

The additional addresses taken up by that way were immediately made available to the local fieldwork institutes and were prioritized in the sample management system in order to enhance the share of these additional interviews in multi-site organisations.

As these figures show, in a considerable number of the multi-site organisations additional addresses could not be taken up. Interviewers report that the persons answering the first interview did often not feel in the position to provide the address and thus some kind of implicit allowance for the additional interviews. Especially in larger organisations, respondents were usually not high-ranking managers, but rather OSH specialists with no specific disciplinary power. More often than in the past waves, respondents referred to the data protection legislation as base for their decision.

Interviews in multi-site organisations of screening countries

Out of these 676 2nd or 3rd addresses, in total 220 further interviews resulted - 186 of these were second interviews and 34 were third interviews in the same organization.

As the following table shows, the most frequent reason of non-response (in the hierarchical code) for the newly taken up addresses were refusals (115 refusals by either the contact person or the targeted person). Quite a few telephone numbers provided during the first interview also proved to be wrong. These were corrected as far as possible by calling the first address again, but these efforts did not always lead to a correct number or a successful contact at the newly provided number. In 50 cases, the address was classified as already questioned. Among these, there are probably some calls that were redirected from the recorded additional address to the person responding the first interview in the organisation.

gross data-file thus also includes contacts at first addresses which did not become an interview because the first unit was too small (<5 employees) or because of any other reason (refusal, interrupted interview, no time etc.).

Table 15: Non-response reasons for the 2nd and 3rd interviews (screening countries)

Response code	Number of addresses	in %
1 No answer	42	6,2%
2 Answer device	5	0,7%
3 Busy	9	1,3%
4 Information tone - Fax - Modem	3	0,4%
5 Wrong telephone number	43	6,4%
6 General appointment	70	10,4%
7 Definitive appointment with target person	24	3,6%
8 Refusal by target person	22	3,3%
9 Refusal by contact person/reception (upfront refusal)	93	13,8%
13 No establishment at this address (private household etc.)	10	1,5%
14 Inactive establishment, terminated	6	0,9%
17 Already questioned (double address)	50	7,4%
18 Complete CATI interview	**217**	**32,1%**
21 Stratification maximum reached (cell full)	25	3,7%
34 Refusal - add number to DO NOT CALL LIST	3	0,4%
35 Partial interview, to be called back	2	0,3%
37 No appointment with target person possible during fieldwork time and period	7	1,0%
38 Target person does not speak proposed languages	1	0,1%
42 Size out of target (less than 5 employees or NA in Q105)	13	1,9%
43 Refusal to give information in Q111, Q112 (sector information)	1	0,1%
51 Online invitation with no result	10	1,5%
52 Complete CAWI interview	**3**	**0,4%**
56 No adequate target person at the establishment	17	2,5%
TOTAL:	**676**	**100%**

In the data-set, interviews at the firstly contacted address are classified with code “1” in the variable “Adr_scrint”. Interviews made at additional addresses named during that first contact received the code “2” (2nd interview) or “3” (3rd interview). In the specific case that the unit at the firstly contacted address had less than 5 employees, the (up to) two additional interviews were also labelled with “2” respectively “3”.

As the table below shows, the share of single-site organisations in the unweighted net sample is relatively homogeneous over the non-screening countries, mostly ranging between about 50% and 70%. In the screening countries, the share of single-site organisations in the net sample is much higher, mostly in the range of 80% to 90%.

Such as systematic discrepancy cannot be totally avoided when applying the screening procedure: In an establishment-based address register (as available in the non-screening countries), all subsidiaries of a multi-site organisation are listed. In extreme cases, this can be several hundred subsidiaries. In the screening countries, in turn, maximum three interviews per multi-site organisation are in the net sample. The share of subsidiaries is thus inevitably lower than for countries with a genuine establishment-level sampling frame. Nevertheless, the relatively large discrepancies between screening and non-screening countries are also a result of the limited success of the screening procedure.

Table 16: Interviews in multi- and single-site organisations, by country, unweighted

Country		Interviews in total	Single-site organisation	Multi-site organisation	NA/DK type of multi-site org.	Hereof head-quarters	Hereof subsidia-ries	NA type of multi-site org.
at	n	1.503	1.028	473	2	332	134	7
	in %	100%	68%	31%	0%	70%	28%	1%
be	n	1506	989	515	2	299	215	1
	in %	100%	66%	34%	0%	58%	42%	0%
bg	n	755	725	29	1	20	8	1
	in %	100%	96%	4%	0%	69%	28%	3%
ch	n	1.502	939	562	1	263	295	4
	in %	100%	63%	37%	0%	47%	52%	1%
cy	n	757	675	80	2	67	12	1
	in %	100%	89%	11%	0%	84%	15%	1%
cz	n	1.552	1.318	227	7	146	66	15
	in %	100%	85%	15%	0%	64%	29%	7%
de	n	2264	1337	924	3	509	403	12
	in %	100%	59%	41%	0%	55%	44%	1%
dk	n	1.513	645	859	9	260	594	5
	in %	100%	43%	57%	1%	30%	69%	1%
ee	n	758	641	115	2	81	34	0
	in %	100%	85%	15%	0%	70%	30%	0%
el	n	1.501	1.264	235	2	172	62	1
	in %	100%	84%	16%	0%	73%	26%	0%
es	n	2.266	1.391	874	1	564	298	12
	in %	100%	61%	39%	0%	65%	34%	1%
fi	n	1.505	856	646	3	253	385	8
	in %	100%	57%	43%	0%	39%	60%	1%
fr	n	2.251	1.325	909	17	235	623	51
	in %	100%	59%	40%	1%	26%	69%	6%
hr	n	740	551	188	1	151	36	1
	in %	100%	74%	25%	0%	80%	19%	1%
hu	n	1.504	1.339	160	5	113	44	3
	in %	100%	89%	11%	0%	71%	28%	2%
ie	n	1.999	1.133	863	3	218	631	14
	in %	100%	57%	43%	0%	25%	73%	2%
is	n	753	502	250	1	158	90	2
	in %	100%	67%	33%	0%	63%	36%	1%
it	n	2.251	1.699	552	0	351	199	2
	in %	100%	75%	25%	0%	64%	36%	0%
lt	n	754	666	86	2	60	25	1
	in %	100%	88%	11%	0%	70%	29%	1%
lu	n	773	583	188	2	103	81	4
	in %	100%	75%	24%	0%	55%	43%	2%
lv	n	756	636	119	1	98	21	0
	in %	100%	84%	16%	0%	82%	18%	0%
mk	n	752	625	126	1	90	36	0
	in %	100%	83%	17%	0%	71%	29%	0%
mt	n	453	377	76	0	57	18	1
	in %	100%	83%	17%	0%	75%	24%	1%
nl	n	1.521	918	597	6	281	285	31
	in %	100%	60%	39%	0%	47%	48%	5%
no	n	1.951	1.007	934	10	188	734	12
	in %	100%	52%	48%	1%	20%	79%	1%
pl	n	2.250	1.590	656	4	333	322	1
	in %	100%	71%	29%	0%	51%	49%	0%
pt	n	1.493	1.185	305	3	258	45	2
	in %	100%	79%	20%	0%	85%	15%	1%
ro	n	1.500	1.429	67	4	42	23	2
	in %	100%	95%	4%	0%	63%	34%	3%
rs	n	751	666	84	1	68	16	0
	in %	100%	89%	11%	0%	81%	19%	0%
se	n	1.512	750	760	2	288	457	15
	in %	100%	50%	50%	0%	38%	60%	2%
si	n	1.067	867	200	0	164	35	1
	in %	100%	81%	19%	0%	82%	18%	1%
sk	n	756	709	43	4	24	16	3
	in %	100%	94%	6%	1%	56%	37%	7%
uk	n	2.251	1.090	1.158	3	347	793	18
	in %	100%	48%	51%	0%	30%	68%	2%
TOTAL	**n**	**45.420**	**31.455**	**13.860**	**105**	**6.593**	**7.036**	**231**
	in %	**100%**	**69%**	**31%**	**0%**	**48%**	**51%**	**2%**

6 The sampling frames used for ESENER-3 – documentation and assessment

6.1 Quality of the sampling frames

One of the big challenges for cross-national surveys among establishments is the lack of a harmonized, high quality sampling frame for all countries. Though some commercial address providers such as Bisnode/Dun & Bradstreet or Bureau van Dijk offer sampling frames for the majority of European countries, these are mostly not available for the level of establishments, but only for companies. Moreover, most commercial providers (including those offering EU-wide samples) share certain shortcomings with regard to the coverage: While privately owned middle- and large-sized enterprises are usually covered well, there are clear coverage deficiencies as regards the smaller enterprises. According to our experience the quality of the frames from one and the same provider may also vary considerably between countries.

Due to this lack of a harmonized sampling frame that can be used for all or most of the countries involved in the survey, for each country the best available frame was selected. To this end, the central coordination team provided each local institute with a suggestion for the best sampling frame. This suggestion was based on recommendations derived from two recent methodological expert studies[19] and on experiences the Kantar network had made with the sampling frames used for previous European high-quality surveys (ESENER-1, ESENER-2, ECS 2009, CEDEFOP pilot survey 2011). Deviations from the recommended frame were allowed only in rare cases, namely where the local fieldwork partner could provide proof that the suggested alternative frame is of the same or higher quality.

The selection of sampling frames by this way helped to get the best frames available at the national level. The quality of the available address registers varies nevertheless considerably between countries in terms of up-to-datedness, accuracy and coverage. The most widespread flaws are related to the coverage of small establishments/companies and the coverage of some particular sectors of activity, namely NACE A, K, O, P, and Q and in some countries also R and S.

In countries where one single register covering all sectors of the ESENER-3 universe was not available, one or more additional registers had to be used.

6.1.1 Coverage of NACE A (agriculture, fishing and forestry)

NACE A is rarely included in any survey among organisations so that practical survey experiences with this sector are limited. Not all selected national sampling frames do cover NACE A. Therefore, sometimes additional address sources had to be used for this sector (see Table 20 for details).

Another difficulty with this sector is the availability of statistics on the universe. Reliable and coherent statistical information on NACE A is hard to get. In some countries, the official company or establishment statistics exclude this sector totally. In others, the sector is included but shows considerable differences to the figures from other sources, especially as regards the number of employees working in the agricultural sector in total and by company/establishment[20]. The differences mainly originate from

[19] The two studies are the Report on Task 2 "Sampling modes and frames" of the "Feasibility study regarding methodology, design and mode of the European Company Survey", EUROFOUND 2017 and the "Technical assessment of the expansion of the Second European Survey of Enterprises on New and Emerging Risks (ESENER-2)", EU-OSHA 2018.

[20] Other cross-national sources used for the verification of the statistical figures on sector A were agri-info (http://www.agri-info.eu/english/t_employment.php) and the Labour Force Survey. As for the latter, it has to be taken into account that the Labour Force Survey is conducted among the resident population only. Therefore, it normally will not include seasonal working migrants from other countries.

different ways of counting employees. The seasonal character of much of the work to be done in the sector, the large share of employees from other countries working in agriculture and the high share of non-permanent and other "non-standard" working contracts makes it difficult to exactly determine the number of employees in the sector.

For reasons of consistency, for ESENER-3 usually the statistics used for the other sectors were also used for NACE A though in a number of countries these might tend to under-estimate the number of establishments in the sector. Only where statistics were not available for sector A or where they were clearly underestimating the universe of establishments in NACE A, estimates were made (see Chapters 9.6 and 9.7 for more details).

6.1.2 Coverage of NACE O, P and Q (public and social services)

Other sectors presenting difficulties in the sampling process are NACE O (Public Administration), P (Education) and Q (Health and Social Work). These three sectors are characterized by a high share of public organisations, with NACE O being almost exclusively made up by institutions owned by the state.

A number of address sources does not cover sector O and includes sectors P and Q only as regards the privately owned entities within these sectors. Even the SBR (Statistical Business Register) compiled by the national statistical offices on behalf of Eurostat does usually not include data on NACE O. Therefore in several countries additional address registers had to be used for sampling NACE O and for supplementing samples in NACE P and Q.

The most frequently used additional sources were registers based on the Yellow Pages or similar telephone registers. In some cases additional lists were compiled from internet sources such as the webpages of ministries etc. (see Table 20 for more details). These additional registers did often not provide any information on the number of employees so that a steering of the net sample by size proved to be more difficult for these sectors.

In several countries (e.g. most of the screening countries), also information on the universe of these three sectors was either lacking or incomplete or of unknown completeness[21]. For the definition of the targets, therefore estimates on the size and structure of the universe had to be used. These were made on base of the Labour Force Survey (for more details see chapters 9.6 and 9.7).

Due to the difficulties of sampling and weighting NACE O, P and Q (and also NACE A), the overall sample quality for these sectors is likely to be somewhat lower than for the other sectors that are well covered in the address sources used as main base for the survey.

6.1.3 Coverage of small units (5-9 employees)

The inclusion of establishments with 5 to 9 employees in ESENER implies a number of challenges for sampling, weighting and fieldwork. The most important sampling challenge is the under-coverage of small units in several of the address registers available for sampling. The reasons for this under-coverage are manifold:

- Among small units, the share of newly founded establishments is much higher than among larger ones since most new businesses start from a rather low size. It may take some time

[21] In a number of countries, the availability of statistical information on NACE O, P and Q has improved since ESENER-2. In case of any remaining doubts about the official statistics on these sectors, it was nevertheless decided to stick to the best estimates since they ensure more homogeneity with the universe figures used in ESENER-2.

before these newly founded establishments are listed in the sources used by address providers for the compilation of their address data.

- Commercial address providers usually compile their address data from various sources, among them tax reports or other financial data about enterprises. In these sources, small enterprises with a small turnover are often not fully listed. This holds particularly for family owned businesses - these do not have the same reporting duties as companies with a shareholder ownership.
- While the number of larger businesses (especially with 250 or more employees) is very limited in most countries, the absolute number of smaller units in the universe is comparably large. Since many surveys do rather concentrate on the middle- and large-sized businesses, there is little need for commercial address providers to provide a full coverage of small units.

In spite of the relative under-coverage of small establishments or companies with 5 to 9 employees in many address sources, no additional sources had to be used for sampling units of that size. In some countries, the number of addresses available for this size-class from the main address provider selected for the country came however to a limit – particularly in view of the much higher refusal rates observed in this segment.

6.1.4 Up-datedness of the registers

The up-datedness of an address register is an important criterion for the judgment on its quality. It can be assessed on base of different criteria. For the ESENER-3 samples, three indicators were analysed ex post on base of the net data set and the gross data file:

(1) Age of the youngest establishments in the net sample

The ESENER-3 questionnaire includes a question asking about the year in which the establishment was founded (Q112/Q112x). If a national net sample does not include any recently founded establishment or if the share of newly founded establishments is very low, this can be a hint on the out-datedness of the address register used for sampling. The analysis of ESENER-3 with regard to this criterion shows:

- In the majority of countries (19 of the 33 countries participating in the survey), there is at least one establishment founded in 2019 (the year of fieldwork for ESENER-2) in the net sample. This is a clear indication that the sampling frames used in these countries are very up-to-date since fieldwork started already on 1st April 2019.
- In 11 countries, the youngest interviewed establishment(s) date(s) from 2018
- In 3 countries, the youngest interviewed establishments were founded in 2017 (BE, EE, RS).

Address sources with establishments dating from 2018 can still be considered as very up-to-date since many countries drew their samples for the main survey already in December 2018 and thus did not have the chance to include establishments founded in 2019.

(2) Share of relatively young establishments within the net sample

The share of more recent establishments in the net sample is an indicator that turns out to be difficult to interpret because the business demography varies largely between countries. While in some countries, many establishments are being newly founded (and maybe also die) within one year, in others the situation is more static. This is probably a major reason for the large country differences regarding the share of interviews with establishments founded in the last ca. 3 years before the survey (after the year 2015): Rates vary from just 0,5% in Serbia to 6% or more in Norway, North Macedonia and Greece.

(3) Share/number of addresses from establishments that ceased to exist

One of the non-response reasons available to interviewers in ESENER-3 was code 14 *"inactive establishment, terminated"*. A high share of addresses from establishments that ceased to exist is a hint on an address-source that is not well maintained. But also here, other aspects such as a severe economic crisis affecting particular countries in the period between the last systematic update of the address register and survey fieldwork may have an influence on the measured rate. The countries with the highest rate of ceased establishments were Latvia (5,2% of all addresses "touched" for the survey) and Malta (4,6%), whereas the average rate was at just 1,0%.

Table 17: Indicators on the up-datedness of the address registers, by country

Country	Year of foundation of youngest establishment in the sample (Q112)	% establishments founded after 2015 (i.e. max. 3,5 years old) Q112gr	% establishments that ceased to exist (non-response code 14)
Base for the calculation	All interviews in non-public establishments	All interviews in non-public establishments	Addresses used (1+ contact attempts)
AT	2018	1,6%	0,5%
BE	2017	1,4%	0,5%
BG	2018	5,2%	1,9%
CH	2018	2,4%	0,5%
CY	2019	2,0%	2,8%
CZ	2019	1,6%	0,5%
DE	2019	1,3%	2,3%
DK	2019	2,5%	0,6%
EE	2017	2,2%	1,4%
EL	2019	7,6%	0,6%
ES	2019	1,6%	0,4%
FI	2019	3,5%	2,0%
FR	2019	1,4%	0,5%
HR	2019	2,5%	0,4%
HU	2019	1,4%	0,4%
IE	2019	3,7%	0,2%
IS	2018	3,1%	2,5%
IT	2019	3,9%	0,2%
LT	2018	4,8%	2,1%
LU	2019	1,5%	1,5%
LV	2018	1,7%	5,2%
MK	2018	6,2%	1,5%
MT	2018	2,5%	4,6%
NL	2018	1,4%	0,2%
NO	2018	6,0%	0,9%
PL	2019	2,1%	1,1%
PT	2019	2,5%	0,6%
RO	2019	2,2%	0,9%
RS	2017	0,5%	0,9%
SE	2019	3,1%	1,5%
SI	2019	2,1%	0,5%
SK	2018	1,1%	0,9%
UK	2019	3,3%	0,8%
ALL	**2019**	**2,7%**	**1,0%**

6.1.5 Inoperative or missing telephone numbers in the sampling frames

A further criterion for a judgment on the quality of a sampling frame for the purpose of a telephone survey is the availability of (correct) telephone numbers:

- A few of the sampling frames selected for ESENER-3 did generally come without telephone numbers because the frame provider does not collect this information. This is most often the case for sampling frames from national statistical offices.
- More frequently, frame providers include telephone numbers to their addresses, but not for all addresses.
- Finally, a considerable share of the telephone numbers that were provided in the sampling frames turned out to be outdated or otherwise wrong. In ESENER-3, the following two non-response codes refer to this category:
    - Non-response code 4: Information tone, fax or modem
    - Non-response code 5: Wrong telephone number

In the sampling phase of ESENER-3 and during fieldwork, provisions were made to account for these failures and to improve on the coverage with telephone numbers respectively with correct telephone numbers.

Approach for missing telephone numbers

For identifying sampling frames with a high share of totally missing telephone numbers, in a first step counts on the total number of addresses and the number of addresses with telephone number were ordered from the frame providers. These were compared to each other and for frames with less than 80% of the addresses having telephone numbers, the sample orders were not restricted to addresses with telephone numbers but included also addresses without numbers. The background of this decision was that establishments with missing telephone numbers in the frame might systematically differ from those that come with numbers (e.g. by ownership type). Therefore, in these cases the sample orders included a random selection of addresses from all contacts, also those without telephone number.

All sampled addresses without telephone number were then sent to the company “Sample Solutions”, a sample provider specialized in the provision and enrichment of samples for business surveys. All in all, in this step 100.918 addresses with missing telephone numbers were sent for data enrichment. These came from 13 countries (CH, DK, FI, HR, HU, IS, IT, LT, MK, NO, PT, SI and UK).

Sample Solutions applied a “big data” approach for the enrichment of the samples. The data enrichment used basically four sources:

(1) Websites from businesses
(2) General online look-ups
(3) A comparison with the internal company database of Sample Solutions
(4) Enquiries in publicly available business lists.

After all, for the 100.918 addresses included in this big data matching exercise, 29.861 (30%) addresses could be enriched with telephone numbers. Any potential sample bias due to missing telephone numbers could thus at least be substantially reduced. Factors such as differences in the legal and the merchant name of firms, different spellings used in the frame and in other sources, difficulties with other letter (Greek, Cyrillic etc.) or an incorrect location indicated in the frame address are among the reasons why the success of this approach is not even bigger.

Approach for incorrect numbers

Addresses of the initial sample that turned out to have wrong telephone numbers were also sent to Sample Solutions for trying to find new, correct numbers. This measure was also meant to further reduce any potential non-response bias. The addresses were sent to Sample Solutions approximately 5-6 weeks after the launch of fieldwork, that means at a time when almost all addresses of the initial samples had been dialed at least once.

In total, 12.901 addresses from all countries were selected for this. The results show that the research of wrong numbers was worth the effort:

- For 7.638 (59%) of these addresses, a telephone number could be found.
- Among these, 1.970 numbers were however identical with the numbers identified as wrong during fieldwork.
- In the end, 5.668 new telephone numbers were added, meaning that the telephone matching was successful for 44% of all researched addresses.
- Among these new numbers, 1.289 (23%) turned out to be also wrong when dialed in the field.
- 501 of the researched addresses in turn resulted in successful interviews (4% of all addresses sent for the telephone number research).

Towards the end of the fieldwork period, the matching exercise was repeated for another bunch of 6.523 records from Germany because a high share of newly added sample for Germany (mainly establishments with 5 to 9 employees) had turned out to have wrong numbers.

As Table 18 shows, the number of addresses with wrong numbers varies largely between countries, from a mere 1,9% of all used addresses in Austria to more than 20% in Hungary (22,7%), Slovakia (22,5% and Serbia (21,8%). These figures are calculated on base of the final disposition codes at the end of the fieldwork period. In view of the research on telephone numbers done during fieldwork (see above), the real shares of wrong numbers are higher[22].

[22] This holds particularly for Germany where a second large-scale telephone number research was carried out towards the end of the fieldwork period.

Table 18: Inoperative telephone numbers, by country

Country	Addresses used	% wrong telephone number (non-response code 5)	% Information tone - Fax - Modem (non-response code 4)	Sum inoperative telephone numbers
AT	16.147	0,3%	1,6%	1,9%
BE	9.177	6,0%	3,9%	9,9%
BG	7.384	0,8%	16,9%	17,7%
CH	6.153	0,2%	5,4%	5,6%
CY	7.016	1,5%	11,6%	13,1%
CZ	51.806	2,0%	8,9%	10,9%
DE	49.832	0,7%	13,4%	14,1%
DK	8.881	1,7%	14,2%	15,9%
EE	2.439	3,1%	2,0%	5,1%
EL	10.691	2,3%	5,1%	7,4%
ES	38.277	2,6%	15,8%	18,4%
FI	6.993	0,1%	5,2%	5,2%
FR	16.184	2,3%	8,8%	11,1%
HR	7.114	2,1%	3,8%	5,8%
HU	15.791	2,3%	20,4%	22,7%
IE	9.288	0,5%	4,1%	4,5%
IS	2.693	0,0%	8,9%	8,9%
IT	16.765	1,8%	8,6%	10,4%
LT	3.507	1,1%	6,7%	7,8%
LU	4.647	0,3%	5,0%	5,3%
LV	3.557	4,7%	4,1%	8,8%
MK	1.563	0,1%	4,0%	4,0%
MT	3.257	0,7%	18,4%	19,1%
NL	16.655	1,0%	10,2%	11,2%
NO	19.565	0,1%	11,8%	11,9%
PL	29.163	7,8%	5,8%	13,6%
PT	9.239	1,8%	5,7%	7,5%
RO	18.894	0,6%	3,8%	4,5%
RS	3.373	0,4%	21,4%	21,8%
SE	8.396	1,3%	6,5%	7,8%
SI	4.658	1,8%	5,6%	7,4%
SK	24.401	12,3%	10,2%	22,5%
UK	13.389	0,2%	8,5%	8,7%
ALL	**446.895**	**2,5%**	**9,6%**	**12,1%**

6.1.6 Accurateness of sector and size indications in the address databases

In any establishment or company survey with a disproportionally stratified sample or a target population limited to part of the universe of establishments or companies, the availability of sector or size information from the sampling frame is important for an effective fieldwork.

All main sampling frames used in ESENER-3 provided information on sector and size, though in some cases the size information for addresses from specific sectors was lacking (mostly NACE O, P or Q)[23]. Analyses of the data-set and the gross data do however show that this information was not always correct: In 29,8% (ESENER-2: 28,5%) of all addresses with size information in the frame, the size classification in the frame did not correspond to the size of the establishment as indicated in the questionnaire in Q102.

For the screening countries, size discrepancies are often inevitable because company based sampling frames indicate the total number of employees in the organisation whereas for the interview only one (or more) single units were selected. But for several non-screening countries, the number of size stratum jumpers is also surprisingly high, with more than 30% of the successfully phoned sample in the UK, Denmark, Poland, Germany, the Netherlands, Spain, Belgium, Italy and Ireland. Partly, this may be due to differences in the definition of whom to count as an employee[24]. But in many cases, it may also be a sign that the address information is not regularly updated. In Germany and Spain (and possibly in further countries), size discrepancies are so large because the address providers do not have any size information on the subsidiaries but estimate the size on base of the number of employees in the entire company and the number of local units it has.

At the beginning of the interview, the sector information from the sampling frame was verified. To this end, the official description of the respective NACE division (NACE 2-digit level) was read out to respondents and they were asked to confirm whether or not it is correct. The sector attribution from the sampling frame was considered as wrong in 9,5% of all organisations cooperating in the survey (ESENER-2: 15,6%).

In some countries with particularly high shares of sector stratum jumping (e.g. the UK), this is largely owed to differences between the locally used sector codes and the NACE codes. The Dun and Bradstreet register used in the United Kingdom is for example classified by SIC and not by NACE.

Moreover, some establishment-level sampling frames do not collect information on the sector of activity per unit, but assume that each local unit has the same main sector of activity as the entries company.

[23] Among the 446.895 addresses used for ESENER-3, 21.451 (54%) did not have any size classification. Hereof, 11.523 addresses were from NACE O, P or Q.

[24] There are different ways on how to count employees, e.g. either as full-time equivalents or – as in the questionnaire – by counting each person as a full employee, regardless of the hours worked. Differences may also occur with regard to the types of employees to be considered: The size information on which the size-classes in the data-set are based refers to employees on the payroll only (Q102). Some address registers might also consider other types of workers.

Table 19: Stratum jumpers (differences between frame classification and respondent information)

Country	Screening applied	Share of NACE codes considered as wrong or possibly wrong by respondents (Q108 = 2 or 9)	Share of NACE codes finally attributed to another NACE Rev.2 2-digit sector	Share of NACE codes finally attributed to another NACE Rev.2 1-digit sector	Share of interviews with a switch in the size-class*
AT	no	14,8%	10,7%	9,6%	24,2%
BE	no	10,2%	8,7%	7,4%	34,2%
BG	yes	11,0%	9,4%	6,6%	20,1%
CH	no	6,9%	4,9%	3,8%	24,4%
CY	yes	13,1%	8,5%	6,9%	35,4%
CZ	yes	11,3%	8,6%	7,4%	23,2%
DE	no	13,7%	11,8%	9,6%	38,1%
DK	no	4,2%	3,2%	2,6%	39,1%
EE	yes	2,6%	1,8%	1,7%	19,9%
EL	yes	2,8%	2,7%	2,3%	24,7%
ES	no	15,8%	11,8%	10,3%	35,0%
FI	no	8,7%	4,8%	3,6%	29,2%
FR	no	7,0%	4,0%	3,2%	26,3%
HR	yes	14,7%	10,3%	6,6%	22,8%
HU	yes	12,0%	9,4%	8,0%	24,4%
IE	no	12,0%	7,3%	5,2%	31,5%
IS	yes	12,4%	9,6%	8,9%	35,6%
IT	no	9,3%	7,5%	5,6%	32,3%
LT	yes	4,9%	4,5%	3,8%	16,2%
LU	no	6,2%	3,6%	3,0%	28,9%
LV	yes	6,0%	4,0%	3,3%	22,5%
MK	yes	4,9%	2,9%	2,7%	21,7%
MT	yes	7,7%	6,4%	5,7%	35,4%
NL	no	14,3%	10,0%	8,1%	36,8%
NO	no	6,2%	4,0%	3,1%	27,2%
PL	no	10,8%	9,8%	8,8%	38,5%
PT	yes	4,6%	2,2%	1,8%	23,4%
RO	yes	5,3%	2,7%	2,3%	24,1%
RS	yes	6,7%	5,6%	5,1%	35,8%
SE	no	4,0%	2,5%	1,9%	26,7%
SI	yes	4,2%	2,2%	1,4%	21,0%
SK	yes	9,9%	7,5%	6,6%	25,5%
UK	no	17,3%	14,6%	12,7%	41,8%
ALL - %		**9,5%**	**7,0%**	**5,8%**	**29,8%**
ALL - n		**4.302**	**3.195**	**2.641**	**13.075**

** Refers only to the addresses with a classification in the source*

6.1.7 The correction of sector codes

Wrong sector codes evidently have to be corrected since sector (and size) are the most important background variables for any surveys among organisations. In ESENER-2, respondents considering the sector indication from the sampling frame as wrong were asked to describe their sector of activity in a few words. After finalization of fieldwork, these were then translated to German and coded centrally by an experienced coding team at Kantar in Munich. Though this procedure worked well, it had a major drawback: As the coding was done only after finalization of fieldwork, the revised sector codes were not available during fieldwork for the steering of the net samples by sector.

For ESENER-3, Kantar therefore developed a sector coding tool integrated into the CATI (and CAWI) script. This tool was meant to identify and code the correct sector on the spot. For this, the respondent was asked to describe the sector of activity of his/her establishment in one keyword (e.g. transport or restaurant). When the interviewer entered this keyword in a mask programmed in the script, all NACE code descriptions including this keyword were shown. The respondent then was asked to select the appropriate description from this list (usually not more than 3 to 5 sector descriptions) and the system stored the respective code[25].

The search engine was fed with the descriptions of all NACE codes at the NACE 3-digit level. In addition, the respective NACE section (1-digit level) was shown at the beginning of each code description because in some instances, the texts of the 3-digit level are so specific that an appropriate keyword would be difficult to find[26].

As shown in chapter 6.1.6, there were in total 4.302 respondents who considered the sector indication from the sampling frame as wrong or were not sure about this. In 3.362 (78%) of these 4.302 interviews, the application of the sector coding tool was successful, that means the sector description of the respondent led to a NACE code considered as correct by the respondent. This sector description was then used for the steering of the net sample. The programmed tool thus successfully reduced the number of sector descriptions for posterior manual coding considerably.

In the remaining 940 (22%) interviews where the sector code from the sampling frame was considered wrong by the respondent, no match for the term(s) named by the respondent could be found in the search engine (within a reasonable time). In these cases, respondents were asked to describe their activity in a few words so as to allow for a later coding of the verbatims. These verbatims were (as in ESENER-2) translated into the German language after finalization of fieldwork and coded by an experienced sector coding team at Kantar Munich. In the (few) cases where the manual coding did not lead to the identification of a NACE code corresponding to the description of the respondent, the sector code from the sampling frame was used for weighting and is included in the data-set.

A comparison of the new codes with the codes from the sampling frames considered as incorrect shows that in some cases both are identical, meaning that the sector indication in the sampling frame was actually correct. Among the 4.302 establishments with a presumably wrong code, finally 3.195 were attributed to another NACE 2-digit code and only 2.641 to another NACE 1-digit code (NACE section). That corresponds to 5,8% of the total sample (see Table 19 above).

[25] In case the respondent knew the code, it was also possible to add the code instead of a keyword and the text description of this code was then shown on the screen and read out to the respondent for confirmation.

[26] An example is NACE A (Agriculture, forestry and fishing). A farmer would normally name “farm” or “agriculture” as keyword, but these words are not used in the NACE 3-digit descriptions. There, in turn, codes for different crops or for animals raised are shown.

6.2 Overview over the sampling frames used for ESENER-3

The following overview shows the names of the address registers used for ESENER-3 and further information such as the up-datedness of the register, the level of entries (companies or establishments), its nature (commercial or official source) etc.

Table 20: Sampling frames used for ESENER-3, by country

Country	Name of the address register(s)	Level of entries	Update frequency	Character of source	Additional sources needed/used for specific sectors	Total number of addresses 5+ available from source (refers to main source only)	Number of addresses 5+ with telephone numbers available from source (refers to main source only)
AT	Herold	Establishments	at least monthly	commercial	no	305.110	258.357
BE	Belfirst	Establishments/ local units	twice per year	commercial	no	430.467	301.076
BG	Dun & Bradstreet	Companies/ enterprises	at least monthly	commercial	no	80.895	74.721
CH	BUR (Establishment register of the Federal Statistical Office)	Establishments/ local units	constantly	official	no	680.061	387.545
CY	Central Statistical Office: Registry of Companies 2015 (2012 for NACE O, 2016 fopr NACE A)	Companies/ enterprises	Systematic updates only every few years	official	Additional addresses for NACE O: acquired from Statistical Service in 2012 and from "Public School Committees" (http://www.moec.gov.cy/schools_info.html; Size unknown); NACE P: http://www.moec.gov.cy/schools_info.html (Size unknown); NACE Q: https://www.moh.gov.cy/moh/moh.nsf/page63_gr/page63_gr?OpenDocument (Size unknown)	11.316	9.862
CZ	Albertina	Companies/ enterprises	quarterly	commercial	no	86.982 (plus further addresses without size indication)	71.923 (plus 116.000 without size indication)
DE	Heins & Partner	Establishments/ local units	quarterly	commercial	no	972.641	839.934
DK	Experience (KOB)	Establishments/ local units	constantly (online updates)	commercial	no	no count available	no count available
EE	Business register of Statistics Estonia	Companies/ enterprises	Constantly for addresses, once per yer for number of employees	official	yes; Register of the constitutional institutions, local governments, government agencies, public institutions, other state agencies and other non-profit associations	16.436	none
EL	ICAP Database	Companies/ enterprises	once a year	commercial	yes; Yellow Pages for NACE OPQ (no size classification available for these addresses)	29.464	not available
ES	Data Centric (Schober)	Establishments/ local units	monthly	commercial	no; but most addresses for NACE O in Data Centric without size indication	215.731 (plus 73.000 without size indication)	180.499 (plus 44.000 without size indication)
FI	Fonecta BtoB	Establishments/ local units	monthly	commercial	no	68.502 (plus 55.268 without size indication)	40.877 (plus 28.823 without size indication)
FR	Cegedim	Establishments/ local units	monthly	commercial (also provides official Sirene database)	no	594.949 (plus 302.000 without size indication)	408.699 (plus 52.000 without size indication)
HR	Bisnode d.o.o.	Companies/ enterprises	once a year	commercial	yes; Ministry of Public Administration (government websites) and additional request at Central Bureau of Statistics for NACE O and for size 50+ in NACE P and Q	35.736	17.967
HU	KSH (central Statistical Office)	Companies/ enterprises	monthly	official	Yellow Pages and government internet pages for addresses from NACE O, P, Q (no size classification available for these addresses)	83.913	no count available
IE	Bill Moss Bureau	Establishments/ local units	monthly	commercial	no	not available	46.058
IS	National registry and Credit Info	Companies/ enterprises	monthly	both commercial and official	yes; Yellow Pages and government website information for O,P and Q	3.542 (plus 11.768 without size indication)	2.739 (plus 3.641 without size indication)
IT	Dun & Bradstreet	Establishments/ local units	monthly	commercial	no	777.115	no count available

Country	Name of the address register(s)	Level of entries	Update frequency	Character of source	Additional sources needed/used for specific sectors	Total number of addresses 5+ available from source (refers to main source only)	Number of addresses 5+ with telephone numbers available from source (refers to main source only)
LT	Creditinfo Lietuva	Companies/ enterprises	monthly	commercial	no	35.058	34.629
LU	Editus (provider of Yellow Pages in Luxembourg)	Establishments/ local units	constantly by several channels	commercial	A few addresses for the education sector added from Yellow Pages (no size classification available for these addresses)	86.498 overall, hereof 5.799 in size 11+	77.809 overall, hereof 4.332 in size 11+
LV	Business register of the central statistical bureau of Latvia (CSB)	Companies/ enterprises	Monthly for NGOs, weekly for others	official	no	25.109	none
MK	Central Register of Companies in Macedonia	Companies/ enterprises	not known	official	no	13.930	none
MT	National Statistics Office (NSO)	Companies/ enterprises	Systematic updates only every few years	official	no	801 (plus 1.381 without size indication)	none
NL	Kamer van Koophandel (Chamber of Commerce)	Establishments/ local units	monthly	official	yes; need to add addresses mainly for NACE O (some for P and Q) from LISA databank	129.924	117.708
NO	Bisnode Matchit	Establishments/ local units	twice per year	commercial	no	105.720	73.935
PL	PCM	Establishments/ local units	at least once per month	commercial	no	257.671 (plus 201.399 without size indication)	193.220 (plus 126.800 without size indication)
PT	Informa Dun & Bradstreet	Companies/ enterprises	daily	commercial	no	94.780 (plus 300.212 without size indication)	77.972 (plus 110.598 without size indication)
RO	Lista Firme	Companies/ enterprises	Regularly	commercial	Yellow Pages for NACE A, K and O	109.691	no count available
RS	Serbian Business Register Agency	Companies/ enterprises	not known	official	Yellow Pages (www.11811.rs) and official Government websites used for NACE O, P and Q	20.554	19.991
SE	PARAD databank of the provider Bisnode	Establishments/ local units	weekly updates (from Bolagsverket and SCB)	commercial, but based on official registers (Bolagsverket and SCB)	no	103.799 (plus 71.224 without size indication)	96.196 (plus 70.308 without size indication)
SI	iPiS Marketing Manager a Bisnode Solution, InfoBON d.o.o.	Companies/ enterprises	At least monthly	commercial	no	14.973	12.326
SK	Albertina	Companies/ enterprises	quarterly	commercial	no	45.044 (plus 666.452 without size indication)	32.651 (plus 140.245 without size indication)
UK	Experian	Establishments/ local units	daily	commercial	no	561.515	388.788

6.3 Assessment of the sampling situation in each country

The following table shortly describes any particular sampling difficulties encountered in the sample preparation phase or when working with the sample during the fieldwork period.

Table 21: Summary of specific sampling challenges and frame evaluation, by country

Country	Comments on the sampling frame(s)
AT	Very good and accurate frame, with only few wrong telephone numbers and a reasonable share of subsidiaries
BE	Belfirst preferred over Infobel due to experiences of FW partner; good share of subsidiaries, rather high number of wrong size indications
BG	D & B preferred over the recommended APIS frame since frame counts of both providers showed a much higher coverage for D & B; relatively high share of wrong numbers & inactive organisations
CH	Very low share of wrong numbers or inactive establishments, but high share of establishments <5 employees; telephone numbers available only for <60% of the addresses

Country	Comments on the sampling frame(s)
CY	No telephone numbers in the frame, these had to be added from other sources; high share of addresses out of scope (7% inactive or private households)
CZ	Quite good frame as regards wrong numbers or inactive units
DE	Best generally available source for establishment level addresses, with good coverage of subsidiaries; but size of local units only estimated and often wrongly so; high share of wrong telephone numbers, particularly for small establishments
DK	Relatively high share of wrong numbers; high share of wrong size indications; very good representation of local units (high share of subsidiaries in the net sample); partly deviating employee size categories (100+)
EE	No telephone numbers in the frame, these had to be added from other sources; low share of wrong numbers or inactive establishments; relatively high share of out of target (<5 employees), partly because no size indication for public entities
EL	Good frame according to indicators from fieldwork
ES	High share of wrong size and sector indications - size indications for establishments only estimated; relatively high share of wrong numbers; reasonably good share of subsidiaries resulting in the net sample
FI	Good address quality, good representation of subsidiaries
FR	Quite good good quality of size and sector information; subsidiaries represented very well
HR	Overall good address quality; hardly any address for NACE O in the frame
HU	High share of wrong numbers, partly from numbers added to the sample from other sources; only very few addresses out of size
IE	Very good overall address quality, but rather high share of wrong size indications; very good representation of subsidiaries
IS	reasonably good overall address quality, but need to screen many addresses on the size (no size indication in the frame); relatively high share of estab. out of target (<5 empl.)
IT	Reasonably good address quality; acceptable representation of local units/subsidiaries in the frame; subsidiaries included in the frame do not have size indication; size imputed by Kantar from available company data
LT	Very complete frame, almost all with telephone numbers; low share of wrong numbers and units out of size (<5 empl.), seemingly high share of newly founded companies in the frame (very up-to-date)
LU	Very complete frame, but enhanced screening efforts due to definition of smallest size class as 1-10 empl.; high share of "size out of target" due to this (8,8%)
LV	Many inactive establishments (5,2%) in the frame and high share of size out of target (<5 empl); otherwise reasonably good frame
MK	Need for adding telephone numbers; very complete frame, with a high share of newly founded companies
MT	High share of companies that ceased to exist (4,6%) and with size out of target (9,6%) due to a lack of size indication for many addresses; necessity to add phone numbers, with high share of added numbers turning out to be wrong (18,4%)
NL	Very good coverage of local units/subsidiaries; size and sector information not always correct (relatively high share of size and sector jumpers and size out of target)
NO	Very up-to-date, very good coverage of local units/ subsidiaries
PL	Addresses available only with sligthly deviating size band definitions (5-10,11-50,51-200-201+); quite good coverage of local units/subsidiaries; rather high share of wrong telephone & fax numbers (13,6%)
PT	Low share of inactive companies and rather low share of wrong telephone numbers; overall good quality
RO	Good address quality as far as can be judged on the available indicators
RS	Very high share of wrong telephone numbers (21,4%); newly founded companies not well represented (youngest company in the net sample from 2017, only 0,5% of interviews with companies founded after 2015)
SE	Good and up-to-date addresses, very accurate sector codes, very good coverage of local units/subsidiaries
SI	Good quality, with low share of wrong numbers, inactive companies etc.
SK	High share of available addresses is without size classification; high share of wrong numbers & fax numbers (22,5%)
UK	Very good coverage of local units/subsidiaries, but high share of wrong size information (9,4% out of target, 41,8% size jumpers among net sample); addresses classified by SIC instead of NACE code (conversion necessary)

7 Fieldwork

7.1 Fieldwork period

All in all, the fieldwork period lasted from 01 April 2019 to 05 August 2019, i.e. approximately 18 weeks.

In the initial planning agreed at the launch of the project, fieldwork was foreseen to start on 01 April and to end on 19 July 2019 (16 weeks). The planning additionally foresaw a buffer of two reserve weeks (until 2nd August), in case any boost samples would be ordered what finally was the case for Ireland, Norway and Slovenia.

The first countries to finalise fieldwork were Estonia and North Macedonia, where the last interviews were made on 20th respectively 29th June. Almost all countries had finalised fieldwork by 2nd August the latest, the last day of the planned reserve period. Only in two countries (Finland[27] and Portugal), one additional working day (5th August) was necessary to collect the last few interviews.

It was an important aim for ESENER-3 to avoid fieldwork being done in the main summer period, particularly for those countries where the main holiday period implies a total closure of many establishments. In the end, fieldwork nevertheless reached into the summer vacation period for a number of countries, though mostly only for a limited number of interviews in cells that proved to be particularly difficult to fill.

Table 22: Fieldwork period, by country

Country	FW start	FW end
AT	2.4.19	17.7.19
BE	3.4.19	10.7.19
BG	1.4.19	5.7.19
CH	1.4.19	9.7.19
CY	4.4.19	26.7.19
CZ	1.4.19	26.7.19
DE	1.4.19	2.8.19
DK	1.4.19	24.7.19
EE	1.4.19	20.6.19
ES	2.4.19	24.7.19
FI	1.4.19	5.8.19
FR	2.4.19	2.8.19
EL	1.4.19	25.7.19
HR	1.4.19	2.8.19
HU	1.4.19	18.7.19
IE	1.4.19	12.7.19
IS	1.4.19	10.7.19

Country	FW start	FW end
IT	1.4.19	23.7.19
LT	1.4.19	17.7.19
LU	2.4.19	12.7.19
LV	1.4.19	4.7.19
MK	2.4.19	29.6.19
MT	4.4.19	24.7.19
NL	1.4.19	25.7.19
NO	1.4.19	2.8.19
PL	2.4.19	23.7.19
PT	2.4.19	5.8.19
RO	2.4.19	29.7.19
RS	1.4.19	15.7.19
SE	1.4.19	5.7.19
SI	3.4.19	17.7.19
SK	1.4.19	2.8.19
UK	1.4.19	1.8.19

[27] Finland had finalised fieldwork already a few days earlier. In the data checks it had however turned out that a few interviews the local fieldwork team had deleted due to quality issues were still counted as complete interviews in the fieldwork monitoring tool and were thus not replaced by new, additional interviews. These missing interviews were then made at the very end of the fieldwork period.

7.2 Targeted and achieved net sample size

The total targeted sample size for ESENER-2 was 45.200 interviews. Hereof, 2.000 interviews were commissioned as national sample boosts ordered by governmental health and safety institutions in Ireland (1.250), Norway (450) and Slovenia (300).

The basic sample sizes for the single countries (not including sample boosts) were roughly adapted to the size of the national economy. The sample sizes ordered by EU-OSHA ranged from 450 interviews in the smallest economy (Malta) to 2.250 interviews in the largest countries of the geographical area covered by the survey (France, Germany, Italy, Poland, Spain and the United Kingdom).

With few exceptions, the targeted sample size was achieved in all countries. Even the very small countries that had to struggle hard to meet the overall targets (CY, IS, LU, MT) due to the limited size of their universe could finally deliver the requested number of interviews on time.

In a number of countries, additional interviews were delivered that go beyond the targets. The additional interviews sum up to n = 220. Mostly, these are online interviews coming in after finalization of CATI fieldwork in the country. Some additional interviews are from telephone calls made still after completion of the net sample in order not to have to cancel the call.

Overall, the net sample size amounts to 45.420 completed interviews. Of these, 43.254 interviews were conducted by telephone (CATI) while 2.166 interviews (4,8%) were done online as CAWI interviews (for details on the CAWI interviews see chapter 8).

Table 23: Targeted and achieved net sample sizes, by country

Country	Country code	Targeted net sample	Achieved net sample	Balance
Austria	AT	1.500	1.503	3
Belgium	BE	1.500	1.506	6
Bulgaria	BG	750	755	5
Croatia	HR	750	740	-10
Cyprus	CY	750	757	7
Czech Republic	CZ	1.500	1.552	52
Denmark	DK	1.500	1.513	13
Estonia	EE	750	758	8
Finland	FI	1.500	1.505	5
France	FR	2.250	2.251	1
Germany	DE	2.250	2.264	14
Greece	EL	1.500	1.501	1
Hungary	HU	1.500	1.504	4
Ireland (incl. national boost of n = 1.250)	IE	2.000	1.999	-1
Italy	IT	2.250	2.251	1
Latvia	LV	750	756	6
Lithuania	LT	750	754	4
Luxembourg	LU	750	773	23
Malta	MT	450	453	3
Netherlands	NL	1.500	1.521	21
Poland	PL	2.250	2.250	0
Portugal	PT	1.500	1.493	-7
Romania	RO	1.500	1.500	0
Slovakia	SK	750	756	6
Slovenia (incl. national boost of n = 300)	SI	1.050	1.067	17
Spain	ES	2.250	2.266	16
Sweden	SE	1.500	1.512	12
United Kingdom	UK	2.250	2.251	1
SUBTOTAL 1: EU-countries	**28 countries**	**39.500**	**39.711**	**211**
Switzerland	CH	1.500	1.502	2
Iceland	IS	750	753	3
North Macedonia	MK	750	752	2
Norway (incl. national boost of n = 450)	NO	1.950	1.951	1
Serbia	RS	750	751	1
SUBTOTAL 2: Non-EU countries	**5 countries**	**5.700**	**5.709**	**9**
TOTAL ALL COUNTRIES	**33 countries**	**45.200**	**45.420**	**220**

7.3 Interview duration

The CATI interviews were meant to take 25 minutes on average. The average duration measured for the survey was 24 minutes and was thus very close to the targeted duration.

As the table below shows, the average duration varies considerably between countries, from ca. 18 minutes in Italy and Greece to about 29 minutes in Finland and Bulgaria. These country variations are partly due to language effects (some languages are shorter than others) and partly due to filtering effects (in countries where health and safety measures such as risk assessments are less widespread, interviews tend to be shorter because the further questions on details of the risk assessments are not asked). In the screening countries, the additional screening questions to be answered by multi-site organisations also lead to a slightly longer interview duration.

Table 24: Measured average interview time, by country

Country	Duration (in minutes)	Country	Duration (in minutes)
AT	23,2	IT	17,8
BE	28,2	LT	22,0
BG	28,9	LU	27,8
CH	26,1	LV	25,3
CY	21,7	MK	22,1
CZ	27,3	MT	24,2
DE	23,4	NL	23,6
DK	25,1	NO	23,2
EE	23,0	PL	25,1
EL	18,3	PT	19,2
ES	23,5	RO	27,5
FI	28,9	RS	23,5
FR	22,4	SE	28,3
HR	28,4	SI	25,2
HU	21,8	SK	23,8
IE	21,3	UK	19,0
IS	24,4	ALL	24,0

In the time measurements, only CATI interviews were taken into account. The time measurement is based on the system time measured at the TripleC centre. This is the internal reference time for international Kantar projects. Time measurements via the time stamps set in the questionnaire may slightly deviate from this due to technical problems occurring e.g. when jumping back and forth in the questionnaire (for correcting answers to previous questions etc.).

7.4 Size and sector structure of the net sample

Size and sector of activity are crucial characteristics for the analysis of survey data among organisations. In all countries included in ESENER-3, the main address sources used for drawing the samples already contained information on the number of employees (size-class) and on the sector of activity for each listed address. This information was taken as base for drawing the gross samples, but respondents were asked to verify this information at the beginning of the interview:

- Question Q102 asked for the number of employees on the payroll of the establishment, with part-time employees meant to be counted as full employees (head count). In case of multi-site organisations, respondents were explicitly advised to refer their answer to the number of employees in the local unit only.
- Q108 asked respondents to confirm the sector of activity to which the establishment is attributed according to the information in the address register. If confirmed by the respondent, the sector attribution from the address register was used in the data-set.
- Respondents who did not confirm the sector attribution from the address source were in Q110 asked to shortly describe the main activity of their establishment in their own words. These verbatim answers were later coded into NACE Rev.2 categories (see chapter 11.3 for more details). In these cases, the coded answers of verbatims were used for the sector attribution within the data set. Exceptions to this are the interviews where the verbatim descriptions of

respondents did not allow the clear attribution to one of the sectors. In these cases, the sector indicated in the address source was used in the data-set in spite of the respondent's consideration of these as incorrect.

The table below shows the distribution of the completed interviews by size-class and sector of activity, based on the information respondents provided during the interview. t

Table 25: Structure of the net sample (all countries), by size and sector (unweighted)

NACE Rev.2	Size size class (Q105)				TOTAL	in %
Division	1 5-9	2 10-49	3 50-249	4 250+		
1 A	381	383	131	30	**925**	2,0%
2 B	37	82	63	34	**216**	0,5%
3 C	1.383	2.240	1.337	1.037	**5.997**	13,2%
4 D	53	81	55	46	**235**	0,5%
5 E	102	201	133	62	**498**	1,1%
6 F	1.263	1.474	401	129	**3.267**	7,2%
7 G	4.027	3.400	831	250	**8.508**	18,7%
8 H	620	836	373	208	**2.037**	4,5%
9 I	1.075	1.612	385	92	**3.164**	7,0%
10 J	366	508	236	120	**1.230**	2,7%
11 K	382	374	176	134	**1.066**	2,3%
12 L	293	299	83	28	**703**	1,5%
13 M	1.035	1.038	331	175	**2.579**	5,7%
14 N	551	779	469	247	**2.046**	4,5%
15 O	333	822	625	430	**2.210**	4,9%
16 P	484	1.779	1.044	233	**3.540**	7,8%
17 Q	1.107	2.235	944	634	**4.920**	10,8%
18 R	288	438	115	58	**899**	2,0%
19 S	679	501	144	56	**1.380**	3,0%
TOTAL	**14.459**	**19.082**	**7.876**	**4.003**	**45.420**	**100,0%**
in %	**31,8%**	**42,0%**	**17,3%**	**8,8%**	**100,0%**	

Though there are some discrepancies between targeted and achieved samples in specific cells, the reached structures are overall quite close to the targets. The largest differences can be observed in the following segments:

- In several countries the targets for the smallest size-class (5 to 9 employees) could not be fully achieved. Though the higher share of invalid addresses in this size-class was anticipated in the sampling design, several local fieldwork partners ran out of addresses in this segment. As far as possible, additional addresses were provided during fieldwork. Nevertheless, in the end some countries had difficulties in meeting the targets for size-class 5-9 employees. The net samples achieved for that size kept more than 20% behind the target in MT (56%[28]), DE (74%), CY and HR (79%).

- In the largest size-classes, the picture is diverse. Overall, the number of interviews achieved in this size-class is only slightly lower than envisaged, with 94% of the reached. But a number of countries had to finalise fieldwork with less than 80% of the target reached: Iceland (34%), Slovakia (53%), Greece (56%), Cyprus (71%), United Kingdom (73%) and Estonia (77%). With

[28] The percentages refer to the target: 41% means for example that 41% of the interviews targeted for this particular segment (100%) were finally achieved.

the exception of the United Kingdom, these are all screening countries. For these, it is much more difficult to fulfil the quota particularly for the largest size-classes because for all multi-site enterprises the indicated size refers to the entire organisation with all its subsidiaries in the country. For Iceland and Cyprus, it was anticipated that it would not be possible to reach the target since targets for these (and other) very small countries were very ambitious and achievable only in an ideal situation where practically all large establishments would participate in the survey.

- In terms of sectors, discrepancies between the targeted and the achieved number of interviews are much smaller, overall as well as in the majority of national samples. The sector that most often presented difficulties on the national level was NACE A (Agriculture, forestry and fishing).

For the smallest of the countries participating in the survey (CY, LU, MT, IS), somewhat larger deviations from the targets had been agreed from the beginning due to the limitations regarding the number and structure of available addresses. Here, the priority was on the achievement of the total sample size in view of the limited number of available addresses.

Where major differences between targeted and achieved net sample turned up, EU-OSHA and Kantar decided for each country how much leeway to grant, taking into account criteria such as the available addresses, the size of the universe in the cell and fieldwork timing.

Table 26: Comparison of targeted and achieved size and sector structures

Target: Adjusted to sample size

	5-9	10-49	50-249	250+	Total
A	455	344	96	36	931
BDEF	1.585	1.746	529	251	4.111
C	1.369	2.172	1.228	986	5.755
GHIR	6.494	6.209	1.527	646	14.875
JKLMNS	3.550	3.273	1.267	957	9.047
O	287	751	550	503	2.091
P	503	1.770	951	233	3.457
Q	1.308	2.114	865	646	4.932
Total	15.550	18.380	7.012	4.258	45.200

Net interviews before manual sector coding

	5-9	10-49	50-249	250+	Total
A	387	380	131	29	927
BDEF	1.447	1.833	650	271	4.201
C	1.360	2.213	1.320	1.028	5.921
GHIR	6.035	6.315	1.707	620	14.677
JKLMNS	3.301	3.516	1.457	767	9.041
O	333	819	623	424	2.199
P	483	1.769	1.045	229	3.526
Q	1.113	2.237	944	634	4.928
Total	14.459	19.082	7.877	4.002	45.420

Net interviews after manual sector coding (final)

	5-9	10-49	50-249	250+	Total
A	381	383	131	30	925
BDEF	1.455	1.838	652	271	4.216
C	1.383	2.240	1.337	1.037	5.997
GHIR	6.010	6.286	1.704	608	14.608
JKLMNS	3.306	3.499	1.440	759	9.004
O	333	822	625	430	2.210
P	484	1.779	1.044	233	3.540
Q	1.107	2.235	944	634	4.920
Total	14.459	19.082	7.877	4.002	45.420

Net interviews after manual sector coding (final)/target

	5-9	10-49	50-249	250+	Total
A	84%	111%	136%	83%	99%
BDEF	92%	105%	123%	108%	103%
C	101%	103%	109%	105%	104%
GHIR	93%	101%	112%	94%	98%
JKLMNS	93%	107%	114%	79%	100%
O	116%	109%	114%	86%	106%
P	96%	100%	110%	100%	102%
Q	85%	106%	109%	98%	100%
Total	93%	104%	112%	94%	100%

7.5 Fieldwork success in terms of cooperation and response rates

7.5.1 Mode of calculation of the various outcome rate variants

There are many different possibilities on how to calculate the response rates for a survey. AAPOR, the American Association for Public Opinion Research, is one of the organisations that has been trying to harmonise the calculation of outcome rates in order to facilitate comparability between surveys. Unfortunately, the recommendations of AAPOR in the report “Standard Definitions. Final Disposition

Codes and Outcome Rates for Surveys" are however not always unambiguous, particularly not for surveys among establishments such as ESENER[29].

For ESENER-3, we have nevertheless opted for a calculation of response rates largely in accordance with the recommendations of AAPOR since this is probably the most widely used standard for scientific surveys. The response rates are therefore not directly comparable to the rates shown for ESENER-2 in the Technical Report on this previous survey wave. In order to establish full comparability, rates of ESENER-2 have therefore been recalculated and will be shown here as benchmark for comparisons.

Response rates

The response rate is the most conservative measure of survey outcomes. In case of a survey among organisations, it measures the number of interviews achieved as compared to the number of all addresses/organisations approached for a survey, except for those that clearly turned out to ineligible (in this case private households, extinguished organisations, double addresses or addresses of organisations that are not within the defined universe due to their size or sector).

Whether a unit from the sampling frame is finally eligible or not is determined at different stages of an interview attempt:

- For all successful interviews it is evident that they were done with eligible organisations. The eligibility is here confirmed during the interview, usually at the beginning.
- For extinguished organisations or private households it becomes clear at the very first contact that these addresses are not eligible. The persons responding the contact attempt (here: the phone call) will immediately tell this if the interviewer introduces the request for participation in the survey.
- For organisations out of target, the non-eligibility can be defined only at a later stage, namely within the interview, in case of ESENER-3 in Q102 (size) and Q108 to Q110 (sector).
- For a large number of organisations, the eligibility can however not be clarified at all during fieldwork for the survey. This is evidently the case for all non-contacts (no answer etc.), but also for all types of refusals, for open appointments made for further calls or for the interview itself as well as for other types of non-responses occurring during the fieldwork period. In all these cases, the final determination of the eligibility would have required to start the interview. This was not possible for the set of addresses with such final disposition codes, they are thus classified as cases with an "unknown eligibility".

A main difference between the different response code variants proposed by AAPOR is the treatment of the criterion "eligibility", particularly the way how to count cases of "unknown eligibility"

Response Rate 1 (RR1)

In the AAPOR definition, the minimum response rate (RR1) is defined as "the number of complete interviews divided by the number of interviews (complete plus partial) plus the number of non-interviews (refusal and break-offs plus non-contacts plus others) plus all cases of unknown eligibility (AAPOR 2016: 61)". RR1 thus treats the cases with unknown eligibility as if they were all eligible. This rate is very similar to the response rate that was calculated in the Technical Report of the preceding survey wave ESENER-

[29] The most recent Standard Definitions report issued by AAPOR and used for ESENER-3 (Revised version of 2016) includes a chapter on establishments and discusses the specific challenges in calculating outcome rates for this type of survey. Nevertheless, it leaves a few questions open. It is for example not very clear on whether complete interviews that were rejected for quality reasons (interviewer mistakes, high item non-response etc.) are to be counted as interviews or not. As these are complete and not only partial interviews, we have opted for their inclusion among the achieved interviews. This concerns the 38 interviews from the response code 22 "complete but unanalysable" and the 376 interviews with code 53 "online interview rejected due to quality reasons".

2. Only addresses with a confirmed ineligibility (inactive establishment, size out of target etc.) are excluded in this mode of calculation (see Table 27).

Response Rate 3 (RR3)

AAPOR response rate 3 (RR3) treats the cases of unknown ineligibility differently. Other than RR1, RR3 does not count all cases of unknown eligibility as unproductive cases (no interview). Instead, it "estimates what proportion of cases of unknown eligibility is actually eligible (AAPOR 2016: 62)". This estimation is made on base of all contacts for which the (in-) eligibility could be confirmed during fieldwork. The eligibility rate e for ESENER-3 was calculated in the following formula[30]:

$$\frac{I + P}{I + P + OOS}$$

I = Interview (ESENER-3 response codes 18,22,52 and 53)

P = Partial interview (ESENER-3 response codes 35 and 36)

OOS = Out of Sample (ESENER-3 response codes 13,14,17,42,44 and 45)

For the total sample (all touched addresses with 5 or more employees, including addresses with no size information), an eligibility rate of 56% results from this calculation for ESENER-3. Eligibility rates vary however largely by size and by country. In the smaller size-classes, the estimated eligibility rate is considerably lower due to many dropouts due to size (less than 5 employees).

For organisations with an unknown eligibility, the rate resulting from this calculation is included in the calculations as estimated eligibility rate[31]. All addresses where the eligibility or ineligibility could not be confirmed within the interview are multiplied by that factor in the calculation of the response rate. AAPOR RR3 thus shows the share of interviews out of all eligible or presumably eligible cases.

Cooperation rates

The cooperation rate measures the number of interviews achieved as compared to the number of all addresses/organisations **successfully** approached for a survey. "Successfully" means that not only efforts were made to contact the unit, but that actually somebody could be reached at the targeted address.

The main difference to the response rate is thus that all contacts that were not successful insofar as they could not be reached during fieldwork (no answer, busy, fax/modem, wrong telephone number etc.) are excluded from the calculations.

For ESENER-3, we additionally excluded codes 37 ("no appointment with target person possible during fieldwork time and period", code 38 ("target person does not speak proposed languages") and code 56

[30] It is debatable whether or not to include partial interviews in the enumerator. We have done so here in the assumption that most partial interviews were interrupted in later parts of the survey, i.e. not before or directly after the questions on size and sector.

[31] While response rate RR1 is in our view not adequate as measure for the quality of fieldwork because it does not take into account the address quality which varies largely between countries and is something the fieldwork institute can hardly influence. Response rate RR3, in turn, provides a too positive picture as the calculation of the estimated eligibility includes also categories which do usually not require to start the interview, but are communicated already in the contact phase. This is the case for private households, establishments that ceased to exist and address doublettes (codes 13,14 and 17 in ESENER-3). Additionally, in ESENER-3 a question asking whether the establishment has at least 5 employees appeared on the address take-up screen for addresses with 5 to 9 employees (Q001size) according to the sampling frame information. For this size-class, the category "size out of target" was therefore not always defined within the questionnaire, but in some cases earlier.

("no adequate target person at the establishment") from the calculations of the cooperation codes, considering them here as not eligible.

Cooperation Rate 1 (CR1)

The minimum cooperation rate CR1 is in AAPOR defined as "the number of complete interviews divided by the number of interviews (complete plus partial) plus the number of non-interviews that involved the identification of and contact with an eligible respondent (refusal and break-off plus other) (AAPOR 2016: 63)". CR1 is roughly equivalent to the cooperation rate as calculated in the ESENER-2 Technical Report.

Cooperation Rate 3 (CR3)

As for the calculation of cooperation rate CR 3, we have opted for two different rates:

- CR3 is the rate as proposed by AAPOR
- "CR3 modified" takes into consideration the unknown eligibility instead of counting the refusals as fully eligible while totally excluding interview categories with a "non-final" status such as response codes 6 (callback possible/general appointment), 7 (definitive appointment with target person) and 51 (online invitation with no result). The variant CR3 modified is thus the equivalent to AAPOR RR3 and in earlier versions of the AAPOR definitions, CR3 used to be calculated also in that way.

For a judgement on the quality of fieldwork, we consider the cooperation rate(s) as more meaningful than the response rate(s) because this measure is independent of the quality of the addresses, a factor that cannot be influenced by fieldwork.

Table 27: Definition of response and cooperation rates as applied to ESENER-3

Response code description (hierarchical code)	**AAPOR Response Rate 1**	**AAPOR Response Rate 3**	**AAPOR Cooperation Rate 1**	**AAPOR Cooperation Rate 3 modified**	**AAPOR Cooperation Rate 3**
No answer			not eligible	not eligible	not eligible
Answer device			not eligible	not eligible	not eligible
Busy			not eligible	not eligible	not eligible
Information tone - Fax - Modem			not eligible	not eligible	not eligible
Wrong telephone number			not eligible	not eligible	not eligible
Callback possible (general appointment)					not included
Definitive appointment with target person					not included
Refusal by target person					
Refusal by contact person/reception (upfront refusal)					
No establishment at this address (private household etc.)	not eligible	not eligible	not eligible	not eligible	not eligible
Inactive establishment, terminated	not eligible	not eligible	not eligible	not eligible	not eligible
Already questioned (double address)	not eligible	not eligible	not eligible	not eligible	not eligible
Complete CATI interview					
Stratification maximum reached (cell full)			not eligible	not eligible	not eligible
Complete, but unanalyzable (data/interviewer issues detected during fieldwork or in final data cleaning)					
Refusal - add number to DO NOT CALL LIST					
Partial interview, to be called back					
Partial interview, not to call back					
No appointment with target person possible during fieldwork time and period			not eligible	not eligible	not eligible
Target person does not speak proposed languages			not eligible	not eligible	not eligible
Size out of target (less than 5 employees or NA in Q105)	not eligible	not eligible	not eligible	not eligible	not eligible
Refusal to give information in Q111, Q112 (sector information)					
No single establishment with 5 or more employees (Q051=0)	not eligible	not eligible	not eligible	not eligible	not eligible
Size of first contact out of scope but interview possible at subsidiary (screening countries)	not eligible	not eligible	not eligible	not eligible	not eligible
Interview terminated after screening phase, not to call back					
Online invitation with no result					not eligible
Complete CAWI interview					
Online interview rejected due to quality reasons					
No adequate target person at the establishment			not eligible	not eligible	not eligible
Online refusal					

= complete interview (denominator)

= included in denominator, unknown eligibility

= included in denominator

= excluded

7.5.2 (Non-) response by reason in the total gross sample

Table 28) shows how the 446.895 addresses that were touched for the survey distribute over the various reasons of (non-)response. Hereby, two different classifications are distinguished:

- The distribution in “final status” reflects the status recorded in the system when fieldwork for all countries was finalised[32].
- In “code hierarchy applied”, the different outcome codes recorded per interview during fieldwork (with up to 77 contacts per address) are ranked according to their importance respectively the definitiveness of the code[33]. The hierarchy according to which this code was calculated is documented in Table 29.

[32] At the end of fieldwork, response code 48 “online invitation sent” was recoded according to the final result, as code 51 (online invitation with no result), code 52 (complete CAWI interview), code 53 (online interview rejected due to quality reasons). Likewise, code 18 (Complete CATI interview) was manually coded to code 22 for interviews that did not pass the quality checks in the local CATI studio or in the posterior data check and cleaning process.

[33] If an address had for example the status “partial interview, to be called back”, various efforts were made to contact the establishment again in order to complete the interview. In some cases, fieldwork terminated however before the interview could be completed. The last code then reflects the latest contact effort (e.g. no answer). But it would be misleading to count this as the final outcome code because the establishment in this example was actually successfully contacted and had even given a partial interview but could just not be reached at the latest contact made in the effort to continue with the interview.

Table 28: (Non-) response by reasons, all countries, absolute and in %

Response/disposition code	Final status (end of fieldwork)		Code hierarchy applied ("highest ranking" result)	
	ALL (abs.)	ALL (in %)	ALL (abs.)	ALL (in %)
1 No answer	61.082	13,7%	26.165	5,9%
2 Answer device	20.851	4,7%	17.621	3,9%
3 Busy	3.964	0,9%	6.482	1,5%
4 Information tone - Fax - Modem	11.075	2,5%	13.633	3,1%
5 Wrong telephone number	42.942	9,6%	34.870	7,8%
6 Call-back possible (general appointment)	13.941	3,1%	51.851	11,6%
7 Definitive appointment with target person (TP)	789	0,2%	11.689	2,6%
8 Refusal by target person	37.004	8,3%	36.857	8,2%
9 Refusal by contact person/reception (upfront refusal)	111.345	24,9%	114.583	25,6%
13 No establishment at this address (private household etc.)	6.811	1,5%	6.813	1,5%
14 Inactive establishment, terminated	4.365	1,0%	4.365	1,0%
17 Already questioned (double address)	1.951	0,4%	1.950	0,4%
18 Complete telephone interview	43.254	9,7%	43.254	9,7%
20 System error	2.249	0,5%	0	0,0%
21 Stratification maximum reached (cell full)	3.132	0,7%	3.119	0,7%
22 Complete, but unanalyzable interview (e.g. sorted out due to interviewer mistakes)	38	0,0%	38	0,0%
34 Refusal - add number to DO NOT CALL LIST	8.158	1,8%	8.075	1,8%
35 Partial interview, to be called back	325	0,1%	1.361	0,3%
36 Partial interview, not to call back	1.301	0,3%	1.301	0,3%
37 No appointment with TP possible during fieldwork time and period	19.946	4,5%	8.037	1,8%
38 Target person does not speak any of the proposed languages	1.310	0,3%	1.296	0,3%
42 Size out of target (less than 5 employees or NA in Q105)	24.253	5,4%	24.220	5,4%
43 Refusal to give information in Q111, Q112 (sector information)	22	0,0%	22	0,0%
44 No single establishment with 5 or more employees (Q051=0)	172	0,0%	172	0,0%
45 Size of first contact out of scope but interview possible at subsidiary (screening countries)	29	0,0%	29	0,0%
46 Interview terminated after screening phase, not to call back	22	0,0%	22	0,0%
51 Online invitation with no result	9.727	2,2%	11.820	2,6%
52 Complete CAWI interview	2.166	0,5%	2.166	0,5%
53 Online interview rejected due to quality reasons	376	0,1%	376	0,1%
56 No adequate target person at the establishment	13.711	3,1%	14.124	3,2%
58 Online refusal (communicated after receiving the link to the online interview)	584	0,1%	584	0,1%
ALL (non-)response categories	**446.895**	**100,0%**	**446.895**	**100,0%**

Table 29: Hierarchy of disposition codes as applied to ESENER-3

Hierarchy in decending order	Response code (hiresp)	Description	Syntax (used with statistical software SPSS)
Priority 1	22	complete, but unanalyzable	comp hiresp=-1.
	53	Online interview rejected due to quality reasons	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,53) hiresp=53.
Priority 2	52	Complete CAWI interview	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,52) hiresp=52.
	18	Complete CATI interview	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,18) hiresp=18.
Priority 3	36	Partial interview, not to call back	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,36) hiresp=36.
	35	Partial interview, to be called back	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,35) hiresp=35.
	43	Refusal to give information in Q111, Q112 (sector information)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,43) hiresp=43.
Priority 4	42	Size out of target (less than 5 employees or NA in Q105)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,42) hiresp=42.
	44	No single establishment with 5 or more employees (Q051=0)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,44) hiresp=44.
	45	Size of first contact out of scope but interview possible at subsidiary (screening countries)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,45) hiresp=45.
	13	No establishment at this address (private household etc.)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,13) hiresp=13.
	14	Inactive establishment, terminated	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,14) hiresp=14.
	17	Already questioned (double address)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,17) hiresp=17.
	21	Stratification maximum reached (cell full)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,21) hiresp=21.
Priority 5	34	Refusal - add number to DO NOT CALL LIST	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,34) hiresp=34.
	8	Refusal by target person	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,8) hiresp=8.
	58	Online refusal	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,58) hiresp=58.
	46	Interview terminated after screening phase, not to call back	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,46) hiresp=46.
	9	Refusal by contact person/reception (upfront refusal)	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,9) hiresp=9.
Priority 6	38	Target person does not speak proposed languages	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,38) hiresp=38.
	51	Online invitation with no result	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,51) hiresp=51.
	56	No adequate target person at the establishment	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,56) hiresp=56.
	7	Definitive appointment with target person	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,7) hiresp=7.
	6	General appointment	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,6) hiresp=6.
	37	No appointment with target person possible during fieldwork time and period	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,37) hiresp=37.
Priority 7	5	Wrong telephone number	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,5) hiresp=5.
	4	Information tone - Fax - Modem	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,4) hiresp=4.
	3	Busy	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,3) hiresp=3.
	2	Answer device	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,2) hiresp=2.
	1	No answer	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,1) hiresp=1.
	20	System error	if hiresp=-1 and any(Responsestatus.1 to Responsestatus.77,20) hiresp=20.

All response and cooperation rates shown in this report for ESENER-3 are calculated on base of the hierarchical code. In the paradata set, this variable is named “hiresp” while the final code at the end of fieldwork is named “finalresp”.

7.5.3 Response and cooperation rates by country

Response and cooperation rates for ESENER-3 vary considerably between countries, no matter which mode of calculation is considered. The variations in the response rates reflect national differences in the willingness to cooperate in this type of surveys, but also differences in the quality of the sampling frame or the work of the local CATI teams. For the cooperation rates, the quality of the sampling frame has much less influence as all addresses with obviously wrong contact information (2 Answer device; 4 Information tone – fax – modem; 5 Wrong telephone number) are excluded from the calculation.

In ESENER-3, the highest response rates were achieved in North Macedonia, with an AAPOR response rate RR3 of 60%. In the calculation of this rate it is assumed that the addresses in the categories with “unknown eligibility” actually have the same eligibility rate as the addresses where an interview was started and the screening question on the number of employees was answered. Very high response rates of 35% or more are also reported for Estonia (45%), Iceland (40%), Switzerland (39%), Latvia (38%), Serbia (38%) and Cyprus (36%). The lowest response rates RR3 were reported from the Czech Republic and Slovakia, with just 7%. The overall response rate RR3 for the 33 countries is 18%.

The more conservative calculation of response rates based on AAPOR RR1 counting all cases of unknown eligibility as fully eligible (not applying an estimated eligibility factor) comes to considerably lower rates. In this perspective, the average response rate is 11%. According to this definition, the response rates achieved in Slovakia and the Czech Republic are again the lowest ones, with just 3%. Germany and Spain also have very low rates according to this definition, with 5% respectively 6%.

Overall, the cooperation rates are considerably higher than the respective response rates, with 16% for CR1, 22% for CR3 and 25% for CR3 modified across all 33 countries. The main difference between RR1, CR1 and CR3 on the one hand and RR3 and CR3 modified on the other hand is the treatment of addresses with an unknown eligibility: While RR1, CR1 and CR3 count all addresses with unknown eligibility with the factor 1, RR3 and CR3 modified apply the estimated eligibility rate to these addresses.

Table 30: Cooperation, response, contact and refusal rate, by country, for all addresses (5+ employees)

Country	Eligibility rate	RR1	RR3	CR1	CR3 modified	CR3
AT	67%	10%	14%	12%	19%	16%
BE	67%	18%	25%	27%	36%	39%
BG	54%	11%	19%	18%	28%	21%
CH	63%	29%	39%	39%	50%	59%
CY	31%	15%	36%	22%	47%	27%
CZ	46%	3%	7%	5%	10%	7%
DE	25%	5%	18%	6%	21%	9%
DK	72%	18%	24%	27%	35%	45%
EE	70%	36%	45%	48%	57%	60%
EL	69%	15%	20%	19%	26%	25%
ES	44%	6%	14%	11%	23%	15%
FI	66%	24%	33%	32%	42%	46%
FR	73%	15%	19%	19%	26%	34%
HR	70%	11%	15%	14%	19%	18%
HU	67%	10%	14%	19%	26%	25%
IE	85%	23%	25%	27%	30%	57%
IS	70%	32%	40%	41%	51%	54%
IT	80%	14%	17%	18%	22%	24%
LT	73%	23%	29%	29%	38%	50%
LU	51%	20%	34%	28%	43%	39%
LV	55%	26%	38%	30%	44%	48%
MK	80%	55%	60%	68%	73%	85%
MT	43%	17%	33%	26%	45%	40%
NL	50%	10%	19%	14%	24%	18%
NO	58%	11%	17%	16%	27%	26%
PL	43%	9%	18%	12%	25%	14%
PT	66%	18%	25%	26%	35%	40%
RO	61%	8%	13%	15%	23%	19%
RS	59%	26%	38%	46%	61%	66%
SE	71%	19%	26%	24%	31%	43%
SI	88%	24%	26%	30%	33%	39%
SK	46%	3%	7%	5%	10%	6%
UK	63%	19%	27%	24%	33%	41%
ALL	**56%**	**11%**	**18%**	**16%**	**25%**	**22%**

In Annex 1, a table can be found that shows all (non-) response reasons by country in absolute figures in a count over the hierarchical codes. This presentation allows for the calculation of different rates of response, cooperation etc.

Compared to ESENER-2, response rates in the new survey wave are somewhat lower: Whereas in ESENER-2, a response rate RR3 of 24% was achieved for the overall sample (all sizes), the rate dropped to 18% in ESENER-3. This drop is largely driven by the developments in a few countries, particularly the drops in the Czech Republic, Slovakia, Spain and Austria.

The following table shows a comparison of response rates (AAPOR RR3) for ESENER-2 and -3, for both the full survey universe and the universe of 10+ employees. The latter is included for comparison purposes - most other cross-national surveys among establishments or companies in Europe use a threshold of 10+ employees. As was to be expected due to a further general tendency to declining response rates, ESENER-3 results are in most countries lower than those achieved for ESENER-2. Exception to this are Switzerland (new fieldwork partner and better sampling frame used in ESENER-3), Cyprus, Estonia, Ireland (other fieldwork partner in ESENER-3), Luxembourg, North Macedonia, Poland (other fieldwork partner) and Serbia. In Hungary, Iceland, Norway and Sweden the response rates are (almost) the same as in 2014. Particularly large drops in the response rates (by >40%) have in turn to be reported from Austria, the Czech Republic, Spain, Slovakia and Malta – the latter having however a still very good rate.

Table 31: Comparison of response rates (AAPOR RR3) between ESENER-2 and ESENER-3

AAPOR Response Rate 3				
Country	ESENER-3 (2019) 5+ employees	ESENER-2 (2014) 5+ employees	ESENER-3 (2019) 10+ employees	ESENER-2 (2014) 10+ employees
AT	14%	26%	13%	26%
BE	25%	29%	25%	30%
BG	19%	25%	16%	25%
CH	39%	32%	45%	31%
CY	36%	32%	31%	25%
CZ	7%	13%	6%	14%
DE	18%	20%	14%	18%
DK	24%	33%	30%	34%
EE	45%	36%	43%	36%
EL	20%	29%	19%	31%
ES	14%	25%	13%	25%
FI	33%	37%	30%	37%
FR	19%	22%	21%	23%
HR	15%	24%	18%	26%
HU	14%	15%	15%	15%
IE	25%	19%	27%	20%
IS	40%	39%	42%	42%
IT	17%	20%	18%	23%
LT	29%	32%	30%	32%
LU	34%	30%	34%	29%
LV	38%	35%	35%	33%
MK	60%	36%	56%	40%
MT	33%	59%	31%	55%
NL	19%	22%	15%	24%
NO	17%	18%	18%	19%
PL	18%	15%	18%	16%
PT	25%	37%	24%	40%
RO	13%	25%	13%	23%
RS	38%	26%	36%	29%
SE	26%	26%	27%	28%
SI	26%	29%	30%	30%
SK	7%	14%	7%	15%
UK	27%	32%	27%	27%
ALL	**18%**	**24%**	**17%**	**24%**

7.5.4 Cooperation rates by size-class and by sector

Cooperation and response rates vary considerably by size-class. Table 32 below shows the different rates by size-class, with the size information taken from the address source.

Table 32: Response and cooperation rates by size-class (size indication from address source)

Size class according to address source	Number of eligible	Eligibility rate	RR1	RR3	CR1	CR3 mod	CR3
No size indication	21.451	47%	8%	16%	15%	27%	21%
5 to 9 employees	225.549	41%	9%	19%	13%	26%	17%
10 to 49 employees	130.439	73%	12%	16%	18%	23%	24%
50 to 249 employees	42.865	83%	16%	18%	23%	26%	32%
250 or more employees	26.591	79%	17%	20%	25%	29%	35%
ALL	**446.895**	**56%**	**11%**	**18%**	**16%**	**25%**	**22%**

In tendency, the rates achieved in the larger establishments are considerably higher than those in the smaller ones. The main reason is that there, often health and safety experts are answering the interview. These are more willing to dedicate time to this topic (which is often their main task at the establishment) than owners or general managers for whom health and safety is often just one task among many others (and not necessarily the most popular one).

Results differ however largely between the various rate definitions. The rate variants not including an estimated eligibility factor show a clear positive correlation between the size-class and the achieved outcome rate, with RR3, CR1 and CR3 almost doubling from size 5-9 to size 250+. In the variants including the estimated eligibility factor (RR3 and CR3 mod), there is however no clear correlation between the size and the willingness to participate in the interview.

The analysis of outcome rates by sector of activity (see Table 33) also shows some variations: In all calculated variants, outcome rates are highest in the Public Administration (NACE O), they are smallest in the Real Estate sector (NACE L) and in Construction (NACE F).

Table 33: Cooperation and response rates, by sector

NACE Rev. 2 sector	RR1	RR3	CR1	CR3 mod	CR3
A	9%	18%	15%	28%	21%
B	17%	24%	25%	33%	34%
C	13%	18%	18%	25%	25%
D	13%	19%	20%	28%	28%
E	16%	22%	24%	31%	32%
F	9%	18%	13%	25%	19%
G	9%	17%	13%	23%	17%
H	10%	17%	14%	25%	20%
I	9%	15%	13%	20%	19%
J	11%	18%	16%	25%	22%
K	10%	17%	14%	24%	19%
L	9%	19%	13%	26%	18%
M	10%	19%	14%	25%	19%
N	10%	18%	15%	25%	21%
O	17%	24%	27%	37%	40%
P	15%	18%	21%	28%	33%
Q	15%	21%	20%	28%	31%
R	12%	20%	18%	29%	27%
S	12%	23%	17%	30%	23%
ALL	**11%**	**18%**	**16%**	**25%**	**22%**

7.6 Specific measures applied to enhance response rates

In order to enhance response rates, a number of measures had been agreed between EU-OSHA and Kantar:

- Samples were selected and acquired locally by each fieldwork partner, but were then sent to the central Kantar sampling unit in London where they were checked and administered centrally, according to uniform rules. This also implied the central release of the initial samples and all further samples considered to be necessary in the further course of fieldwork (see chapter 5.7).
- Fieldwork was monitored centrally (in addition to the checks of fieldwork quality done in the local studios), using the same tools and templates for all countries.
- A motivation letter with the logo and signature of EU-OSHA was made available in all languages used in the survey. The motivation letter was foreseen to be sent by email whenever considered useful by the interviewer. In total, 26.334 emails with the motivation letter were sent to potential respondents of the telephone interviews. In addition, the letter was sent to 16.298 persons who provided their email address for receiving the invitation for the online interview. According to the feedback from the interviewers, the motivation letter proved to be very helpful, particularly in larger organisations where often different people were involved in the decision on the interview request.
- In addition to the motivation letter, EU-OSHA also placed information for respondents on their website. This information was available in all languages used in the survey.
- Addresses with non-response code "5" (wrong telephone number) were extracted from the sample and sent for a specialized supplier to investigate the correct telephone numbers. This telephone number research was done once for all countries after about 5 weeks of fieldwork. For Germany, it was repeated towards the end of fieldwork since many newly uploaded addresses had also turned out to have wrong telephone numbers. In addition, numbers that could not be researched centrally were sent to the local fieldwork partners for an additional search in national address sources.
- For respondents refusing participation in the CATI interview, an additional online interviewing option was offered in all countries (see chapter 8 for details).

7.7 Number of call attempts

that could not be reached with the first call were re-

The Table 35 below shows the number of call attempts made during ESENER-3 fieldwork. On average, all addresses actually used for the survey were called 5,26 times (ESENER-2: 4,87). For successful interviews, the rate was slightly higher, with 5,50 call attempts for each successful CATI interview and 4,48 attempts for each successful CAWI interview. On the average of all successful interviews, the number of call attempts was 5,46.

For a successful interview (CATI or CAWI) in large workplaces (250+ employees) more call efforts were necessary than for those in small workplaces, but with about one call the difference in the number of call attempts by size is not very big[34]. Differences between the sectors of activity are larger: While for successful interviews in NACE A "Agriculture, Forestry and Fishing" only 4,51 calls per successful interview were needed, for NACE I "Accommodation and food service activities" almost two additional

[34] For all successful interviews, these calculations are based on the size respectively sector attribution from the data-set (information provided by the respondent). For the contacts not leading to an interview, the size and sector attribution from the address register was used.

attempts were required (6,38), probably due to the often non-standard working hours in this type of businesses.

In only 13% of all successful interviews, just one call was necessary, meaning that in these cases, the respondent was immediately available and willing to participate in the interview. For almost half of the successful addresses (46%), 5 or more calls were necessary to get the interview.

Table 34: Number of call attempts, by size and sector

Average number of call attempts	All used addresses (mean)	All used addresses (maximum)	Successful interviews only (mean)	Successful interviews only (maximum)
All	5,26	77	5,46	46
Size-class 5-9 employees	5,09	77	5,14	43
Size-class 10-49 employees	5,38	64	5,46	46
Size-class 50-249 employees	5,37	77	5,73	44
Size-class 250+ employees	6,24	57	6,01	36
NACE A	4,63	44	4,51	21
NACE B	5,28	35	5,06	27
NACE C	4,96	54	5,17	38
NACE D	5,15	51	5,58	38
NACE E	5,09	42	5,14	28
NACE F	5,33	64	5,13	46
NACE G	4,93	77	5,36	41
NACE H	5,12	48	5,35	37
NACE I	6,19	58	6,38	40
NACE J	5,04	49	4,99	37
NACE K	5,23	42	5,93	36
NACE L	5,33	57	5,99	40
NACE M	4,90	63	5,14	33
NACE N	5,30	77	5,54	36
NACE O	5,10	62	5,41	36
NACE P	5,54	52	5,49	44
NACE Q	6,14	54	5,91	36
NACE R	5,41	57	5,58	41
NACE S	5,02	58	5,44	40

Table 35 shows the number of call attempts in a differentiation by the last response code. The highest number of call attempts is recorded for the 201 partial interviews where a call-back was possible. With almost 14 calls on average, here many efforts were made to complete these interviews. Addresses with “no answer” were also called many times, with 7,82 call attempts on average for each of these addresses.

Table 35: Number of call attempts, by last response code

Last response code	Number of addresses used/touched for	Average number of contact attempts
1 No answer	61.082	7,82
2 Answer device	20.851	7,81
3 Busy	3.964	6,74
4 Information tone - Fax - Modem	11.075	4,78
5 Wrong telephone number	42.942	3,34
6 General appointment	13.941	7,40
7 Definitive appointment with target person	789	7,31
8 Refusal by target person	37.004	4,41
9 Refusal by contact person/reception (upfront refusal)	111.345	4,32
13 No establishment at this address (private household etc.)	6.811	2,85
14 Inactive establishment, terminated	4.365	3,13
17 Already questioned (double address)	1.951	4,90
18 Complete CATI interview	43.254	5,50
20 System error	2.249	6,13
21 Stratification maximum reached (cell full)	3.132	5,95
22 Complete, but unanalyzable	38	4,50
34 Refusal - add number to DO NOT CALL LIST	8.158	4,98
35 Partial interview, to be called back	325	13,75
36 Partial interview, not to call back	1.301	6,25
37 No appointment with target person possible during fieldwork	19.946	6,67
38 Target person does not speak proposed languages	1.310	3,65
42 Size out of target (less than 5 employees or NA in Q105)	24.253	3,52
43 Refusal to give information in Q111, Q112 (sector information)	22	4,86
44 No single establishment with 5 or more employees (Q051=0)	172	4,62
45 Size of first contact out of scope but interview possible at	29	5,83
46 Interview terminated after screening phase, not to call back	22	4,45
51 Online invitation with no result	9.727	6,07
52 Complete CAWI interview	2.166	4,48
53 Online interview rejected due to quality reasons	376	4,69
56 No adequate target person at the establishment	13.711	5,07
58 Online refusal	584	3,99
ALL	**446.895**	**5,26**

There are considerable differences regarding the required call attempts by country (see Table 33): In North Macedonia, the country with the highest response rate in ESENER-3, each address was called just 3,16 times on average. For the successful interviews, even just 2,86 calls were necessary. In the United Kingdom, in turn, about 9 call attempts (8,99) per address were recorded overall while each successful interview required 7,77 calls on average. Further countries with a particularly high number of calls are Ireland with 8,46 calls (6,37 for the successful interviews) and Portugal with 7,95 calls (6,39 for successful interviews) for all touched addresses In Germany, the value for all addresses is just average (5,45), but with 7,61 call attempts it is very high for each successful interview.

Table 36: Number of call attempts, by country

Country	Number of addresses used/touched for the survey	Average number of contact		Number of completed interviews
		All used addresses	Successful interviews only	
AT	16.147	7,60	6,78	1.503
BE	9.177	5,07	5,25	1.506
BG	7.384	3,76	3,46	755
CH	6.153	4,95	5,03	1.502
CY	7.016	4,77	4,92	757
CZ	51.806	4,51	4,18	1.552
DE	49.832	5,45	7,61	2.264
DK	8.881	4,70	5,62	1.513
EE	2.439	4,08	3,41	758
EL	10.691	6,81	6,18	1.501
ES	38.277	4,72	5,10	2.266
FI	6.993	5,54	5,29	1.505
FR	16.184	7,35	6,95	2.251
HR	7.114	6,55	5,83	740
HU	15.791	3,54	4,55	1.504
IE	9.288	8,46	6,37	1.999
IS	2.693	5,20	5,25	753
IT	16.765	5,41	4,92	2.251
LT	3.507	4,36	4,22	754
LU	4.647	5,16	5,28	773
LV	3.557	4,83	4,90	756
MK	1.563	3,16	2,86	752
MT	3.257	5,45	6,61	453
NL	16.655	4,03	5,30	1.521
NO	19.565	5,48	4,86	1.951
PL	29.163	4,12	4,36	2.250
PT	9.239	7,95	6,39	1.493
RO	18.894	3,20	4,26	1.500
RS	3.373	4,13	3,74	751
SE	8.396	6,49	5,71	1.512
SI	4.658	5,14	5,52	1.067
SK	24.401	4,69	4,48	756
UK	13.389	8,99	7,77	2.251
ALL	**446.895**	**5,26**	**5,46**	**45.420**

7.8 Observations from fieldwork

Overall, fieldwork ran smoothly and in most countries without any noteworthy problems. There were however a few countries where fieldwork ran less smoothly:

- In Slovakia and the Czech Republic, fieldwork progress was very slow from the beginning. The main reasons for this were very low response rates[35].
  Since the size of the initial samples was limited and additional samples were issued only ca. 6 weeks after the launch of fieldwork, the low response rates lead to a very low number of achieved interviews. With several tranches of additional addresses uploaded for these countries and a substantial broadening of the interviewer team in Slovakia, the envisaged net samples could however be reached at the end, albeit at the expense of reasonably high response rates.

- In the Portuguese CATI centre, a technical problem led to a total dropout of the CATI system for a period of 2-3 weeks. The dropout and the need to catch up afterwards with many CATI projects affected by the dropout led to considerable delays in the fieldwork in Portugal. In the end, fieldwork could however be completed in time and with the envisaged number of interviews.

- Germany had to struggle hard with the smallest size-class. The main reason for the difficulties in size 5-9 were the bad quality of the addresses for this size. Though the sampling frame used for ESENER-3 provides addresses at the establishment level, the size indication for these addresses very often turned out to be wrong. The sample provider does not collect this information from the establishments themselves or from any other reliable source, but calculates estimates. These estimates often turned out to be wrong[36]. As a means to improve on the response rates, in Germany several codes considered as “soft refusals” were released again towards the end of the fieldwork period for a further contact attempt by a particularly successful interviewer.

[35] According to the local fieldwork partners in these countries, the drop in response rates is among others a consequence of the General Data Protection Regulation (GDPR). Several measures were taken to enhance the willingness of respondents to participate, but with limited success. Among these measures was a test with a monetary incentive in the CZ, offered to 100 respondents during a specified period as donation for a national charity organisation. The incentivization was not further pursued since the test did not lead to a significant rise in the cooperation rates.

[36] The supplier has information on the overall number of employees in the organisation and the number of local units in the country. In the estimates, the headquarter is attributed 40% of the employees of the organisation while the remaining 60 of establishments are distributed on all further local units.

8 Online interviews (CAWI)

8.1 Online interviews as means to reduce non-response

The possibility for respondents to do the interview online as CAWI interview was introduced to ESENER-2 and ESENER-3 as a means of reducing non-response[37]. ESENER is not a concurrent CATI/CAWI switch-mode survey where respondents have the free choice to do the interview either CATI or CAWI, but a sequential design where the different modes are offered one after the other to the respondents. In ESENER-3, all completed online questionnaires are from respondents previously contacted by telephone for the CATI interview. As far as possible[38], respondents who refused to give a telephone interview were immediately afterwards asked whether they would be willing to do the interview online instead:

Q007

"You mention how you generally don't participate in telephone interviews. Would you be willing to complete the questionnaire in an online version instead?"

Those who agreed to this were asked to provide an email address to the telephone interviewer and a personalized link to the online questionnaire was sent out within the next hour[39].

8.2 Success rate of online interviews

The CAWI option was offered in all countries. In the course of fieldwork, the telephone interviewers triggered the posting of personalized online invitation links to almost 19.000 addresses where respondents had denied the participation in the CATI interview. The number of establishments that received an invitation to the online interview varied from just 68 in Iceland to as many as 4.000 in the Czech Republic.

In total, 2.542 establishments completed the online interview. Not all of these were however accepted as valid interviews. In order to ensure a comparable level of quality as for the CATI interviews, all online interviews had to pass certain minimum quality checks: Interviews completed in a very short time (less than 8 minutes) as well as interviews with an item non-response rate of more than 12% were generally sorted out. Interviews with more than 10% but less than 12% item non-response were further analysed and if certain key questions were answered, they were included in the final ESENER-3 dataset. Otherwise, they were sorted out. The decisions on which of these interviews to accept as valid interviews was taken by the EU-OSHA team.

In the end, 376 of the 2.542 completed online interviews (15%)[40] did not pass the quality checks. Among these, 366 were rejected due to their item non-response rate while only 6 were rejected for their short interview duration. Four interviews failed by both criteria. The remaining 2.166 interviews are included in the data-set. In the variable "mode", they can be distinguished from the CATI interviews.

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37 The online option was first introduced in ESENER-2, ESENER-1 was a mere CATI survey.

38 In establishments where the gatekeeper or the targeted respondent categorically denied participation in any survey, it was usually not possible to ask these questions.

39 The recorded email addresses were checked by the system on their correct structure (minimum number of letters, position of the @ sign etc.) and after entering, the interviewers read them out again to the respondent for confirmation. If in spite of the applied checks the recorded email address caused an error message (recipient does not exist and similar), the respective establishment was contacted again by phone and asked to correct the email address.

40 84 of the accepted online interviews have between 10% and 12% of item non-response. If these had been excluded (as in ESENER-2), the share of rejected online interviews for ESENER-3 would be at 18% and thus very close to the 19% reported for ESENER-2. The lower share of rejected interviews in ESENER-3 is thus largely not to be interpreted as a sign of an improved quality of the completed online questionnaires.

In each of the 33 countries, some respondents actually completed the online interview. The number and share of online interviews among all ESENER-3 interviews varies however largely between countries: While in Greece just 3 interviews respectively 0,2% of all Greek interviews were done online, the final net sample of the Czech Republic includes 536 accepted CAWI interviews, accounting for 34,5% of the national net sample[41].

Table 37: CAWI invitations and CAWI interviews, by country

Country	CAWI invitations sent	Completed online interviews	Herof: accepted online interviews*	Hereof: rejected online interviews*	% of rejected online interviews	Completed online interviews in % of invitations sent	Accepted online interviews in % of invitations sent
AT	399	53	46	7	13%	13%	12%
BE	746	90	78	12	13%	12%	10%
BG	316	30	25	5	17%	9%	8%
CH	440	66	54	12	18%	15%	12%
CY	375	39	33	6	15%	10%	9%
CZ	4.000	632	536	96	15%	16%	13%
DE	943	99	80	19	19%	10%	8%
DK	764	134	121	13	10%	18%	16%
EE	229	52	45	7	13%	23%	20%
EL	101	3	3	0	0%	3%	3%
ES	1.506	120	103	17	14%	8%	7%
FI	313	54	45	9	17%	17%	14%
FR	773	48	40	8	17%	6%	5%
HR	144	19	18	1	5%	13%	13%
HU	638	32	29	3	9%	5%	5%
IE	130	14	13	1	7%	11%	10%
IS	68	20	14	6	30%	29%	21%
IT	370	22	20	2	9%	6%	5%
LT	183	25	21	4	16%	14%	11%
LU	852	209	169	40	19%	25%	20%
LV	154	25	22	3	12%	16%	14%
MK	100	15	11	4	27%	15%	11%
MT	123	19	14	5	26%	15%	11%
NL	1.824	334	295	39	12%	18%	16%
NO	181	38	29	9	24%	21%	16%
PL	344	14	13	1	7%	4%	4%
PT	376	46	39	7	15%	12%	10%
RO	148	7	6	1	14%	5%	4%
RS	96	11	9	2	18%	11%	9%
SE	558	100	88	12	12%	18%	16%
SI	481	89	79	10	11%	19%	16%
SK	967	78	64	14	18%	8%	7%
UK	181	5	4	1	20%	3%	2%
TOTAL	**18.823**	**2.542**	**2.166**	**376**	**14,8%**	**13,5%**	**11,5%**

[41] For ESENER-2, EU-OSHA had set an upper limit for the CAWI interviews, with a maximum of 10% of the interviews in a country being allowed to be made online. The main motivation behind this decision was the uncertainty about the quality of the online interviews and their comparability with the telephone interviews. The outcomes of ESENER-2 had however shown that the online interviews were not of a generally lower quality and though some mode effects could be observed, these were overall moderate. For ESENER-3, the share of online interviews was therefore closely observed during fieldwork while it was agreed to handle the online limitation more flexibly. The very high share of online interviews for the Czech Republic was however allowed only because of the low response rate reached in the CATI interviews.

The success rate for the CAWI option, measured as share of accepted online interviews obtained from the posted CAWI invitations, was 11,5% on the average of all 33 country. Again, considerable variations by country can be observed: While in the United Kingdom just 2% and in Greece 3% of the posted online interview invitations actually resulted in a valid interview, it was 21% in Iceland. In seven further countries, the success rate reached between 15% and 20%[42].

Compared to ESENER-2, the success rate for the online interviews has almost doubled: In ESENER-2, just 6,3% of all online invitations resulted in valid interviews. When including also the completed interviews that were finally rejected for quality reasons, the difference is a bit lower due to the modified acceptance criteria (13,5% vs. 7,8% in ESENER-2).

When comparing the cooperation rates of the ESENER-3 online variant to those of genuine online surveys among organisations, it needs to be taken into account that the CAWI interviews carried out for ESENER-3 were all completed by respondents who had been contacted by telephone and had refused to take part in the telephone interview. This is therefore a group of persons with a generally lower than average willingness to cooperate. Some local fieldwork partners reported that they had the impression that the agreement to the online interview option was sometimes used as a possibility to "escape" the interview without having to say a clear "no". Nevertheless, the CAWI option helped to convert a number of refusals into completed interviews and thus contributed to the survey quality.

The bigger success of the new ESENER wave in terms of returned, completed online interviews is probably largely attributable to the more complex reminder strategy applied: While in ESENER-2, just one online reminder was sent a week after the posting of the invitation link, in ESENER-3 two online reminders were sent. Establishments that had still not completed the online interview one week after the second reminder email were then contacted again by phone. In this final telephone reminder, they were asked to either still complete the interview online or to do the interview by telephone.

In total, 394 interviews resulted from this final reminder step, hereof 142 as online interviews and 252 made by telephone. The success of this third and quite work intense reminder is not very big compared to the number of establishments contacted again by telephone. Nevertheless, it lead to some additional interviews. The high share of telephone interviews among all interviews received after this reminder (64%) indicates that a third mere online reminder would probably have had much less effect.

The result of the first two reminders, sent online, cannot be analysed since the timing for these reminders was different for each address (1 week after the posting of the online interview link to a particular establishment).

[42] A low success rate here does not necessarily mean that online interviewing is particularly difficult in these countries. The online success rate in ESENER also depends on whom the invitations are sent. In the United Kingdom, for example, it is common practice at the Kantar CATI centre to recall so called "soft refusals" again and again until getting either a final refusal or an interview. The online invitation was sent here only to (part of) those who categorically refused participation in CATI.

Table 38: Application and success of the telephone reminder on open online interview invitations

Country	CAWI invitations sent	Establishments approached with telephone reminders	Establishments actually reached with the telephone reminder	CATI interviews resulting from the telephone reminder	CAWI interviews done after the telephone reminder	Total interviews done after the telephone reminder	Total success of CATI reminder (% completed interviews of launched reminders)	Total success of CATI reminder (% completed interviews of establishments reached with CATI reminder)
AT	399	231	208	13	3	16	7%	8%
BE	746	387	354	13	7	20	5%	6%
BG	316	112	102	4	1	5	4%	5%
CH	440	230	202	19	1	20	9%	10%
CY	375	194	190	8	0	8	4%	4%
CZ	4.000	1.691	1.499	12	33	45	3%	3%
DE	943	437	424	12	6	18	4%	4%
DK	764	371	354	4	4	8	2%	2%
EE	229	116	110	15	6	21	18%	19%
EL	101	55	54	3	0	3	5%	6%
ES	1.506	797	740	10	6	16	2%	2%
FI	313	84	82	5	1	6	7%	7%
FR	773	437	419	21	3	24	5%	6%
HR	144	31	30	2	1	3	10%	10%
HU	638	311	276	9	1	10	3%	4%
IE	130	65	58	4	1	5	8%	9%
IS	68	34	32	2	1	3	9%	9%
IT	370	252	233	9	2	11	4%	5%
LT	183	96	91	2	3	5	5%	5%
LU	852	450	435	14	16	30	7%	7%
LV	154	82	82	1	3	4	5%	5%
MK	100	35	30	6	1	7	20%	23%
MT	123	16	14	2	0	2	13%	14%
NL	1.824	772	757	8	26	34	4%	4%
NO	181	92	82	3	2	5	5%	6%
PL	344	173	162	11	0	11	6%	7%
PT	376	127	124	4	1	5	4%	4%
RO	148	71	52	2	0	2	3%	4%
RS	96	48	36	6	0	6	13%	17%
SE	558	228	207	4	6	10	4%	5%
SI	481	233	210	15	4	19	8%	9%
SK	967	270	248	0	3	3	1%	1%
UK	181	86	84	9	0	9	10%	11%
ALL	**18.823**	**8.614**	**7.981**	**252**	**142**	**394**	**4,6%**	**4,9%**

8.3 Structure of the online interviews

The share of CAWI interviews was largest in size-classes 50-249 and 250+ employees, with more than 6% of all ESENER-3 interviews in these two size-classes done online. The smallest group of establishments included in the survey (5 to 9 employees) made considerably less often use of the online option.

CAWI interviews are spread over almost all sectors of activity. Only in one small cell (small establishments of NACE B, Mining and quarrying) there were no CAWI interviews at all. The share of online interviews among all interviews is lowest in NACE L (Real estate activities) and I (Accommodation and food service activities) while it is highest in NACE C (Manufacturing) and NACE F (Construction).

Overall, online interviews are however spread relatively evenly over sectors and sizes. This ensures that in case further analyses should detect any systematic mode differences between the CATI and the CAWI interviews, these effects will not be concentrated on a specific size-class or specific sectors of activity.

Table 39: Distribution of CAWI interviews, in % of all interviews within the cell

NACE Rev. 2 division	5-9	10-49	50-249	250+	Total
1 A	4,2%	4,2%	11,5%	3,3%	**5,2%**
2 B	0,0%	3,7%	3,2%	8,8%	**3,7%**
3 C	3,8%	5,1%	8,0%	7,2%	**5,8%**
4 D	3,8%	4,9%	7,3%	4,3%	**5,1%**
5 E	1,0%	4,0%	5,3%	6,5%	**4,0%**
6 F	4,0%	6,0%	9,2%	7,8%	**5,7%**
7 G	3,4%	5,0%	6,9%	8,4%	**4,5%**
8 H	4,2%	5,4%	5,1%	3,8%	**4,8%**
9 I	2,3%	3,8%	3,4%	7,6%	**3,4%**
10 J	3,3%	4,5%	4,7%	7,5%	**4,5%**
11 K	5,0%	5,1%	7,4%	5,2%	**5,4%**
12 L	3,1%	2,7%	3,6%	7,1%	**3,1%**
13 M	4,5%	5,9%	7,9%	5,1%	**5,5%**
14 N	3,6%	3,7%	6,0%	7,3%	**4,6%**
15 O	6,9%	5,1%	5,8%	4,9%	**5,5%**
16 P	3,5%	4,6%	5,4%	5,6%	**4,7%**
17 Q	3,4%	3,4%	5,5%	3,9%	**3,9%**
18 R	3,5%	6,4%	4,3%	8,6%	**5,3%**
19 S	3,5%	4,6%	4,1%	7,3%	**4,1%**
Total:	**3,6%**	**4,7%**	**6,3%**	**6,1%**	**4,8%**

In order to analyse possible mode differences between ESENER CATI and online interviews systematically, two types of logit regression model were calculated that took into consideration a set of background variables for which differences were assumed:

- In the first model, the dependent variable was the participation in the CAWI mode instead of the participation in the CATI mode (taking into account only the respondents to the survey).
- In the second set of models (in total 7 analyses), the influence of the mode of participation on the answers to selected key variables of the survey was analysed.

The regression analysis shows that “Country” is the most important factor explaining the participation in the CAWI interviews (instead of the participation in CATI). With the exception of Greece, Poland and Romania, it is in all countries more likely that respondents participate in CAWI than in the United Kingdom which has been chosen as reference country in the analysis. This result is not surprising in view of the large variety in the share of interviews conducted online. But since the multi-variate analysis controls for several further factors, the results may differ to a certain degree from the mere bi-variate analysis on the share of CAWI interviews among all interviews done in a country.

Table 40: Results from logit regression, with "Mode CAWI" as dependent variable

Explaining factors:	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to participate in CAWI - : less likely to participate in CAWI	Degree/extent of the correlation (odds ratio)
Country (Reference: United Kingdom)			
Austria	***	+	17,030
Belgium	***	+	27,810
Bulgaria	***	+	15,209
Croatia	***	+	13,231
Cyprus	***	+	20,280
Czech Republic	***	+	266,432
Denmark	***	+	51,879
Estonia	***	+	29,275
Finland	***	+	16,079
France	***	+	9,502
Germany	***	+	18,419
Greece	-		
Hungary	***	+	9,322
Iceland	***	+	9,489
Ireland	*	+	3,833
Italy	**	+	4,559
Latvia	***	+	14,141
Lithuania	***	+	12,571
Luxembourg	***	+	131,672
Macedonia	***	+	6,905
Malta	***	+	14,929
Netherlands	***	+	130,747
Norway	***	+	8,524
Poland	-		
Portugal	***	+	12,359
Romania	-		
Serbia	***	+	5,691
Slovakia	***	+	45,354
Slovenia	***	+	40,744
Spain	***	+	23,620
Sweden	***	+	38,096
Switzerland	***	+	19,844
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	***	+	1,231
size_3 (50 to 249 employees)	***	+	1,723
size_4 (250 or more employees)	***	+	1,708
Sector (Reference: Sector_3 = NACE C)			
NACE A	-		
NACE B	-		
NACE D	-		
NACE E	-		
NACE F	-		
NACE G	-		
NACE H	-		
NACE I	-		
NACE J	-		
NACE K	-		
NACE L	-		
NACE M	-		
NACE N	-		
NACEO	***	+	1,491
NACE P	*	+	1,265
NACE Q	-		
NACE R	-		
NACE S	-		

Explaining factors:	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to participate in CAWI - : less likely to participate in CAWI	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	***	-	0,773
Manager with OSH duties	-		
OSH specialist	-		
Employee representative in charge of OSH	-		
Another employee in charge of OSH	*	-	0,844
External OSH consultant	-		
Ownership type (Q111; Reference: Not public)			
Public organisation	***	-	0,460
NA ownership type	**	+	2,135
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	***	-	0,659
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	***	+	1,311
Economic situation neither good nor bad	***	+	1,539
Quite bad economic situation	***	+	1,502
Very bad economic situation	-		
NA economic situation	***	+	3,272
Dependent variable: Mode = CAWI interview (participation in the CAWI interview instead of the telephone interview)			

The large differences in the usage of the CAWI mode by country may have various causes:

- CAWI interviewing among businesses is more common in some countries than in others. In countries where this mode has been widely used in the past already, it is more likely that it also works for ESENER-3 as a means to avoid total non-response. The Netherlands, Luxembourg and the Nordic countries are for example countries where this mode has already been used widely for b2b surveys.
- The local fieldwork partners were encouraged to offer the CAWI mode only as a means to reduce non-response. A specific question was programmed for this in the entry part of the CATI script, aimed at convincing respondents refusing CATI to participate in CAWI instead. While this procedure was the same for all countries, there was some discretion left to the local fieldwork partners and their interviewers as regards the classification of respondents into the category *"refusal to participate in a telephone interview" (and possibly willing to participate online)* as opposed to some kind of general refusal category. Some fieldwork partners made more use of this specific refusal category than others, depending e.g. on their assessment of the likelihood that the CAWI invitation would then really lead to a completed interview.
- The regression analysis was limited to the number of accepted CAWI interviews. Results for countries with a high number or rate of refused CAWI interviews could be somewhat different in an analysis taking also these interviews into account.

The following other factors included in the regression analysis have an influence on the interviews being carried out online:

- Larger establishments are significantly more likely to use the CAWI option: Compared to the smallest size-class of 5-9 employees, it is 1,7 times (or by 70%) more likely for a respondent from an establishment with 250 or more employees to do a CAWI interview.
- As regards the sector of activity, statistically significant correlations with the mode of completing the survey can be identified only for NACE O (Public administration) and P (Education). Respondents in both sectors were more likely to complete the online version, though for NACE P the correlation is significant at the 5% level only.
- Regarding the function of respondents, the category of the "managers without OSH duties" shows a significant correlation in the model: Respondents of this type are less likely to do the

interview in the CAWI mode than owners or managers. A possible explanation for this correlation is that if an establishment received a link for the online interview, the interview might often not be filled in by such a general manager, but be transferred at some point to somebody more involved in OSH details. Respondents of the type "another employee in charge of OSH" are also less likely to participate in the online variant, though the correlation is weaker here.

- Public entities are considerably less likely to participate online than non-public entities. This is however also related to the fact that the CATI response rate is higher for this sector than for all others.
- Units of multi-site organisations are less likely to participate online.
- Establishments with a less favorable current economic situation are more likely to answer the interview online than the reference group of establishments with a very good economic situation, (except for those with a very bad economic situation for which there is no significant correlation visible). Or establishments participating online are more open to admit a less favourable economic situation in the interview.

Summarizing these observations, it can be concluded that there are some structural differences as regards the participation in the interview by mode, though these are rather moderate.

As for the second type of analysis, the analysis of correlations between the mode of interviewing and a selection of content-related variables, the summary of results in the table below shows the following:

- For four of the seven OSH indicators analysed, the mode of interviewing shows a significant correlation. This is the case for the performance of risk assessments, the training of employees on the proper use of their equipment and on psychosocial risk prevention and the discussion of possible OSH impacts in case of the introduction of new technologies.
- In all four models, hereby respondents that completed the interview online report to apply the OSH measure less often in the establishment than respondents from the CATI interview. Respondents of the online interview are for example about 20% less likely to indicate that they conduct risk assessments in the establishments than respondents of the telephone interview[43].
- Though in all four models, significant mode effects can be identified, the magnitude of these effects is not very large, mostly ranging between 15% and 20%, being higher just for model 2 (training on the prevention of psycho-social risks).
- While models 1-3 were almost identically calculated already for ESENER-2, models 4 to 7 are new. The regressions on model 1-3 in ESENER-2 had shown similar odds ratios for the two items related to training, but no significant correlation between the mode and the performance of workplace risk assessments.
- For models 5 to 7, no significant correlations between the mode and the dependent variable could be identified. Dependent variables were here the existence of an action plan on work-related stress (asked only in establishments with 20 or more employees), the provision of equipment in the last 3 years and the reporting of increased sickness absence as an outcome indicator.

The regression models show that there are mode effects for some of the OSH indicators tested. In all cases where effects can be observed, the online interviews show a lower "OSH performance" than the CATI interviews. This can however have two different causes:

- Respondents may answer differently in the online interview, namely more honestly and with less social desirability effect.

[43] The odds ratio of 0.797 means that the likeliness of online respondents to indicate the performance of risk assessments is only 80% of that of telephone respondents. We inverted this to a lack of 20% in the interpretation since this is easier to capture.

- It may also be the case that establishments answering the interview online differ from those answering by telephone in so far as they tend to have less focus on OSH and thus less OSH measures in place. Since online interviews are not offered for free choice in ESENER, but only after refusal of the telephone interview, this interpretation has a certain plausibility.

Table 41: Summary of multi-variate regression analyses on mode effects

Analysis No.	Dependent variable	Significance level	Direction of the correlation: + more likely to do/have this in the establishment -: Less likely to do/have this in the establishment	Odds ratio
1	Workplace risk assessments carried out regularly (yes)	***		0.797
2	Training on proper use/adjustment of workstation (yes)	***	-	0.658
3	Training on prevention of psycho-social risks (yes)	***	-	0.839
4	Discussion of impact of new technologies on OSH (yes)	***	-	0.814
5	Existence of an action plan on work-related stress (yes)	-		
6	Outcome indicator: Increased sickness absence (yes)	-		
7	Provision of ergonomic equipment in last 3 years (yes)	-		

It cannot be determined on base of the data which of these two possible explanations for the differences applies to ESENER and possibly, it is a mixture of both.

The models were all controlled by the same set of variables, among them country, sector, size, respondent type, risk profile, availability of a health and safety expertise and others. The full set of controlled variables and the results in detail are shown in Annex 2.

9 Weighting: Procedure and principles

9.1 The necessity of weighting

In representative surveys based on random probability sampling weighting is used to correct differences in the probability of the units to be included in the net sample. Such differences lead to structural discrepancies of the net sample as compared to the universe. The weighting procedure corrects these discrepancies by ex post facto adapting the inclusion probabilities.

Inclusion probabilities vary if the gross sample is drawn disproportionally to the universe. This applies for the ESENER-3 survey for several reasons:

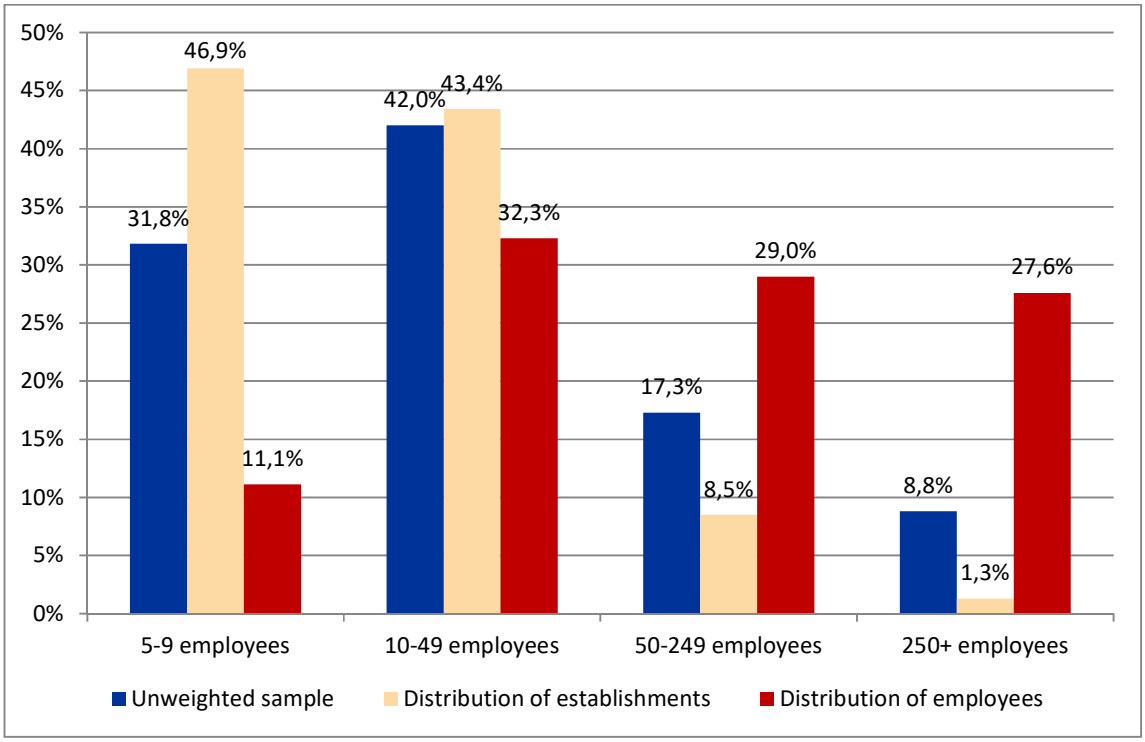
- Gross samples were deliberately drawn disproportionally: Firstly by country and secondly by establishment size within countries. In the Republic of Ireland, additionally strong sector disproportionalities were introduced.
- The ESENER-3 survey is expected to provide insights related to establishments (e.g. "How many *establishments* practice risk assessments?" as well as insights related to employees (e.g. "How many *employees* work in establishments which practice risk assessments?"). Since the distribution of establishments by size significantly differs from the distribution of employees, the net sample is necessarily biased at least with regard to one of the target structures. In ESENER-3, this bias is more than in ESENER-2 on the establishment perspective.
- Additionally, the necessity of applying a screening procedure in several countries had an effect on the inclusion probabilities of units from multi-site organisations.

The data-set includes establishment-proportional as well as employee-proportional weighting factors. For any bivariate content related[44] analysis done with the ESENER-3 data it is essential to apply the weighting. Unweighted counts will lead to results that are not representative for the population covered by the survey because the sample design is strongly disproportional in various dimensions. The weights made available with the data-set redress the various disproportionalities introduced into the sampling of the survey:

- The weighting corrects for the disproportionality in terms of size. In the chosen sampling design, the larger units were deliberately oversampled. The targets for each size-class did not reflect the structure of the universe of establishments but aimed at getting enough interviews from establishments from different size classes and at getting relatively homogenous factors for both the establishment and the employee-proportional weighting, though with a focus on the quality of the establishment-proportional weighting.
- The graph below illustrates to what extent the distribution of establishments and of employees across size classes differs in the universe and compares them with the actual distribution of the unweighted net sample which is somewhere in between.

[44] For methodological analysis as done in this report, the use of unweighted data is usually more appropriate.

Figure 3: Size-structure of the net sample, weighted and unweighted



- **The national sample sizes are also not proportional to the size of the respective national economy**. The staggered target sample sizes for ESENER-3 (450, 750, 1.500 or 2.250 interviews) reflect the differences in the national universes only to a certain degree. In spite of their smaller target sample size, small countries are still over-proportionally represented in the sample: While e.g. in Luxembourg, 750 interviews were made to represent the country's universe of about 12.000 establishments, in Germany 2.250 interviews were made for a total universe of about 1,2 million establishments. Consequently, in an establishment-proportional perspective the average inclusion rate is as high as 1:16 in Luxembourg, while it is only 1:536 in Germany. The national sample boosts lead to additional differences regarding the selection probabilities.

- In the countries that had to use the **screener** in order to get a random selection of establishments for the interview, an additional **selection probability weighting factor** has been introduced. This weighting factor corrects for the unequal selection probabilities of subsidiaries from multi-site organisations in these countries[45]. The exact value of this weighting factor is determined on base of the answers to the screening questionnaire: There, interviewees were asked for the number of establishments the organisation has within the defined universe in the country. This figure is used as base for the calculation of the selection probability factor. The factor is equal to the number of subsidiaries the originally selected multi-site company has in total within the defined universe. In order to give outliers (individual enterprises with a very high number of subsidiaries/local units) not too much influence, this factor was limited to 5 as

[45] The entry factor has been applied to all interviews with subsidiaries from screening countries, i.e. to the additional addresses of subsidiaries taken up during the screening at the headquarters as well as to original addresses from the sampling frame that were classified as subsidiaries by respondents.

maximum. In organisations where two subsidiaries could be successfully interviewed, each of these received a factor of up to 5[46].

The weighting factors as described below include corrections of these design effects and – beyond this – of any potential selective non-response by sector or size. As a result the weighting adjusts the structures of the sample to the structures of the universe.

9.2 Type of weights delivered with the data-set

For both the establishment-proportional and the employee-proportional weighting there are three weighting factors available which produce identical percentage results at the national level but have different areas of application.

9.2.1 Establishment-proportional weighting factors

There are three **establishment-proportional weighting factors provided in the data-set**:

- The factor **"estwei"** is a factor that weights the data according to the structure of the universe of establishments in a given country. It is scaled to the national net sample size, i.e. it sums up to the total number of interviews made in the country, not to the number of establishments in the universe. Weighting factors in this mode can be considerably smaller or larger than the value "1" since some interviews (those representing only a relatively small part of the universe) are "weighted down" while others are "weighted up".
- **The factor "estwei" can be used for any analysis with the data of just one country. But it cannot be used for any international analysis** because the size of the national samples is not proportional to the size of the national universes and this additional disproportionality is not redressed in the factor "estwei".
- The factor **"estprop"** is based on the factor "estwei". It additionally adjusts for the disproportionality of the national sample sizes and is therefore the factor **to be used for international analyses**. The factor is scaled to the number of interviews across all countries, not to the number of establishments in the universe. Since national structures are not affected this factor can also be used for descriptive national analyses. Since the weighted number of interviews per country does not correspond to the actual national net sample size, analyses including significance tests at national level should better be made by using the factor "estwei".

[46] The factor depends on the number of subsidiaries the company indicated to have. If it has e.g. 7 subsidiaries and two of them were interviewed, each of these got the factor 3,5. If it has 10 or more subsidiaries, the factor for each of the two interviewed subsidiaries is 5.

- The factor **"estex"** produces the same percentage results as "estprop" but is an extrapolation to the universe of establishments in the countries covered by the survey. This factor is provided for easier estimations of absolute figures (e.g. absolute number of establishments practicing risk assessments). It should be used for descriptive analyses only. For significance tests the above-mentioned caveat for "estprop" applies even more. In this mode of weighting all values are normally 1 or larger since each interview stands for at least one establishment in reality[47].

9.2.2 Employee-proportional weighting factors

The **employee-proportional weighting factors** "empwei", "empprop" and "empex" were calculated according to the same principles and the same caveats apply:

- The factor **"empwei"** is a factor that weights the data according to the structure of the universe of employees (in establishments with 5 or more employees) in a given country. It is scaled up to the total number of interviews made in the country, not to the number of employees in the universe.
- **The factor "empwei" can be used for any analysis with the data of just one country. But it cannot be used for any international analysis** because the size of the national samples is not proportional to the size of the universe.
- The factor **"empprop"** is based on the factor "empwei" and additionally adjusts for the disproportionality of the national sample sizes **for international analysis**. It is scaled to the number of interviews, not to the number of establishments in the universe.
- The factor "**empex"** produces the same percentage results as "empprop", but is an extrapolation to the universe of employees (in establishments with 5 or more employees).

9.2.3 Further hints on the usage of the different factors

The extrapolation weights "estex" or "empex" should not be used for multivariate analyses. By nature, these weights lead to an extremely high number of cases. This has the effect that e.g. in a regression analysis almost all values become significant. This can be avoided by using the "estwei" or "empwei" weighting factors for this type of calculations in national analyses and the "estprop" or "empprop" weighting factors in international analyses.

For any bivariate cross-tabulations done with the statistics software SPSS, it is recommended to amend the command syntax by the order "/count asis" because the standard SPSS cross-tabulation command rounds values of less than 0,5 down to '0' and ignores them in the calculation. By adding the command "/count asis", the program considers the values including all positions after the decimal point.

[47] For some cases, the establishment proportional extrapolation factor in the data-set is slightly smaller than 1 (0,988). In theory, this is evidently not possible in a survey for which none of the units is interviewed more than once. The interviews with a factor of 0,988 actually represent exactly one case in the universe, but due to the adaptation of the sample to size and sector in the weighting process, the calculated factor is slightly below 1.

9.3 Weighting principles

In the following, the weighting principles are illustrated using the establishment-proportional weighting factors. The employee-proportional factors “empwei”, “empprop” and “empex” were calculated in the same way as the establishment-proportional factors with the only difference that the variables N_{ijY}, N_{totY} and N_{tot_europe} refer to the number of employees in the universe, not to the number of establishments.

In the weighting process, basically the number of interviews in the net sample in each cell of the weighting matrix is put into relation to the total number of establishments in the universe according to the available statistics in the same cell.

The establishment-proportional factors are calculated as follows:

- Country-specific post-stratification weight **“estwei”**, adjusted to the number of net interviews

  The correction factor “estwei” adapts the actual structure of the net sample to the target structure of establishments in the universe, summing up to the total number of interviews made in the country.

  $estwei_{ijY} = N_{ijY} / n_{ijY} * n_{totY} / N_{totY}$

  with $\sum estwei_{ijY} = n_{totY}$

- Internationally adjusted post-stratification weight **“estprop”**

  Like the factor “estwei”, “estprop” is a weighting and not an extrapolation factor. Other than “estwei”, it takes into account the different sizes of the national net samples in relation to their actual share in the universe. The factors sum up to the total number of interviews made in all surveyed countries together. At a local level the sum of the factors differs to some degree from the actual national net sample size.

  $estprop_{ijY} = estwei_{ijY} * N_{totY} / n_{totY} * n_{tot\_europe} / N_{tot\_europe}$

  or $estprop_{ijY} = N_{ijY} / n_{ijY} * n_{totY} / N_{totY} * N_{totY} / n_{totY} * n_{tot\_europe} / N_{tot\_europe}$

  or $estprop_{ijY} = N_{ijY} / n_{ijY} * n_{tot\_europe} / N_{tot\_europe}$

  with $\sum estprop_{ijY} = N_{tot\_europe}$

- Post-stratification extrapolation weight **“estex”**, adjusted to the total number of establishments in the universe

  The correction factor “estex” adapts the actual size of the net sample to the target size of the universe. Since this factor extrapolates to the total number of establishments, country-specific results automatically reflect the actual size of the country within the total European universe.

  $estex_{ijY} = N_{ijY} / n_{ijY}$

  with $\sum estex_{ijY} = N_{totY}$

In the formulae above the variables are defined as follows:

N_{ijY} = total number of establishments in cell ij of the weighting matrix in the universe of country Y

n_{ijY} = total number of completed interviews in cell ij of the weighting matrix in country Y. Please note that in the screener countries the subsidiaries interviewed are taken into account by their design weight in this sum. The design weight corrects for the lower selection

probabilities of the subsidiaries and is equal to the number of eligible subsidiaries of the originally selected multi-site company (limited to a maximum of 5).

n_{totY} = total unweighted net sample size in country Y

N_{totY} = total number of establishments in country Y

n_{tot_europe} = total unweighted net sample size in Europe (i.e. in all countries involved)

N_{tot_europe} = total number of establishments in Europe (i.e. in all countries involved)

In order to avoid individual factors becoming too large by applying this procedure, upper and lower factor limitations were introduced. These were handled individually for each type of weighting factor per country, taking into account the respective structures of the net sample and the universe. Those limits were passed in some screener countries if an individual case had a high design factor (e.g. 5) and – at the same time – was part of a weighting cell with a high target number, but actually with a low number of cases . Extraordinarily high factors resulted especially in the employee weighting procedure.

9.4 Generalised Regression estimation (GREG)

There are different algorithms to arrive at the weighting factors. For the weighting of ESENER-3, the Generalised Regression estimation (GREG) method has been applied to develop them. GREG aims at developing weights that ensure unbiasedness of the estimates, subject to the constraint that totals of certain characteristics (xk) measured in the sample (S) – if being weighted by the weights – correspond to known totals or distributions in the universe (U). The constraint mentioned above is expressed in brackets on the right hand of Figure 1.

Figure 1: Distance function of a generalised regression estimation

$$\sum_{S} \boldsymbol{d_k}\, \boldsymbol{G}\left(\frac{\boldsymbol{w_k}}{\boldsymbol{d_k}}\right) - \lambda'\left(\sum_{S} \boldsymbol{w_k x_k} - \sum_{U} \boldsymbol{x_k}\right)$$

with:

w_k = final weight
x_k = element within sample/universe
d_k = design weight
S = sample
U = universe
G = distance function
λ = Langrange multiplier

Additionally, in developing regression estimators a special focus is laid on the distance between the design weights and the new weights. In screener countries having companies as the unit of selection the design weights adjust for the differing probabilities of selection depending on the number of establishments in the target group a company has. In non-screener countries where the sampling units are establishments directly the selection probability is the same for all establishments and thus, the design weights are ones.

When trying to achieve correspondence between the totals of certain characteristics measured in the sample and known totals or distributions in the universe a second objective is to minimize a function

reflecting the distance between initial design weights and new weights. If the design weights are ones as in the case of non-screener countries, this means that the objective is to keep the new weights as near to one as possible. Stated in another way, the objective of the adjustment "is to derive new weights that modify as little as possible the original sampling weights (…), which have the desirable property of yielding unbiased estimates" (Deville, Särndal 1992, p 377). This is equivalent to keeping the variance of estimates due to weighting as low as possible or, stated in the opposite direction, the precision of the estimates as high as possible. Mathematically, this means, the problem is to minimize a distance function introducing a vector of a Langrange multiplier λ. This leads to the minimizing problem given in Figure 1.

Deville and Särndal (1992) describe several distance functions G. A drawback e.g. of the linear method is that it can lead to negative weights which are not desirable. Our own experience revealed best results using a logit distance function where specific lower and upper bounds of weights can be defined. If possible, the estimation returns weights that satisfy these bounds. If the weights returned lie outside these bounds certain measures described in 1.3 were taken.

The adjustment to known population totals of certain characteristics implies, that there is a source providing the information about the total in the population. This requirement is easily fulfilled if there is a one-to-one-correspondence of target population, sampling frame, and unit of enquiry and if the distribution of the population according to the relevant characteristics is known: For ESENER this means that there is a register comprising the information about the population of the establishments and that there is a sampling frame from which the establishments of the intended sample can be drawn. Unfortunately, this is only true for a certain number of countries. For the other countries, the population register and the sampling frame are on the company level. Thus, the target structure to be used had to be based on best estimates.

9.5 Weighting steps

In order to get the best possible results, each of the 33 countries was weighted individually in a multi-step iterative procedure. In terms of substance a fine differentiation by sectors is important for ESENER since the type of activities done in an establishment determine to a considerable degree the kind and degree of health and safety risks involved in the work.

The following procedure was applied:

(1) Definition of the weighting matrix

In all countries except for Ireland, a 76-cell matrix consisting of the 19 relevant NACE Rev 2 sectors at 1-digit level (NACE sections) by the 4 size-classes was used as starting point.

In Ireland, for the boosted NACE sections I and Q a finer weighting at the level of the NACE divisions was applied. This resulted in 12 additional cells for the weighting and thus in a weighting matrix consisting of 88 cells.

(2) Control and revision of the weighting matrix

The matrix showing the distribution of the net interviews achieved in the country was analysed and compared to the figures for the universe. Cells that were empty in the sample but not in the universe and cells with only very few interviews were pooled with neighbouring cells in order to limit the range of weighting factors and to minimise the risk of outliers, i.e. that just one or two single interviews represent a large number of entities in the entire universe. Where necessary, cells of two or more sectors within a sector group and the same size-class were pooled. There was no pooling of cells belonging to different sector groups. In some cases, it was necessary to further pool cells of different size-classes when all the cells of a sector group within the size class were already pooled.

Checking of the weighting matrix and combination of cells was made separately for the establishment-proportional weighting and for the employee-proportional weighting. The ratio of net interviews and the target number in each cell may significantly vary between the two perspectives. The combination of cells is documented in detail in the Annex.

(3) Weighting

Based on the revised 76-cell matrix (Ireland: 88-cell matrix) the six weights were calculated for each country, as described in 9.3 above.

(4) Additional sector and size-class weighting

Pooling of cells may lead to marginal distributions of sectors and/or size-classes deviating from the universe structure. In order to fine-tune the sector structure at the NACE Rev. 2 1-digit level and the size-class, additional sector weighting (without taking into account establishment size) and size-class weighting (without taking into account the sector) was applied. In principle the 19 relevant NACE Rev 2 sectors at 1-digit level were used in order to further adapt the net sample structure to the structure of the universe. However, in some countries with very small samples still some small sectors (such as NACE sectors B, D, E or L) had to be pooled.

The smaller a national sample size, the more likely it was that for this step still some small sectors (such as B, D, E or L) had to be summarized with others.

Since weighting of sectors/size-classes in step (4) might affect the size structure, steps (3) and (4) were applied repeatedly in an iterative process.

9.6 Availability of statistical information and necessity of best estimates

The statistical information required for the sampling (definition of targets) and weighting was collected at the national level by the local fieldwork partners and was then centrally checked and compared. In most cases, the provided statistics originate from the respective national statistical office.

In a number of countries reliable statistical information is available only on the number and structure of enterprises/companies, but not on the number and structure of establishments/local units. In principle, national statistical institutes are asked by Eurostat to collect this information together with the enterprise/company figures for the SBS (Structural Business Statistics). But many countries do either not yet collect these data or they do not make them available or they are collected, but not in a differentiation by size.

Since the survey is to be conducted at the level of establishments in all countries, it also needs to be weighted on the establishment structures in order to maintain the full cross-national comparability of the data. Against this background, the lack of establishment statistics raises the necessity to do best estimates on the number and structure of establishments/local units for those countries where this information is not available from the national statistical office or from another reliable source (such as e.g. the provider of a representative database of business addresses).

Even in countries with available establishment statistics, best estimates turned out to be necessary for part of the structures because the available statistics showed blanks or unrealistically low values[48] in

[48] The judgement on what can be considered as “unrealistically low value” was made on base of a comparison with the values for the same cell in other countries and with the figures the Labour Force Survey provides on the number of employees in the respective size and sector. Only if discrepancies in both comparisons were very large, the provided statistics were replaced by best estimates. Nevertheless, there is a certain degree of arbitrariness in these decisions.

certain sectors of activity (e.g. in NACE A or NACE O) or because the size-differentiation was not available in the required form. The latter applied mostly to the smallest size-class where information was sometimes available only for establishments with 0 to 9 employees (i.e. including self-employed persons without any further employees) or for 1 to 9 employees, but not in the breakdown 5 to 9 employees. Some smaller countries do not differentiate their statistics for the larger size-classes as needed for the survey (50 to 249 and 250+ employees), but only for a size-class 100+ or 200+. In these cases, best estimates had to be applied for concerned cells of the weighting matrix[49].

Before deciding on general principles to be applied for these estimates, Kantar had collected statistical information from a number of different sources in the preparation of ESENER-2 and tested different approaches for their plausibility. Finally, the following principles for the best estimates were applied for ESENER-2. These principles were - for reasons of consistency and because we still consider them as the best approach – also applied to ESENER-3:

(a) Countries where statistics are generally available on the distribution of enterprises/companies, but not on the distribution of establishments/local units

In these countries, best estimates on NACE sectors A to N as well as R and S were generally derived from the data available on the number and structure of enterprises/companies[50]. To this end, in a preparatory step the company and establishment structures from countries where both company and establishment statistics were available were compared and an average company-establishment ratio was derived by this way, differentiated by sizes and sectors. This ratio was then applied to the company statistics. The calculations made for establishing this ratio were repeated for ESENER-3 with updated statistics.

Exceptions to this general rule were sectors of activity or size-bands for which the appropriate company-data was either not available or clearly unreliable (usually due to under-coverage). For these particular cells, estimates were not based on the company figures, but were derived from the Labour Force Survey (LFS) instead. LFS- based estimates were applied in the following cases:

- For the figures on the number of establishments in sectors O, P and Q and their distribution over the size-classes. Though in some countries plausible company figures were available for at least some of these sectors (usually for NACE Q rather than for NACE O or P)[51], the LFS estimates were generally applied for NACE O, P and Q in all countries where only company statistics were available[52]. This ensures more homogeneity for the figures of these sectors, both from a national perspective (share of the sector within the national universe) and from an international perspective.
- For sectors A, K, R and S where company figures were not available or clearly too low.
- For size-class 5 to 9 (all sectors) in countries where the company or establishment statistics provide only the breakdown 0 to 9 or 1 to 9 employees.

In some particular cases, a deviation from these general rules for the estimates might have led to more accurate figures than the applied company-based estimates. It was however decided together with EU-OSHA that the coherent application of a set of rules for the estimates would be given priority over the implementation of the best possible solution for individual estimates.

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[49] The need for best estimates for diverging size-classes was lower than in ESENER-2, several statistical offices have improved their statistics in this regard and adapted them to the standard classifications recommended by Eurostat.

[50] All EU countries collect this type of statistics and deliver them to Eurostat for their SBS (Structural Business Statistics)..

[51] The company statistics of many countries for which estimates were needed do not cover these three sectors in sufficient completeness. Particularly entities in public ownership are often not registered or they are only registered as large “umbrella units”, e.g. the Ministry of Education as organisation responsible for all public schools in the country. In several countries, the statistical situation has however improved since 2014 (ESENER-2) for NACE O,P and Q.

[52] An exception to this is Slovenia where establishments in NACE O,P and Q were estimated on base of the company figures provided in the official statistics. This exception was made because for Slovenia, LFS data had not been available for ESENER-2 so that the consistency with ESENER-2 was not an argument for using the LFS data.

(b) Countries with establishment statistics lacking particular information

The establishment statistics that were made available were usually more complete than the statistics on companies, especially as regards the coverage of entities from the public sector. Nevertheless, some of these statistics do also not cover particular sectors or they are available for slightly deviating size-classes only. In these cases, also best estimates were used to complete the data:

- For sectors of activity not covered or clearly under-represented in the establishment statistics (NACE O, P, Q or A in some countries), data from the Labour Force Survey were used to complement the statistics.
- LFS-data were again used for size-class 5 to 9 (all sectors) in countries where only a breakdown for 0 to 9 or 1 to 9 was available.
- In countries where the available breakdown was 1-5/6-9 employees, the figure on the share of establishments with 5 employees was estimated on base of data from large-scale establishment surveys conducted in the past at Kantar. These were then added to the given statistics for 6 to 9 employees.

(c) Countries lacking any statistics on the distribution of establishments or companies

A specific case were countries where no information at all was available on the universe, neither from establishment or company statistics nor from the Eurostat Labour Force Survey. This applies only to some sectors of the Serbian universe, namely NACE O, P and Q. While for ESENER-2 the figures for these sectors had to be estimated on base of the statistics from another country in the region (Croatia), this time at least figures on the overall number of employees by NACE section were available from the national Labour Force Survey. These figures were taken as base for the estimates on the number and size distribution of establishments of NACE O,P and Q in Serbia.

A note on statistics on NACE A

Though NACE A is generally included in the statistics of most countries, the figures in the available sources often vary largely with regard to the size of the units and the number of employees working in the sector. For reasons of consistency, we used the official figures in the establishment or company statistics provided by the national statistical offices wherever these were available. In a number of countries these tend to under-estimate the size of the single establishments and the number of employees working in the sector.

9.7 The statistical sources used for the weighting

The tables shown on the following pages shows the statistical sources used for the weighting. It also documents where estimates were necessary and on which source or principle these estimates are based. Table 42, spread over various pages, shows the sources used for the establishment-proportional weighting. The subsequent table lists the sources used for the employee-proportional weighting.

Table 42: Statistical sources used for the establishment-proportional weighting

Country	Main source for statistical background information	Level of the information available from this source	Comments/Specific observations	Additional statistics used for particular sectors and/or size-classes	Estimates (overview)	Summary evaluation of the reliability of the available figures used for the weighting
AT	Statistics Austria: Arbeitsstättenzählung 2011 (Census on local units)	Establishments/ local units ("Arbeitsstätten")	The census on local units is the only source for statistics on establishments/local units available in Austria. The data with reference year 2011 are quite outdated, but were used again in lack of alternatives; A comparison of the LFS figures from 2012 and 2017 shows a high stability of the sector and size structure of the Austrian economy	none	none	medium (high at the time the statistics were compiled)
BE	Belfirst: company statistics, 03/2019	Companies/enterprises; statistics on the level of establishments/ local units also provided by Belfirst, but with the size indication for the entire organisation, not the local unit; this leads to clearly implausible figures for the distribution of establishments; therefore decision to apply estimates based on the company structures	-	LFS 2017 for estimates on NACE O, P and Q	Distribution of establishments estimated on base of figures for the distribution of companies; distribution of NACE O,P,Q estimated on base of LFS data	medium
BG	National Statistical Institute: Establishment Statistics 2017	Establishments/local units	Establishment statistics made available from the statistical office for the first time, on request	none	none	high
CH	Federal office for statistics (Bundesamt für Statistik BFS), STATENT, July 2019	Establishments/ local units ("Arbeitsstätten")	The number of establishments according to this statistics is comparatively high, but was used because of the generally high reliability of the STATENT statistics	none	none	high
CY	2017 Statistical Service of the Republoic of Cyprus, Registry of Companies	Companies/enterprises	official company figures for size 5-9 available now (in ESENER-2 necessity of estimates on base of size-class 0-9 employees)	LFS 2017 for estimates on NACE D, O, P and Q for reasons of consistency; official figures on NACE O,P,Q more realistic than for ESENER-2	* Distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data;	medium
CZ	Czech Statistical Office: company register, 06/2018	Companies/enterprises	-	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium
DE	Structures from the establishment Panel of the Federal Agency of Labour 2018	Establishments/ local units	Source takes employees not liable to social security insurance into account (450€ jobbers, civil servants) and was therefore preferred over the official statistics where these are not covered	LFS 2017 for NACE P	* distribution of NACE P (due to alleged under-coverage in the main statistical source used for the survey)	high to medium
DK	Statistical Office: workplaces by time, industry and size of workplace, 2017	Establishments/ local units	workplaces interpreted as roughly equivalent to establishments/local units	-	-	high
EE	E-business Register, Centre of Registers and Information System, 12/2017	Companies/enterprises	-	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium
EL	Hellenic Statistical Authority, 2016	Companies/enterprises	* figures for NACE K (financial and insurance activities) implausibly low (reference publication: EBF: European Banking Sector - facts and figures 2012)	LFS 2017 for estimates on NACE K, O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium
ES	INE (National Statistical office), DIRCE Directorio Central de Empresas, Unidades locales activas, 2018	Establishments/ local units	* no figures for NACE A and O provided by INE * figures for NACE P and Q cover public units only partly (under-representation)	LFS 2017 for estimates on NACE A, O, P and Q	Distribution of NACE A, O,P,Q estimated on base of LFS data	high (medium for A, O, P, Q)
FI	Statistics Finland: establishments by industry and personnel size, 2017 (Tilastokeskus: Yritysten rakenne- ja tilinpäätöstilasto)	Establishments/ local units	clear under-representation of NACE O, P and Q	LFS 2017 for estimates on NACE O, P and Q	distribution of NACE O,P,Q estimated on base of LFS data	high (medium for O, P, Q)

Country	Main source for statistical background information	Level of the information available from this source	Comments/Specific observations	Additional statistics used for particular sectors and/or size-classes	Estimates (overview)	Summary evaluation of the reliability of the available figures used for the weighting
FR	INSEE (National statistical office): Sirene anonymisée, etablissements 2018	Establishments/ local units	statistics shows only size class 6-9 employees; figure for 5 employees estimated on base of given figures for size-class 6-9 and added	none	Number of establishments with 5 employees (see comments column)	high
HR	Croatian Bureau of Statistics: Statistical Business Register 2017	Companies/enterprises	-	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium
HU	Hungarian Centrral Statistical Office database, 2016		NACE O almost empty (10 units 5+), P and Q clearly underrepresented	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium
IE	CSO (Central Statistical Office) 2016 and 2017; Bill Moss establishment statistics 2019 for divisions in NACE I & Q and generally for size 5-9 (all sectors)	Companies/enterprises, establishments for some segments	* final decision to go for a mixture of estimates based on the company statistics of the CSO and LFS data; Bill Moss statistics not generally used because of doubts about the reliability, particularly in size 5-9; Census of Industrial Unit not used as not available in the necessary breakdowns * NACE B-N: Own estimates on the number and distribution of establishments, based on CSO company statistics 12/2017 * Establishments NACE Q-S: Own estimates on the number and distribution of establishments, based on CSO company statistics 12/2016 * NACE A, O & P: Own estimates on the number and distribution of establishments, based on annual data from the Labour Force Survey, 2017 * Distribution of boost sectors NACE I and O based on the distribution of the subsectors (NACE divisions) in Bill Moss (ratio)	* LFS 2017 for estimates on NACE A, O and P	* distribution of establishments for NACE B to N, Q, R and S estimated on base of figures for the distribution of companies; * distribution of NACE A, O,P estimated on base of LFS data	medium
IS	Creditinfo, 2018	Companies/enterprises	NACE O almost empty (16 units 5+)	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium
IT	ISTAT (National Statistical office): Establishment statistics 2017 and Census 2011	Establishments/ local units	* Up-to-date establishment figures not available for sectors A, O, P and Q * Usage of the data from the Census of 2011 for NACE O,P,Q * LFS-based estimates for NACE A (Census 2011 figures unrealistically low)	LFS 2017 as base for estimates on NACE A (50%)	* distribution of establishments in NACE A estimated on base of LFS data (50% of LFS figures only due to strong seasonal changes and consistency with ESENER-2)	high for NACE B-N, R,S; medium for NACE A,O,P,Q
LT	Lithuanian Department of Statistics: The register of legal entities, 1/2019	Companies/enterprises	* LFS estimates used for NACE O to S due to unrealistically low figures	LFS 2017 for estimates on NACE O, P, Q, R, S	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q, R, S estimated on base of LFS data	medium
LU	STATEC (National statistical office): business demography, 1/2017	Companies/enterprises	statistics does not show any figures for NACE O, P and Q underrespresented according to other available sources	LFS 2017 combined with other sources (e.g. Interregionale Arbeitsmarktbeobachtungsstelle 11/2016: Die Arbeitsmarktsituation in der Großregion) for estimates on NACE O, P and Q (direct usage of LFS data for LU leads to too low figures due to the large-scale labour migration from the border regions)	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q (see column "additional statistics")	medium
LV	Central Statistical Bureau of the Republic of Latvia: Local unit statistics 2017 (establishment statistics compiled on request)	Establishments/ local units	Combination of 3 statistics: * local units of business entities * local units of state institutions * local units of foundations, associations and NGOs	-	-	high
MK	Statitics on active business entitites by size and persons employed, National Statistical Office 2017	Companies/enterprises	Company statistics include counts on NACE O,P,Q to a possibly comprehensive degree; for reasons of consistency of teh OPQ estimates for screening countries nevertheless usage of teh LFS figures (these are very similar for NAVE P and Q, but notably higher for NACE O).	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium

Country	Main source for statistical background information	Level of the information available from this source	Comments/Specific observations	Additional statistics used for particular sectors and/or size-classes	Estimates (overview)	Summary evaluation of the reliability of the available figures used for the weighting
MT	National Statistics Office (NSO): Business Demographics 2017	Companies/enterprises	NACE = =O,P,Q included in company statistics, but uncertain whether full coverage	LFS 2017 for estimates on NACE A, O, P and Q and on size-class 5-9 (all sectors)	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of LFS data	medium to low
NL	Nederlandse Kamers van Koophandel, July 2019	Establishments/ local units	NACE O almost empty (9 units 5+) and P also clearly under-represented; Q also likely to be somewhat under-represented (judgement on base of more detailed national statistics available about the number or personnel working in the sector and on base of the LFS data)	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments in NACE O,P,Q estimated on base of LFS data	high (medium for O, P, Q)
NO	Statistical Office at:https://www.ssb.no/en/virksomheter-foretak-og-regnskap/statistikker/bedrifter/aar, July 2019	Establishments/ local units	In ESENER-2, equivocally the count from the sampling frame had been used for weighting; figures for the number of establishments considerably higher in ESENER-3, using the official statistics on establishments	-	-	high
PL	National Statistical Office: REGON register, 4/2019 for sizes 10+; estimates based on counts from frame provider Bisnode for size 5-9	Establishments/ local units	Smallest required size-class not available from Statistical Office, only as 0-9 employees; therefore estimate of the number of establishments 5-9 based on a company count from the frame provider Bisnode and the implementation of a company-establ. factor estimate	LFS 2017 for estimates on NACE O, P and Q	* distribution of NACE O,P,Q estimated on base of LFS data * distribution of size-class 5-9 (all sectors) estimated on base of LFS data	high (medium for size 5-9)
PT	INE (Instituto Nacional Estatistica): Sistema de Contas Integradas das Empresas 2016	Companies/enterprises	No data available for NACE K and O; P and Q likely to be underrepresented	LFS 2017 for estimates on NACE K, O, P and Q	* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE K,O,P,Q estimated on base of LFS data	medium
RO	National Statistics Institute: Lista firme 2018	Companies/enterprises	* Figures for O and P unrealistically low; Q likely to be somewhat underrepresented	LFS 2017 for estimates on NACE O, P and Q	* distribution of NACE O,P,Q estimated on base of LFS data	medium
RS	National Statistical Institute 2016: http://data.stat.gov.rs/Home/Result/190102?languageCode=sr-Latn&displayMode=table&guid=34903484-6d19-4102-b4d6-6d6e39e6d76a https://www.nbs.rs/internet/english/55/55_4/quarter_report_I_18.pdf for units in the banking sector	Companies/enterprises	* The sources does not provide any statistics by size on NACE sections A and K and very low counts for NACE O and Q * No data on size-class 5-9 available (only 0-9 employees)	LFS 2017 for estimates on NACE O, P and Q	* In absence of Eurostat LFS data on Serbia, values for sectors O, P and Q were estimated on base of the total figure given for these sectors in the Serbian national Labour Force Survey (without size indication) * Data for size-class 5-9 for sectors with available company statistics estimated on base of the company figures given for size-class 0-9 (20% of the values) * Data for NACE K taken from statistics on banking units; size distribution estimated	medium to low
SE	SCB (Statistical Office Sweden): Establishmant statistics Arbetsstellen och Sysselsatta, 2017	Establishments/ local units	-	-	-	high
SI	Enterprise statistics of statistical office of Slovenia 2016	Companies/enterprises	NACE O,P,Q probably covered well in company statistics; distributiion of establishments in NACE O,P,Q estimated on this base		* distribution of establishments estimated on base of figures for the distribution of companies; * distribution of NACE O,P,Q estimated on base of company statistics * distribution of size-class 5-9 (all sectors) estimated on base of Ajpes data about distribution of companies	medium
SK	Creditinfo Albertina 2017	Companies/enterprises	-	LFS 2017 for estimates on NACE O, P and Q	* distribution of establishments in NACE O,P,Q estimated on base of LFS data	medium
UK	Interdepartmental Business Register (IDBR) Register of the statistical office	Establishments/ local units	-	-	-	high

Table 43: Statistical sources used for the employee-proportional weighting

Country	Source of statistics for employee- proportional weighting	Short characterisation (summary)
AT	Statistics Austria: Arbeitsstättenzählung 2011 (Census on local units)	national census, though quite outdated
BE	Estimate on base of the (assumed) distribution of establishments; calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
BG	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017 (Official figures on the distribution available from statistical office, but only for level of companies and not for all sectors)	estimate, calibrated
CH	Federal office for statistics Bundesamt für Statistik BFS): STATENT July 2019	official figures, based on statutory register
CY	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017 (Official figures on the distribution available from statistical office, but only for level of companies and not for all sectors)	estimate, calibrated
CZ	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
DE	Establishment panel of the IAB, the research institution of the Federal Agency for Labour's research institute, 2018	based on official figures
DK	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
EE	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
EL	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
ES	Estimate on base of the distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
FI	Estimate on base of the distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
FR	INSEE (National statistical office): Enquete emploi 2018; size-class 50-249 and 250+ estimated on base of INSEE figures for size-classes 50-499 and 500+; calibration on LFS 2017 total of employees in spite of availability of establishment-level statistics for reasons of consistency with ESENER-2 (LFS ca. 1,1 Mio. more employees than enquete d'emploi)	official figures
HR	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
HU	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017 (Official figures on the distribution available from statistical office, but only for level of companies and not for all sectors)	estimate, calibrated
IE	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
IS	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
IT	ISTAT (National Statistical office): Census 2011, for size 5-9 estimates on base of the number of establishments (*average size)	national census
LT	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
LU	Estimate on base of the (assumed) distribution of establishments; no calibration on LFS data because LFS data far too low for LU due to numerous commuters living in neighbouring countries but working in LU	estimate, not calibrated
LV	Central Statistical Bureau of the Republic of Latvia: Employees in local units 2017 (compiled for the project, combines 3 different sources, see comment on statistics on local units)	official figures, based on statutory register entries
MK	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2012	estimate, calibrated
MT	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
NL	Nederlandse Kamers van Koophandel 2019, except for NACE O, P and Q where LFS data were taken	official figures for NACE A-N, R & S, based on statutory register entries; estimate for NACE O, P & Q

Country	Source of statistics for employee- proportional weighting	Short characterisation (summary)
NO	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
PL	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
PT	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
RO	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
RS	Estimate on base of the (assumed) distribution of establishments; not calibrated due to lack of LFS data for Serbia	estimate, not calibrated
SE	SCB (Statistical Office Sweden): Employees in establishments, 2017	official figures, based on statutory register entries
SI	Estimate on base of the (assumed) distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
SK	Estimate on base of the distribution of establishments, calibrated on total of employees 5+ acc. to LFS 2017	estimate, calibrated
UK	UK Business: Activity, size and location 2017	official figures

10 Outcome of the weighting

10.1 Effectiveness of the weighting

The effectiveness is a measure for the deviation of the weighted structures from the unweighted structures: The larger the variance of the weights, the lower the effectivity. The closer to 100% the value for the effectiveness is, the better is the quality of the net sample.

For net samples without any deliberate disproportionality, effectivity rates of 70% or more are usually considered as very good. In samples with deliberate disproportionalities, differences between the unweighted sample structures and the weighted structures are naturally considerably larger. What can be considered as good effectivity values within such a disproportional design is difficult to determine – it largely depends on the degree of the introduced disproportionalities. The size disproportionalities for ESENER-3 are quite large.

In view of these disproportionalities, the average effectivity rate of 71,39% for the establishment proportional weighting is certainly a good value. There are only six countries with an effectivity rate of less than 60% (EL, HR, IE, MT and SK), whereas a number of countries has effectivity rates of more than 80% (BE, CH, IT, NO, SE and UK). The higher effectivity rates as compared to ESENER-2 (59,2% on average) are at least partly attributable to the modified distribution of the net sample, with more small and less large establishments than in ESENER-2.

The exceptionally high effectivity for Norway in the establishment proportional weighting is due to the national sample boost order with 450 additional interviews distributed among the two smallest size-classes only. This boost structure brought the distribution of the Norwegian net sample even closer to the establishment-proportional perspective.

Table 44: Effectiveness of the weighting, by country

Country	Establishment-proportional weighting (estex/estprop)	Employee Proportional weighting (empex/empprop)
	Effectivity	Effectivity
AT	79,06%	54,75%
BE	80,18%	59,75%
BG	73,49%	47,37%
CH	80,20%	61,24%
CY	65,56%	48,02%
CZ	60,00%	44,00%
DE	70,33%	63,03%
DK	77,06%	61,12%
EE	70,58%	46,08%
EL	50,21%	43,51%
ES	78,42%	62,14%
FI	78,66%	65,69%
FR	79,12%	59,71%
HR	57,42%	52,88%
HU	75,75%	41,57%
IE	29,64%	25,64%
IS	60,03%	24,71%
IT	86,59%	51,90%
LT	73,56%	51,85%
LU	73,34%	62,42%
LV	78,85%	38,51%
MK	72,33%	47,12%
MT	50,37%	49,98%
NL	78,40%	44,65%
NO	90,64%	48,48%
PL	79,65%	60,59%
PT	73,77%	51,36%
RO	67,32%	46,62%
RS	71,99%	50,48%
SE	84,45%	61,33%
SI	68,06%	47,44%
SK	56,06%	40,38%
UK	84,63%	46,78%
ALL	**71,39%**	**50,34%**

Effectivity rates for the employee-proportional weighting are somewhat lower, with an average level of about 50,34%. This is a logical consequence of the emphasis on the establishment proportional perspective in the calculation of the target sample structures. It is however surprising that in spite of the modifications in the sample distribution, the effectivity for the employee proportional weighting is not lower than in ESENER-2, but at almost exactly the same average value (50,54% in ESENER-2).

Effectivity rates for the national samples range from a very low 24,71% in Ireland to 65,96% in Finland. The very low effectivity rate in Ireland (in both the establishment and the employee proportional weighting) is a logical consequence of the large sample boost of 1.250 additional interviews allocated exclusively in two NACE sections (I and Q). Not considering these boost interviews (which definitely improve results for the boosted sectors and do not lead to a worsening of results for any other sector), effectivity rates for Ireland would raise considerably.

10.2 Comparison of unweighted and weighted sample structures

A country by country comparison of the weighted sample with the (partly estimated) figures on the universe shows that deviations are minimal for the establishment structures and a bit larger in some cases for the employee proportional structures[53].

In the weighting, compromises have to be found between meeting the structures of the universe as well as possible and the limitation of weighting factors in order not to have too large factors for particular interviews. To this end, a range limitation was applied to the weighting, but factors were in individual cases opened. In the employee proportional weighting, in several cases (single cells defined by size and sector or small sectors) priority was given to the limitation of the weights over the exact match of the extrapolated figures with the universe structures.

10.3 Range of Weights

The range of weights resulting from the weighting procedure is often considered as an additional quality criterion. A large range implies a higher influence of the weighting on the survey data and thus also an enhanced risk that particular establishments whose situation might be not that typical for their size and sector may get too much influence on the results.

Due to the considerable disproportionalities between the sizes of the national samples and the structure of the universe, the absolute figures for the range of weights (from the smallest to the largest factor within the national sample) varies considerably in the internationally comparable weighting factors estex and estprop respectively empex and empprop. For an easier comparison of the national weights, therefore the ratio between the largest and the smallest weighting factor within the country is a more suitable measure for the variance of the weights. The ratio shows how many times higher the largest weight attributed to an interview in the sample is as compared to the lowest weight attributed to an interview.

The measure has to be interpreted with care because only the two extremes (the smallest and the largest factor) are taken into account. These extremes might reflect just a few outliers[54]. We nevertheless show this ratio because it provides an easy illustration of the dimensions to which the weights may vary: The ratio of 74,0 in France means for example that the interview with the largest weight received a weight 74 times as high as the interview(s) with the smallest weight.

The differences between the smallest and largest weights as expressed in these ratios may appear high, but are a result of the disproportionalities by size. Differences between the largest and the smallest weighting factor are much smaller if comparing only weights from the same size-class within a country.

[53] Due to the large size, the tables with the comparison of the extrapolated structures with the figures on the universe are not attached to this report, but delivered separately to EU-OSHA in form of an Excel file.

[54] Though weighting factors were generally limited, in individual cases larger ranges in the factors were taken into account if the structure of the universe otherwise would not have been met sufficiently well.

On the average of all countries, the ratio is however smaller than in ESENER-2, with an average ratio of 77,3 in ESENER-3 for the establishment proportional weighting (117,0 in ESENER-2) and 81,5 in the employee proportional weighting (95,2 in ESENER-2). The highest ratio between the largest and the interview with the smallest attributed establishment-proportional weight can be observed in Switzerland, where this ratio amounts to 351. The lowest ratios are reported for Norway and Sweden, with a value of just above 19. For the employee-proportional perspective, the ratio is highest in Iceland and Ireland (318) and lowest in Poland (27,0).

Table 45: Ratio of largest to smallest weights

Country	Establishment-proportional weighting (estex/estprop) Ratio (Largest factor/ smallest factor)	Employee Proportional weighting (empex/empprop) Ratio (Largest factor/ smallest factor)
AT	85,2	53,8
BE	37,6	99,0
BG	148,4	213,1
CH	64,6	48,1
CY	61,7	241,2
CZ	191,0	298,0
DE	93,7	42,7
DK	67,5	79,2
EE	146,2	253,9
EL	351,1	173,0
ES	95,9	29,5
FI	41,5	78,3
FR	74,0	69,2
HR	159,8	132,6
HU	131,1	256,4
IE	285,3	317,9
IS	52,5	318,0
IT	37,5	99,0
LT	99,5	168,7
LU	47,7	151,0
LV	66,0	78,3
MK	145,1	239,8
MT	82,3	163,5
NL	104,8	171,9
NO	19,2	61,8
PL	33,8	27,0
PT	121,7	243,6
RO	145,6	209,8
RS	66,4	147,8
SE	19,1	67,2
SI	132,1	198,0
SK	194,0	264,0
UK	27,4	76,0
ALL	**77,3**	**81,5**

Within the entire sample with all 33 countries, the range of weight ratios in ESENER-3 is quite high since here, all types of disproportionalities in the sampling (disproportionality by country and size for all countries; disproportionality by sectors for Ireland with its sample boost) and the screening weights (for subsidiaries of multi-site organisations) apply and add up to a large range of factors.

In the overall data-set, the establishment extrapolation weighting factors range from 0,988 to 2.496. This means a ratio of about 2.500 between the largest and the smallest weighting factor. The smallest factor of 0,988 is attributed to 4 interviews from Iceland, a very small country with an estimated universe of just about 5.700 establishments with 5 or more employees. The largest factor of 2.496 is attributed to 5 interviews of the smallest size-class from Germany, the largest country participating in the survey. These huge ratios result from a combination of the weights at the national level with the large country disproportionalities in the sample.

10.4 Comparison of sampling and weighting between ESENER-2 and ESENER-3

Since several questions from ESENER-2 were in an identical form included in ESENER-3 as trend questions, it is useful to know in how far both surveys are comparable as regards the methodology. Therefore, we shortly summarize the differences between both surveys that were already mentioned in

previous chapters and assess their potential impact on the comparability of the data from both survey waves.

Sampling procedure

The general sampling principles were for both surveys basically the same: In both ESENER-2 and ESENER-3, probabilistic samples were drawn in a multi-stratified sampling procedure with targets set for each cell of the sampling matrix. There are however some differences in detail:

- In ESENER-2, samples were distributed as a mix between establishment and employee proportionality, with a method trying to establish the best compromise between both. For ESENER-3, this method was modified so as to give more emphasis on the establishment perspective, at the expense of the accuracy and effectivity of the employee proportional figures.
- In ESENER-2, a fix ratio of 5:1 gross addresses per net interview was issued for the initial sample, with the same ratio of addresses applied to all countries and cells (defined by size and sector). In ESENER-3 the size and the structure of the initial sample was adapted to the results obtained in ESENER-2.

Whether the differences in the drawing of the initial sample led to better sector and size structures in the net sample could not yet be analysed. As regards the calculation of the target sample structures, the shift towards the establishment-proportional perspective is likely to have contributed to the higher effectivity of the establishment-proportional weighting. In terms of comparability between the two survey waves, both modifications in the design do not have a major impact.

Screening

In both survey waves, a screening procedure was applied in order to get an establishment level sample out of company-based address registers wherever no genuine establishment-based sampling frames were available. Some important details of the procedure were however modified:

- In ESENER-2, efforts were made to get two interviews in multi-site organisations of screening countries. The first interview was made with the firstly contacted unit (normally the headquarters), the second interview was made with another randomly selected unit of that organisation.
- In ESENER-3, it was tried to get three instead of two interviews in total from each multi-site organisaion with 6 or more eligible establishments. This change in the method was meant to enhance the number of subsidiaries in the net sample.
- Respondents in ESENER-3 were asked for more information about the structure of the local units (e.g. number of units by size-class). This enabled a more elaborated selection process for subsidiaries in multi-site organisations, leaving less room for discretion for the choice of specific local units on part of the respondents.

The advantages of the refined screening procedure as applied in ESENER-3 were mostly of a theoretical nature. In practice, the more complex and more complicated screening procedure probably contributed to the lower overall number of interviews done with newly taken up addresses. The lower share of interviews from subsidiaries was partly compensated by the application of an entry factor for all subsidiaries in the sample, including those not originating from addresses newly taken up during the survey. In how far the different screening results have an impact on the data comparability depends largely on whether or not there are systematic differences between single-site and multi-site organisations and in particular between headquarters and subsidiaries of multi-site organisations as regards health and safety measures.

Weighting

For ESENER-2, weighting was done with an iterative proportional fitting approach. ESENER-3 in turn used the GREG method for weighting. All other weighting parameters such as the applied weighting matrix (universe figures by country, size and sector) or the methods for best estimates on the universe in screening countries have not been substantially modified. The available quality indicators suggest that for ESENER, the application of the GREG method has actually led to an improvement of the weighting, with a higher effectivity in the establishment-proportional weighting and overall slightly smaller ranges of weights.

As regards the statistics on which the weighting is based, the same basic rules as in ESENER-2 have been applied for the check of statistics and for the elaboration of best estimates on missing values. Nevertheless, a comparison between the weighting structures of ESENER-2 and ESENER-3 show some larger differences in selected countries. The reasons for these differences are manifold: In some cases formerly not obtainable statistics show values that deviate somewhat from the estimates made in ESENER-2 in lack of official data[55]. In many cases, however, the official company statistics have changed quite substantially – be it due to real changes in the economy or due to improvements respectively changes in the statistical mapping of the economy.

In countries where major changes of this type have taken place, these may have a certain (though still moderate) influence on the data, in particular for variables showing large sector or size differences. Overall, the impact of these methodological differences on the comparability of the data is however likely to be moderate only.

[55] There are e.g. countries where now statistics on establishments in size-class 5-9 are available whereas in ESENER-2, their number had to be estimated on base of figures showing the distribution of establishments with 0-9 employees (e.g. including the large group of self-employed persons without employees). In countries showing

11 Data

11.1 Data structure

The data of ESENER-3 are delivered in one integrated SPSS data-set containing the data of all 33 participating countries. All variables and values are labeled in English language.

The data set also contains some additional variables built on base of information from the data-set and aimed at facilitating its use.

11.2 Data processing and cleaning steps

The data collected for ESENER-3 were subject to several checks on technical correctness and consistency:

Check of the pilot survey data on any technical issues

One of the aims of the pilot survey was to test the entire survey infrastructure and to detect any potential problems or mistakes. This also included the live test on the CATI and CAWI scripts and the data files they produce as outputs. In order to detect any possible errors in these, a data checking syntax was programmed and applied to the pilot data-set. The checking syntax alerts e.g. if unforeseen codes appear in the data on a question or if data are missing. There were no such mistakes identified in the analysis of the pilot data.

Check of final scripts with dummy data

Between the pilot survey and the main survey, a number of changes were implemented in the CATI and CAWI scripts. Therefore, the revised CATI and CAWI scripts foreseen for the main fieldwork phase were again subject to thorough tests by both programmers and the coordination team. This included tests with dummy data fed into system in order to analyse the output on the correct storage of the variable and on any potential filtering mistakes. Any issues detected at this stage were corrected before the launch of fieldwork.

Weekly checks of interim data-sets in the main survey phase

Once fieldwork was started, data sets were checked regularly. In the starting phase, these checks were done twice a week, later they were done on a weekly basis. The aim of these checks was again to ensure that no filtering mistakes or other data processing mistakes occurred. There were no such mistakes detected. After the first data-check, EU-OSHA and Kantar did however decide to change the entry filter in Q164a, asking the question to a more establishments from that moment on. Until then, 103 interviews were done that would have received the question with the new filtering, for these Q164a was set to “no answer” (see Table 46: Documentation of data cleaning and editing measures

Due to these checking steps done before and after fieldwork, there was little need for any posterior data-cleaning and corrections. A few interviews were however deleted since it turned out that these were duplicates, done as both a CATI and a CAWI interview. In these cases, the CATI interview was kept and the online interview was excluded from the dataset.

Table 46: Documentation of data cleaning and editing measures

Question No.	Country	Number of concerned interviews	Problem detected	Measure taken
Q164a	several	103	filtering changed after start of fieldwork, question should be asked also for Q100 = 4 (function in establishment: health and safety officer); no filtering mistake, but posterior decision to change the filter	set to 9 "No answer"
Q111, T112	UK	1	sector text missing in open ended question T112	sector set to address info
entire interviews	BE, CH, ES, FI, IE	40	During fieldwork the local team detected in quality checks (listen ins etc.) that some interviews were identified as not analyzable.	excluded from data file, respcode in gross file set to 22
Q254	several	533	filtering changed after start of fieldwork, question should be asked only if Q107=1	set to missing
Q102, size	CH, LU, IS	3	In some sample cells of these countries,the number of interviews was too low for weighting; besides, the display of these data would have cause data protection issues	interviews from the concerned cells (250+) were set to the next smaller size-class

11.3 Coding of sector corrections

The only open question in the ESENER-3 questionnaire was Q110, asking for a description of the sector of activity in those cases where the sector attribution of the address source was considered incorrect (Q108=2 or 9) and where the online sector coding tool in Q109 did not lead to the identification of a new sector.

After completion of fieldwork, the sector coding was done centrally at Kantar Public in Munich by a team of trained coding specialists. To this end, the sector description verbatims were extracted from the dataset and sent to a professional translation agency or to native speakers of the respective language at Kantar for translation into German language. The translation into German was necessary because Kantar maintains computer-aided tools that help to alleviate the coding process by pre-selecting verbatims into the appropriate sector category by using key words. These tools were programmed by Kantar in Munich and are not available in English.

For all 940 cases for which respondents provided a description on the sector of activity for posterior coding (Q110), the ex-post sector coding led to valid sector codes at the NACE Rev.2 2-digit level (NACE divisions). For 383 interviews (41% of the manually coded interviews), the code turning out after the manual coding of the open answers of respondents was however identical with the code from the sampling frame considered as wrong by them.

Table 47: Results of the coding of the verbatims on the sector correction

Number of interviews	in absolute figures	in %
Number of interviews/sector descriptions to be coded	4.302	100,0%
Base for the sector coding		
Sector tool included in the CATI/CAWI script (Q109) leads to the same NACE Rev.2 2-digit code as indicated in the address source	724	16,8%
Sector tool included in the CATI/CAWI script (Q109) leads to a different code at the NACE Rev.2 2-digit level	2.638	61,3%
Coding of open answer leads to the same NACE Rev.2 2-digit code as indicated in address source	383	8,9%
Coding of open answer corrected at the NACE Rev.2 2-digit level	557	12,9%

11.4 Hints on specific variables

Q102: Number of employees on the payroll of the establishment

Though this question was asked as numerical question, for reasons of data-protection the number of employees can be delivered only in a summarized form as size-classes (5-9, 10-49, 50-249 and 250+ employees). The definition of size-classes as used for sampling, weighting and cross-tabulations is based on this variable (Q102), i.e. it includes only employees on the payroll of the establishment.

Sector variables

The data-set contains 3 different sector variables:

- Sectorgrp:
  This sector variable reflects the sector summarizing of the 32-cell matrix used for the steering of fieldwork.
- Nace1_16:
  This sector variable shows sectors on the level of the NACE Rev.2 1-digit level. For reasons of data protection, very small sectors are summarized in this variable so that the variable does not differentiate all relevant 19 NACE 1-digit categories, but only 16 categories. This variable is the finest sector differentiation that can be made available to researchers outside of EU-OSHA. The following NACE sections are summarized here:
  - Sectors B, D and E were summarized to a sector group B D E
  - Sectors K and L were summarized to a sector group K L
- Nace1:
  This variable contains the full differentiation into 19 NACE Rev. 2 categories (sections). For reasons of data protection, it is available only to the researchers of EU-OSHA.
- Nace2:
  This variable contains the full differentiation into 85 NACE Rev. 2 categories (divisions). It is available only to the researchers of EU-OSHA. For reasons of data protection, it may not be made available for any external researchers.

For the analysis of country results by individual sizes and/or sectors, we strongly advise to check the number of net interviews per cell beforehand. For small sectors in small countries, the number of interviews within a cell (defined by sector and/or size-class) is often too small as to allow for any generalization on this basis. If at all, in these cases only results for the entire sector should be analysed, without differentiation by size-classes.

Q350_1 to Q350_4:

Question Q350_1 to Q350_4 contains country-specific terminology of different forms of employee representation. These terms were not translated by translators, but were provided by national health and safety experts within the respective country.

11.5 Newly calculated variables

The data-set includes a number of newly created variables meant to facilitate the use of the data-set. Some of these variables were also used for the analyses in the Technical Report and the Quality Report. All newly created variables from the data-set are documented in the table below, including the SPSS syntax with which they were created.

Table 48: List of newly created variables in the data-set, incl. SPSS syntax

Name of the new variable	Description	Syntax (used with statistical software SPSS)
EU28	Variable differentiating between EU member states and non-member states	comp eu28=0. if any (countrystr,"at","be","bg","cy","cz","dk","de","ee","ie","el","es","fi","fr","hr","hu","it","lv","lt","lu", "mt","nl","pl","pt","ro","se","si","sk","uk") eu28=1. var lab eu28 "EU member states". val lab eu28 0 "no" 1 "yes".
EU27	Variable differentiating between EU member states and non-member states	comp eu27=0. if any (countrystr,"at","be","bg","cy","cz","dk","de","ee","ie","el","es","fi","fr","hr","hu","it","lv","lt","lu", "mt","nl","pl","pt","ro","se","si","sk") eu27=1. var lab eu27 "EU member states". val lab eu27 0 "no" 1 "yes".
entry	Variable reflects the entry into the interview	comp entry=0. if q001>0 and online=0 entry=1. if q001>0 and online=1 entry=2. if q002>0 and online=0 entry=3. if q002>0 and online=1 entry=4. if q020>0 and online=0 entry=5. if q020>0 and online=0 and q002>0 entry=6. if q020>0 and online=1 entry=7. if q020>0 and online=1 and q002>0 entry=8. var lab entry "Interview entry". val lab entry 1 "Q001: cati" 2 "Q001: cawi" 3 "Q002: 2nd/3rd cati interview" 4 "Q002: 2nd/3rd cawi interview" 5 "Q020: cawi recalls cati interview" 6 "Q020: 2nd/3rd cawi recalls cati interview" 7 "Q020: cawi recalls cawi interview" 8 "Q020: 2nd/3rd cawi recalls cawi interview".
Q051	Q051 grouped	recode q051 (5 thru 9=1) (10 thru 49=2) (50 thru 249=3) (250 thru 998=4) (999=9) into q051gr. var lab q051gr 'Number of employees in the company'. val lab q051gr 1 '5 to 9' 2 '10 to 49' 3 '50 to 249' 4 '250+' 9 'NA'.
Q052	Q052 grouped	recode q052 (1=1) (2=2) (3 thru 9=3) (10 thru 998=4) into q052gr. var lab q052gr 'Establishments with 5 or more employees'. val lab q052gr 1 '1' 2 '2' 3 '3 to 9' 4 '10+'.
Q055	Q055a to Q055i integrated	comp Q055=$sysmis. if any(1,Q055a,Q055b,Q055c,Q055d,Q055e,Q055f,Q055g,Q055h,Q055i) q055=1. if any(2,Q055a,Q055b,Q055c,Q055d,Q055e,Q055f,Q055g,Q055h,Q055i) q055=2. if any(9,Q055a,Q055b,Q055c,Q055d,Q055e,Q055f,Q055g,Q055h,Q055i) q055=9. var lab q055 'Screening: Telephone number of second/third establishment provided'. val lab q055 1 'Information about additional respondent obtained' 2 'Ask again at the end of the interview' 9 'Refused'.

Q113	Q113_1 to Q113_9 transformed into a single-punch question with the following categories:
	1 "owner of a firm, managing director, site manager" (Q113_1,2=1)
	2 "Manager without specific OSH tasks" (Q113_3=1 and Q113_1,2,4,5,6,7 not 1)
	3 "Manager with specific OSH tasks" (Q113_3=1 and Q113_4,5,6=1 and Q113_1,2,7 not 1)"
	4 "OSH specialist without managerial function" (Q113_4=1 and Q113_1,2,3,5,7 not 1)
	5 "Employee representative in charge of OSH" (Q113_5=1 and Q113_1,2,3,7 not 1)
	6 "Another employee in charge of the subject" (Q113_6=1 and Q113_1,2,3,4,5,7 not 1)
	7 "External OSH consultant (Q113_7=1 and Q113_1,2,3,4,5,6 not 1)
	9 "no answer" (Q113_9=1)
		comp Q113=0.
		if any(1,Q113_1,Q113_2) Q113=1.
		do if Q113=0 and Q113_3=1.
		  if any(1,Q113_4,Q113_5,Q113_6) Q113=3.
		  if not any(1,Q113_4,Q113_5,Q113_6) Q113=2.
		end if.
		do if Q113=0.
		  if Q113_4=1 and not Q113_5=1 Q113=4.
		end if.
		do if Q113=0.
		  if Q113_5=1 Q113=5.
		end if.
		do if Q113=0.
		  if Q113_6=1 and not any(1,Q113_4,Q113_5) Q113=6.
		end if.
		do if Q113=0.
		  if Q113_7=1 Q113=7.
		end if.
		do if Q113=0.
		  if Q113_9=1 Q113=9.
		end if.

Q100all	Q050 and Q100 integrated (identical questions; Q050 asked to screening countries, Q100 to non-screening countries)	recode q050 (1=1) (2=2) (8 9=9) into q100all. recode q100 (1=1) (2=2) (8 9=9) into q100all. var lab q100all 'Q050+Q100: Single organisation or one of several establishments'. val lab q100all 1 'A single company or organisation' 2 'One of a number of different establishments' 9 'Don`t know/No answer'.
Q101all	Q101a and Q101b integrated (identical questions; Q101a asked to non-screening countries, Q101b to screening countries)	comp q101all=$sysmis. if q101a>0 q103all=q101a. if q101b>0 q103all=q101b. var lab q101all 'Q101a+Q101b: Is this the headquarters or is it a subsidiary site?'. val lab q101all 1 'Headquarters' 2 'Subsidiary site' 9 'No answer'.
Q102gr	Q102 grouped	recode q102 (5 thru 9=1) (10 thru 19=2) (20 thru 49=3) (50 thru 99=4) (100 thru 149=5) (150 thru 249=6) (250 thru 999998=7) into q102gr. var lab q102gr 'People working at this establishment'. val lab q102gr 1 '5-9' 2 '10-19' 3 '20-49' 4 '50-99' 5 '100-149' 6 '150-249' 7 '250+'.

Name of the new variable	Description	Syntax (used with statistical software SPSS)
Q112gr	q112 and q112x integrated	recode q112 (0 thru 1989=1) (1990 thru 2015=2) (2016 thru 2019=3) (9999=9) into q112gr. if q112=9998 q112gr=q112x. var lab q112gr 'Founding year of the establishment'. val lab q112gr 1 'Before 1990' 2 '1990 to 2015' 3 'After 2015' 9 'No answer'.
Q164all	Q164a and Q164b integrated (basically the same questions; Q164b asked to owners or managing directors etc. of an establishment, Q164 to other types of respondents)	comp q164all=$sysmis. if q164a>0 q164all=q164a. if q164b>0 q164all=q164b. var lab q164all 'Training recieved on health and safety'. val lab q164all 1 'Yes' 2 'No' 9 'No answer'.
Q256gr	Q256 grouped	recode q256 (lo thru 2014=1) (2015=2) (2016=3) (2017=4) (2018=5) (2019=6) (9998=8) (9999=9) into q256gr. var lab q256gr 'Year of last risk assessment'. val lab q256gr 1 'before 2015' 2 '2015' 3 '2016' 4 '2017' 5 '2018' 6 '2019' 8 'don´t know' 9 'no answer'.
Q303all	Q303a and Q303b integrated (basically the same questions; Q303a asked to establishments with at least 20 employees, Q303b to establishments with less than 20 employees)	comp q303all =$sysmis. if q303a>0 q303all=q303a. if q303b>0 q303all=q303b. var lab q303all 'Work related stress has been identified'. val lab q303all 1 'Yes' 2 'No' 9 'No answer'.

11.6 Margin of error

The following table shows the margin of statistical error to expected for the ESENER-3 net sample and different sub-samples. The confidence interval for the entire data-set is at just 0,4% respectively 0,5%, depending on the distribution of answers on a question. For the national samples, the confidence intervals are considerably larger.

Table 49: Margin of error

Size of the (sub-) sample (n =)	Percentage	Standard error s.e.	Confidence interval c.i. (95%)	Range	
				min	max
n=100	80,0%	4,0%	7,9%	72,1%	87,9%
n=450	80,0%	1,9%	3,7%	76,3%	83,7%
n=750	80,0%	1,5%	2,9%	77,1%	82,9%
n=1.000	80,0%	1,3%	2,5%	77,5%	82,5%
n=1.500	80,0%	1,0%	2,0%	78,0%	82,0%
n=2.250	80,0%	0,8%	1,7%	78,3%	81,7%
n=5.000	80,0%	0,6%	1,1%	78,9%	81,1%
n=20.000	80,0%	0,3%	0,6%	79,4%	80,6%
n=45.000	80,0%	0,2%	0,4%	79,6%	80,4%
n=100	50,0%	5,0%	9,8%	40,2%	59,8%
n=450	50,0%	2,4%	4,6%	45,4%	54,6%
n=750	50,0%	1,8%	3,6%	46,4%	53,6%
n=1.000	50,0%	1,6%	3,1%	46,9%	53,1%
n=1.500	50,0%	1,3%	2,5%	47,5%	52,5%
n=2.250	50,0%	1,1%	2,1%	47,9%	52,1%
n=5.000	50,0%	0,7%	1,4%	48,6%	51,4%
n=20.000	50,0%	0,4%	0,7%	49,3%	50,7%
n=45.000	50,0%	0,2%	0,5%	49,5%	50,5%

12 Annexes

Annex 1 – Non-response reasons by country, absolute (hierarchical)

Table 50: ESENER-3 outcome codes by country, numerical

	Total	Country										
		AT	BE	BG	CH	CY	CZ	DE	DK	EE	EL	ES
1 No answer	**26.165**	1.481	138	648	276	323	7.036	625	511	132	451	2.454
2 Answer device	**17.621**	935	797	47	452	97	925	1.315	266	36	231	1.574
3 Busy	**6.482**	28	127	272	65	18	503	402	93	42	263	307
4 Information tone - Fax - Modem	**13.633**	45	632	111	16	117	1.505	303	166	114	418	1.390
5 Wrong telephone number	**34.870**	242	403	1.164	344	776	4.437	1.153	1.054	63	477	6.002
6 General appointment	**51.851**	1.025	954	447	489	421	4.726	10.213	1.331	127	1.343	2.703
7 Definitive appointment with target person	**11.689**	779	172	27	560	30	1.120	613	330	50	341	722
8 Refusal by target person	**36.857**	2.154	518	198	177	878	4.028	5.252	329	122	1.019	2.902
9 Refusal by contact person/reception (upfront refusal)	**114.583**	5.628	1.748	2.409	857	1.085	17.898	17.606	1.244	379	3.196	9.405
13 No establishment at this address (private household etc.)	**6.813**	35	101	127	3	295	531	714	85	23	97	1.219
14 Inactive establishment, terminated	**4.365**	82	47	140	32	198	247	1.126	53	33	63	146
17 Already questioned (double address)	**1.950**	10	110	21	12	118	268	28	104	4	16	141
18 Complete CATI interview	**43.254**	1.457	1.428	730	1.448	724	1.016	2.184	1.392	713	1.498	2.163
21 Stratification maximum reached (cell full)	**3.119**	83	129	32	40	22	78	42	178	105	294	107
22 complete, but unanalyzable	**38**	0	1	0	1	0	0	0	0	0	0	22
34 Refusal - add number to DO NOT CALL LIST	**8.075**	36	26	50	1	36	202	76	197	6	86	240
35 Partial interview, to be called back	**1.361**	8	33	85	4	14	21	17	20	0	88	76
36 Partial interview, not to call back	**1.301**	79	31	91	9	32	81	94	9	2	64	124
37 No appointment with target person possible during fieldwork time and period	**8.037**	833	109	24	1	26	836	498	213	24	79	1.331
38 Target person does not speak proposed languages	**1.296**	40	136	10	15	35	115	156	48	5	7	66
42 Size out of target (less than 5 employees or NA in Q105)	**24.220**	673	516	504	853	1.218	1.036	5.263	350	255	542	1.654
43 Refusal to give information in Q111, Q112 (sector information)	**22**	4	1	1	1	1	0	0	0	0	0	1
44 No single establishment with 5 or more employees (Q051=0)	**172**	0	0	2	0	9	5	0	0	10	23	0
45 Size of first contact out of scope but interview possible at subsidiary (screening countries)	**29**	0	0	0	0	1	1	0	0	1	3	0
46 Interview terminated after screening phase, not to call back	**22**	0	0	0	0	0	3	0	0	0	1	0
51 Online invitation with no result	**11.820**	125	523	195	275	216	2.531	544	494	128	70	1.018
52 Complete CAWI interview	**2.166**	46	78	25	54	33	536	80	121	45	3	103
53 Online interview rejected due to quality reasons	**376**	7	12	5	12	6	96	19	13	7	0	17
56 No adequate target person at the establishment	**14.124**	304	380	11	135	265	1.880	1.489	250	8	16	2.362
58 Online refusal	**584**	8	27	8	21	22	145	20	30	5	2	28
Total	**446.895**	**16.147**	**9.177**	**7.384**	**6.153**	**7.016**	**51.806**	**49.832**	**8.881**	**2.439**	**10.691**	**38.277**

	Country										
	FI	FR	HR	HU	IE	IS	IT	LT	LU	LV	MK
1 No answer	624	93	479	1.900	364	122	1.025	170	134	107	129
2 Answer device	136	1.070	57	354	553	38	305	21	61	2	29
3 Busy	33	111	352	322	65	18	164	44	280	5	4
4 Information tone - Fax - Modem	10	420	215	430	35	1	400	64	9	113	7
5 Wrong telephone number	325	1.213	234	3.132	208	236	1.441	191	265	82	60
6 General appointment	900	3.419	935	571	3.065	259	1.578	645	346	585	118
7 Definitive appointment with target person	187	401	250	742	724	71	1.219	120	79	244	13
8 Refusal by target person	595	950	132	870	290	263	581	127	236	160	34
9 Refusal by contact person/reception (upfront refusal)	1.177	2.967	2.957	2.663	349	318	6.289	606	891	624	85
13 No establishment at this address (private household etc.)	48	134	97	393	18	3	128	69	72	77	43
14 Inactive establishment, terminated	139	75	25	68	18	66	31	73	71	186	23
17 Already questioned (double address)	52	34	27	50	11	38	105	18	224	13	16
18 Complete CATI interview	1.460	2.211	722	1.475	1.986	739	2.231	733	604	734	741
21 Stratification maximum reached (cell full)	124	53	45	67	144	72	109	17	27	43	33
22 complete, but unanalyzable	13	0	0	0	1	0	0	0	0	0	0
34 Refusal - add number to DO NOT CALL LIST	29	290	181	846	439	70	34	9	105	9	4
35 Partial interview, to be called back	9	46	13	36	394	1	28	3	4	3	2
36 Partial interview, not to call back	7	67	18	54	31	6	57	4	2	8	8
37 No appointment with target person possible during fieldwork time and period	162	970	53	42	7	46	441	162	9	5	13
38 Target person does not speak proposed languages	28	37	2	46	4	22	25	31	33	2	2
42 Size out of target (less than 5 employees or NA in Q105)	543	616	172	273	375	218	322	112	411	340	92
43 Refusal to give information in Q111, Q112 (sector information)	0	1	0	0	0	0	1	0	0	0	0
44 No single establishment with 5 or more employees (Q051=0)	0	0	9	17	0	4	0	4	0	2	12
45 Size of first contact out of scope but interview possible at subsidiary (screening countries)	0	0	3	2	0	3	0	1	0	1	1
46 Interview terminated after screening phase, not to call back	0	0	3	2	0	0	0	2	0	0	0
51 Online invitation with no result	220	514	104	463	98	40	197	138	408	97	71
52 Complete CAWI interview	45	40	18	29	13	14	20	21	169	22	11
53 Online interview rejected due to quality reasons	9	8	1	3	1	6	2	4	40	3	4
56 No adequate target person at the establishment	108	435	10	913	92	19	23	114	151	82	6
58 Online refusal	10	9	0	28	3	0	9	4	16	8	2
Total	**6.993**	**16.184**	**7.114**	**15.791**	**9.288**	**2.693**	**16.765**	**3.507**	**4.647**	**3.557**	**1.563**

	Country										
	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	UK
1 No answer	114	396	192	1.688	298	2.759	236	295	365	410	190
2 Answer device	88	448	2.285	1.180	169	2.705	12	288	65	577	503
3 Busy	14	55	956	489	20	982	60	51	80	188	69
4 Information tone - Fax - Modem	37	205	67	2.749	251	184	19	118	93	3.346	43
5 Wrong telephone number	521	1.742	2.101	1.433	341	701	719	466	277	2.141	926
6 General appointment	452	1.147	2.582	1.844	1.563	1.308	233	1.895	326	1.106	3.195
7 Definitive appointment with target person	19	298	584	194	61	466	109	428	210	87	439
8 Refusal by target person	143	2.000	771	2.114	383	2.231	59	248	241	6.137	715
9 Refusal by contact person/reception (upfront refusal)	465	4.692	3.934	10.904	1.802	3.255	260	1.415	1.404	4.891	1.180
13 No establishment at this address (private household etc.)	117	182	107	1.095	83	476	96	5	47	172	121
14 Inactive establishment, terminated	149	32	184	328	58	165	31	122	25	222	107
17 Already questioned (double address)	67	31	58	34	45	35	25	69	13	103	50
18 Complete CATI interview	439	1.226	1.922	2.237	1.454	1.494	742	1.424	988	692	2.247
21 Stratification maximum reached (cell full)	11	319	25	175	121	75	129	65	23	0	332
22 complete, but unanalyzable	0	0	0	0	0	0	0	0	0	0	0
34 Refusal - add number to DO NOT CALL LIST	59	230	854	436	23	902	58	372	13	1.254	902
35 Partial interview, to be called back	13	2	10	25	24	40	1	8	5	27	301
36 Partial interview, not to call back	14	33	42	81	56	38	3	1	14	54	87
37 No appointment with target person possible during fieldwork time and period	13	277	1.209	132	116	72	84	53	4	181	12
38 Target person does not speak proposed languages	10	49	187	18	21	46	0	41	9	40	10
42 Size out of target (less than 5 employees or NA in Q105)	297	1.373	1.089	1.625	575	341	358	435	59	482	1.248
43 Refusal to give information in Q111, Q112 (sector information)	1	3	2	1	0	0	2	0	0	2	0
44 No single establishment with 5 or more employees (Q051=0)	10	0	0	0	40	8	8	0	7	2	0
45 Size of first contact out of scope but interview possible at subsidiary (screening countries)	3	0	0	0	8	0	0	0	1	0	0
46 Interview terminated after screening phase, not to call back	0	0	0	0	2	1	3	0	0	5	0
51 Online invitation with no result	93	1.179	98	214	249	108	71	364	286	559	130
52 Complete CAWI interview	14	295	29	13	39	6	9	88	79	64	4
53 Online interview rejected due to quality reasons	5	39	9	1	7	1	2	12	10	14	1
56 No adequate target person at the establishment	86	331	262	147	1.423	487	35	118	2	1.612	568
58 Online refusal	3	71	6	6	7	8	9	15	12	33	9
Total	**3.257**	**16.655**	**19.565**	**29.163**	**9.239**	**18.894**	**3.373**	**8.396**	**4.658**	**24.401**	**13.389**

Annex 2 – Multivariate regression models to analyse mode effects in the ESENER-3 dataset

Table 51: Mode effect regression model 1 : Risk assessments

Dependent variable: Workplace risk assessments regularly carried out ("yes" to Q250)

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to carry out risk assess. - : less likely to carry out risk assess.	Degree/extent of the correlation (odds ratio)
Interview Mode (Reference: CATI)			
CAWI	***	-	0,797
Country (Reference: United Kingdom)			
Austria	***	-	0,161
Belgium	***	-	0,240
Bulgaria	-		
Croatia	***	-	0,576
Cyprus	***	-	0,094
Czech Republic	***	-	0,344
Denmark	-		
Estonia	***	-	0,400
Finland	***	-	0,509
France	***	-	0,228
Germany	***	-	0,232
Greece	***	-	0,151
Hungary	***	-	0,594
Iceland	***	-	0,131
Ireland	***	-	0,506
Italy	***	+	1,553
Latvia	-		
Lithuania	***	-	0,186
Luxembourg	***	-	0,095
Macedonia	***	-	0,131
Malta	***	-	0,325
Netherlands	***	-	0,553
Norway	***	-	0,556
Poland	***	-	0,590
Portugal	***	-	0,498
Romania	-		
Serbia	*	-	0,705
Slovakia	***	-	0,210
Slovenia	-		
Spain	***	+	1,600
Sweden	*	-	0,760
Switzerland	***	-	0,091
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	***	+	1,277
size_3 (50 to 249 employees)	***	+	1,908
size_4 (250 or more employees)	***	+	2,855
Sector group (Reference: Sector_4 = NACE G,H,I,R)			
NACE A	*	+	1,291
NACE B, D, E, F	***	+	1,581
NACE C	***	+	1,428
NACE J, K, L, M, N, S	***	-	0,823
NACE O	***	-	0,714
NACE P, Q	***	+	1,234

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to carry out risk assess. - : less likely to carry out risk assess.	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	**	-	0,930
Manager with OSH duties	***	+	1,270
OSH specialist	***	+	1,935
Employee representative in charge of OSH	-		
Another employee in charge of OSH	*	-	0,904
External OSH consultant	*	+	2,244
Ownership type (Q111; Reference: Not public)			
Public organisation	***	-	0,863
NA ownership type	-		
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	***	+	1,310
OSH experts (Q151_3 to _5; Reference: None of these OSH expert types available in the establishment)			
OSH expertise available	***	+	2,525
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	-		
Economic situation neither good nor bad	***	-	0,851
Quite bad economic situation	***	-	0,780
Very bad economic situation	-		
NA economic situation	***	-	0,738
Employee representation in terms of OSH (Q350_1 to 4; Reference: non-existence of the respective position/body of representation)			
General ER (works council or trade union)	***	+	1,268
Health and safety representation (OSH representative or co	***	+	2,064
Risk profile (Reference: 0 risks of the respective type; numerical; odds ratio per risk)			
"Traditional" health and safety risks (Q200_1 to _10)	***	+	1,127
Pschosocial risks (Q201_1 to _7)	***	-	0,894
Visit from labour inspectorate (Q154; Reference: not visited in last 3 years)			
Visited	***	+	1,590
NA Labour inspectorate visit	***	-	0,788
Dependent variable: Workplace risk assessments regularly carried out ("yes" to Q250)			

Table 52: Mode effect regression model 2 : Employee training on usage of equipment

Dependent variable: Employee training on proper usage of workplace equipment ("yes" to Q355_1)

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to provide such training - : less likely to provide such training	Degree/extent of the correlation (odds ratio)
Interview Mode (Reference: CATI)			
CAWI	***	-	0,658
Country (Reference: United Kingdom)			
Austria	***	-	0,509
Belgium	***	-	0,354
Bulgaria	***	-	0,410
Croatia	***	-	0,496
Cyprus	***	-	0,449
Czech Republic	***	-	0,340
Denmark	***	-	0,524
Estonia	***	-	0,422
Finland	***	-	0,698
France	***	-	0,164
Germany	***	-	0,450
Greece	***	-	0,621
Hungary	***	-	0,453
Iceland	***	-	0,498
Ireland	***	+	1,492
Italy	-		
Latvia	***	-	0,392
Lithuania	***	-	0,282
Luxembourg	***	-	0,293
Macedonia	***	-	0,423
Malta	***	-	0,578
Netherlands	***	-	0,285
Norway	-		
Poland	***	-	0,220
Portugal	***	-	0,605
Romania	***	-	0,214
Serbia	**	-	0,733
Slovakia	***	-	0,461
Slovenia	-		
Spain	-		
Sweden	***	-	0,567
Switzerland	***	-	0,484
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	*	+	1,057
size_3 (50 to 249 employees)	**	+	1,112
size_4 (250 or more employees)	***	+	1,463
Sector group (Reference: Sector_4 = NACE G,H,I,R)			
NACE A	-		
NACE B, D, E, F	-		
NACE C	**	+	1,108
NACE J, K, L, M, N, S	-		
NACE O	-		
NACE P, Q	***	-	0,745

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to provide such training - : less likely to provide such training	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	**	-	**0,917**
Manager with OSH duties	-		
OSH specialist	-		
Employee representative in charge of OSH	*	-	**0,895**
Another employee in charge of OSH	***	-	**0,849**
External OSH consultant	-		
Ownership type (Q111; Reference: Not public)			
Public organisation	***	-	**0,854**
NA ownership type	-		
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	-		
OSH experts (Q151; Reference: None of the mentioned OSH expert types available in the establishment)			
OSH expertise available	***	+	**1,828**
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	*	-	**0,935**
Economic situation neither good nor bad	***	-	**0,821**
Quite bad economic situation	***	-	**0,648**
Very bad economic situation	*	-	**0,751**
NA economic situation	***	-	**0,763**
Employee representation in terms of OSH (Q350_1 to 4; Reference: non-existence of the respective position/body of representation)			
General ER (works council or trade union)			
Health and safety representation (OSH representative or con	***	+	**2,064**
Risk profile (Reference: 0 risks of the respective type; numerical; odds ratio per risk)			
Risk_tard (Q200_1 to _9)	***	+	**1,127**
Risk_psycho (Q201_1 to _7)	***	-	**0,960**
Visit from labour inspectorate (Q154; Reference: not visited in last 3 years)			
Visited	***	+	**1,221**
NA Labour inspectorate visit	-		
Dependent variable: Employee training on the use and adjustment of their working equipment and furniture ("yes" to Q355_1)			

Table 53: Mode effect regression model 3: Employee training on the prevention of PSR

Dependent variable: Employee training on the prevention of psycho-social risks ("yes" to Q355_3)

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to provide such training - : less likely to provide such training	Degree/extent of the correlation (odds ratio)
Interview Mode (Reference: CATI)			
CAWI	***	-	0,839
Country (Reference: United Kingdom)			
Austria	***	-	0,445
Belgium	***	-	0,471
Bulgaria	***	-	0,410
Croatia	***	-	0,404
Cyprus	***	-	0,442
Czech Republic	***	-	0,290
Denmark	***	-	0,573
Estonia	***	-	0,466
Finland	***	-	0,693
France	***	-	0,480
Germany	***	-	0,371
Greece	***	-	0,689
Hungary	***	-	0,642
Iceland	**	-	0,775
Ireland	*	-	0,862
Italy	-		
Latvia	*	-	0,817
Lithuania	***	-	0,498
Luxembourg	***	-	0,349
Macedonia	***	-	0,571
Malta	***	-	0,503
Netherlands	***	-	0,458
Norway	***	-	0,773
Poland	***	-	0,805
Portugal	***	-	0,654
Romania	***	-	0,664
Serbia	***	-	0,768
Slovakia	***	-	0,397
Slovenia	-		
Spain	-		
Sweden	***	-	0,776
Switzerland	***	-	0,471
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	-		
size_3 (50 to 249 employees)	-		
size_4 (250 or more employees)	***	+	1,398
Sector group (Reference: Sector_4 = NACE G,H,I,R)			
NACE A	***	-	0,799
NACE B, D, E, F	***	-	0,703
NACE C	***	-	0,768
NACE J, K, L, M, N, S	***	+	1,161
NACE O	***	+	1,179
NACE P, Q	***	+	2,154

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to provide such training - : less likely to provide such training	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	-		
Manager with OSH duties	-		
OSH specialist	-		
Employee representative in charge of OSH	-		
Another employee in charge of OSH	***	-	**0,897**
External OSH consultant	-		
Ownership type (Q111; Reference: Not public)			
Public organisation	***	+	**1,109**
NA ownership type	-	-	**0,998**
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	***	+	**1,251**
OSH experts (Q151; Reference: None of the mentioned OSH expert types available in the establishment)			
OSH expertise available	***	+	**1,645**
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	***	-	**0,839**
Economic situation neither good nor bad	***	-	**0,712**
Quite bad economic situation	***	-	**0,643**
Very bad economic situation	***	-	**0,520**
NA economic situation	***	-	**0,747**
Employee representation in terms of OSH (Q350_1 to 4; Reference: non-existence of the respective position/body of representation)			
General ER (works council or trade union)			
Health and safety representation (OSH representative or con	***	+	**2,064**
Risk profile (Reference: 0 risks of the respective type; numerical; odds ratio per risk)			
Risk_tard (Q200_1 to _9)	-		
Risk_psycho (Q201_1 to _7)	***	+	**1,044**
Visit from labour inspectorate (Q154; Reference: not visited in last 3 years)			
Visited	***	+	**1,218**
NA Labour inspectorate visit	*	+	**1,118**
Dependent variable: Training on how to prevent psychosocial risks such as stress or bullying ("yes" to Q355_3)			

Table 54: Mode effect regression model 4: Discussion of OSH impacts of new technologies

Dependent variable: Possible impacts of new technologies on health and safety of employees discussed? (Q311 = "yes")

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to discuss OSH impacts - : less likely to discuss OSH impacts	Degree/extent of the correlation (odds ratio)
Interview Mode (Reference: CATI)			
CAWI	***	-	0,814
Country (Reference: United Kingdom)			
Austria	***	-	0,362
Belgium	***	-	0,637
Bulgaria	***	-	0,738
Croatia	***	-	0,367
Cyprus	***	-	0,356
Czech Republic	***	-	0,670
Denmark	***	-	0,487
Estonia	***	-	0,490
Finland	***	-	0,344
France	***	-	0,428
Germany	***	-	0,442
Greece	***	-	0,339
Hungary	***	+	3,078
Iceland	***	-	0,394
Ireland	*	-	0,842
Italy	***	-	0,378
Latvia	**	+	1,287
Lithuania	***	-	0,293
Luxembourg	***	-	0,396
Macedonia	*	-	0,782
Malta	*	-	0,768
Netherlands	*	-	0,840
Norway	***	-	0,392
Poland	***	-	0,647
Portugal	***	-	0,721
Romania	-		
Serbia	***	-	0,295
Slovakia	***	-	0,391
Slovenia	***	-	0,398
Spain	*	-	0,868
Sweden	-		
Switzerland	***	-	0,470
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	-		
size_3 (50 to 249 employees)	-		
size_4 (250 or more employees)	***	+	1,352
Sector group (Reference: Sector_4 = NACE G,H,I,R)			
NACE A	-		
NACE B, D, E, F	*	-	0,900
NACE C	-		
NACE J, K, L, M, N, S	***	+	1,425
NACE O	*	+	1,141
NACE P, Q	***	+	1,414

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to discuss OSH impacts - : less likely to discuss OSH impacts	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	-	+	1,009
Manager with OSH duties	***	+	1,168
OSH specialist	***	+	1,122
Employee representative in charge of OSH	-		
Another employee in charge of OSH	-		
External OSH consultant	-		
Ownership type (Q111; Reference: Not public)			
Public organisation	-		
NA ownership type	*	+	1,426
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	***	+	1,154
OSH experts (Q151; Reference: None of the mentioned OSH expert types available in the establishment)			
Expertise	***	+	1,403
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	***	-	0,832
Economic situation neither good nor bad	***	-	0,666
Quite bad economic situation	***	-	0,653
Very bad economic situation	***	-	0,499
NA economic situation	***	-	0,735
Employee representation in terms of OSH (Q350_1 to 4; Reference: non-existence of the respective position/body of representation)			
General ER (works council or trade union)			
Health and safety representation (OSH representative or con	***	+	2,064
Risk profile (Reference: 0 risks of the respective type; numerical; odds ratio per risk)			
Risk_tard (Q200_1 to _9)	***	+	1,031
Risk_psycho (Q201_1 to _7)	***	+	1,040
Visit from labour inspectorate (Q154; Reference: not visited in last 3 years)			
Visited	***	+	1,135
NA Labour inspectorate visit	-		
Dependent variable: Possible impacts of new technologies on health and safety of employees discussed? (Q311 = "yes")			

Table 55: Mode effect regression model 5: Existence of an action plan on work-related stress

Dependent variable: Existence of an action plan to prevent work-related stress (Q300 = "yes")

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to have an action plan - : less likely to have an action plan	Degree/extent of the correlation (odds ratio)
Interview Mode (Reference: CATI)			
CAWI	-		
Country (Reference: United Kingdom)			
Austria	***	-	0,226
Belgium	***	-	0,411
Bulgaria	***	-	0,116
Croatia	***	-	0,063
Cyprus	***	-	0,140
Czech Republic	***	-	0,041
Denmark	***	-	0,709
Estonia	***	-	0,087
Finland	***	-	0,420
France	***	-	0,343
Germany	***	-	0,130
Greece	***	-	0,098
Hungary	***	-	0,121
Iceland	***	-	0,246
Ireland	***	-	0,632
Italy	***	-	0,415
Latvia	***	-	0,183
Lithuania	***	-	0,152
Luxembourg	***	-	0,104
Macedonia	***	-	0,152
Malta	***	-	0,308
Netherlands	***	-	0,284
Norway	***	-	0,280
Poland	***	-	0,099
Portugal	***	-	0,119
Romania	***	-	0,318
Serbia	***	-	0,068
Slovakia	***	-	0,078
Slovenia	***	-	0,196
Spain	***	-	0,270
Sweden	-		
Switzerland	***	-	0,233
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	***	+	1,134
size_3 (50 to 249 employees)	***	+	1,929
size_4 (250 or more employees)	-		
Sector group (Reference: Sector_4 = NACE G,H,I,R)			
NACE A	-		
NACE B, D, E, F	-		
NACE C	*	-	0,886
NACE J, K, L, M, N, S	***	+	1,170
NACE O	-		
NACE P, Q	***	+	1,699

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to have an action plan - : less likely to have an action plan	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	-		
Manager with OSH duties	***	+	1,262
OSH specialist	***	+	1,274
Employee representative in charge of OSH	-		
Another employee in charge of OSH	-		
External OSH consultant	*	+	1,666
Ownership type (Q111; Reference: Not public)			
Public organisation	*	-	0,900
NA ownership type	-		
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	***	+	1,300
OSH experts (Q151; Reference: None of the mentioned OSH expert types available in the establishment)			
OSH expertise available	***	+	1,806
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	***	-	0,874
Economic situation neither good nor bad	***	-	0,733
Quite bad economic situation	***	-	0,628
Very bad economic situation	***	-	0,608
NA economic situation	-		
Employee representation in terms of OSH (Q350_1 to 4; Reference: non-existence of the respective position/body of representation)			
General ER (works council or trade union)	***	+	1,447
Health and safety representation (OSH representative or con	***	+	1,587
Risk profile (Reference: 0 risks of the respective type; numerical; odds ratio per risk)			
Risk_tard (Q200_1 to _9)	**	-	0,978
Risk_psycho (Q201_1 to _7)	***	-	0,962
Visit from labour inspectorate (Q154; Reference: not visited in last 3 years)			
Visited	***	+	1,351
NA Labour inspectorate visit	***	+	1,354
Dependent variable: Existence of an action plan to prevent work-related stress (Q300 = "yes")			

Table 56: Mode effect regression model 6: Increase of sickness absence in past 3 years

Dependent variable: Sickness absence rather increased over the last 3 years (Q159 = “yes”)

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to report increased sickness absence - : less likely to report that	Degree/extent of the correlation (odds ratio)
Interview Mode (Reference: CATI)			
CAWI	-		
Country (Reference: United Kingdom)			
Austria	-		
Belgium	***	+	1,976
Bulgaria	*	+	1,279
Croatia	***	-	0,656
Cyprus	-		
Czech Republic	-		
Denmark	***	+	1,509
Estonia	-		
Finland	***	+	1,748
France	***	+	1,701
Germany	***	+	1,413
Greece	-		
Hungary	-		
Iceland	***	+	1,482
Ireland	-		
Italy	-		
Latvia	-		
Lithuania	**	-	0,715
Luxembourg	***	+	2,290
Macedonia	***	+	1,424
Malta	-		
Netherlands	***	+	2,920
Norway	***	+	2,236
Poland	-		
Portugal	-		
Romania	***	+	1,829
Serbia	-		
Slovakia	-		
Slovenia	-		
Spain	***	+	1,368
Sweden	***	+	2,059
Switzerland	***	+	1,567
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	**	+	1,083
size_3 (50 to 249 employees)	***	+	1,177
size_4 (250 or more employees)	***	+	1,162
Sector group (Reference: Sector_4 = NACE G,H,I,R)			
NACE A	-		
NACE B, D, E, F	-		
NACE C	*	+	1,087
NACE J, K, L, M, N, S	*	-	0,923
NACE O	-		
NACE P, Q	***	+	1,155

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to report increased sickness absence - : less likely to report that	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	-		
Manager with OSH duties	-		
OSH specialist	***	-	**0,861**
Employee representative in charge of OSH	***	-	**0,818**
Another employee in charge of OSH	***	-	**0,828**
External OSH consultant	-		
Ownership type (Q111; Reference: Not public)			
Public organisation	-		
NA ownership type	-		
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	**	+	**1,060**
OSH experts (Q151; Reference: None of the mentioned OSH expert types available in the establishment)			
OSH expertise available	***	+	**1,128**
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	*	-	**0,939**
Economic situation neither good nor bad	-		
Quite bad economic situation	***	+	**1,295**
Very bad economic situation	***	+	**1,537**
NA economic situation	***	-	**0,729**
Employee representation in terms of OSH (Q350_1 to 4; Reference: non-existence of the respective position/body of representation)			
General ER (works council or trade union)			
Health and safety representation (OSH representative or con	***	+	**2,064**
Risk profile (Reference: 0 risks of the respective type; numerical; odds ratio per risk)			
Risk_tard (Q200_1 to _9)	***	+	**1,021**
Risk_psycho (Q201_1 to _7)	***	+	**1,092**
Visit from labour inspectorate (Q154; Reference: not visited in last 3 years)			
Visited	***	+	**1,164**
NA Labour inspectorate visit	***	-	**0,706**
Dependent variable: Mode = Sickness absence rather increased over the last 3 years (Q159)			

Table 57: Mode effect regression model 7: Provision of ergonomic equipment in last 3 years

Dependent variable: Provision of ergonomic equipment as measure taken in last 3 years (Q202 = “yes”)

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to have provided ergonomic equipment - : less likely to have done so	Degree/extent of the correlation (odds ratio)
Interview Mode (Reference: CATI)			
CAWI	-		
Country (Reference: United Kingdom)			
Austria	***	+	1,830
Belgium	***	+	2,201
Bulgaria	***	-	0,640
Croatia	-		
Cyprus	***	+	1,325
Czech Republic	***	-	0,671
Denmark	***	+	1,723
Estonia	***	+	2,664
Finland	***	+	1,882
France	***	+	2,571
Germany	***	+	1,683
Greece	***	+	1,617
Hungary	-		
Iceland	***	+	2,784
Ireland	-		
Italy	*	+	1,157
Latvia	*	+	1,282
Lithuania	***	-	0,622
Luxembourg	**	+	1,330
Macedonia	*	-	0,785
Malta	***	+	1,592
Netherlands	***	+	2,242
Norway	***	+	1,922
Poland	***	+	1,692
Portugal	-		
Romania	-		
Serbia	-		
Slovakia	***	-	0,559
Slovenia	-		
Spain	***	+	2,214
Sweden	***	+	3,596
Switzerland	***	+	1,493
Size class (Reference: size_1 = 5 to 9 employees)			
size_2 (10 to 49 employees)	***	+	1,238
size_3 (50 to 249 employees)	***	+	1,945
size_4 (250 or more employees)	***	+	3,137
Sector group (Reference: Sector_4 = NACE G,H,I,R)			
NACE A	***	-	0,721
NACE B, D, E, F	***	-	0,848
NACE C	***	+	1,138
NACE J, K, L, M, N, S	***	+	2,529
NACE O	***	+	1,876
NACE P, Q	***	+	1,501

Explaining factors: (NA = No answer)	Level of significance: * low (p<0,05) ** medium (p<0,01) *** high (p<0,005)	Direction of the correlation: + : more likely to have provided ergonomic equipment - : less likely to have done so	Degree/extent of the correlation (odds ratio)
Function of the respondent (Q113; Reference: Owner, managing director)			
Manager without OSH duties	***	+	**1,281**
Manager with OSH duties	***	+	**1,533**
OSH specialist	***	+	**1,676**
Employee representative in charge of OSH	***	+	**1,411**
Another employee in charge of OSH	***	+	**1,350**
External OSH consultant	-		
Ownership type (Q111; Reference: Not public)			
Public organisation	***	-	**0,835**
NA ownership type	-		
Type of organisation (Q100; Reference: Single-site organisation)			
Part of a multi-site organisation	*	+	**1,061**
OSH experts (Q151; Reference: None of the mentioned OSH expert types available in the establishment)			
OSH expertise available	***	+	**1,713**
Economic situation (Q400; Reference: Very good economic situation)			
Quite good economic situation	***	-	**0,830**
Economic situation neither good nor bad	***	-	**0,623**
Quite bad economic situation	***	-	**0,472**
Very bad economic situation	***	-	**0,435**
NA economic situation	***	-	**0,691**
Employee representation in terms of OSH (Q350_1 to 4; Reference: non-existence of the respective position/body of representation)			
General ER (Works Council or TU)	***	+	**1,227**
OSH ER (OSH rep. Or committee)	***	+	**1,410**
Risk profile (Reference: 0 risks of the respective type; numerical; odds ratio per risk)			
Risk_tard (Q200_1 to _9)	***	+	**1,081**
Risk_psycho (Q201_1 to _7)	-		
Visit from labour inspectorate (Q154; Reference: not visited in last 3 years)			
Visited	***	-	**0,870**
NA Labour inspectorate visit	-		
Dependent variable: Provision of ergonomic equipment as measure taken in the last 3 years (Q202)			

Annex 3 – Literature

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