

TNO/IKEI/UKWON report for
Eurofound

European Company Survey: Construction of the Workplace Innovation Index and Selection of Companies

TNO innovation
for life

February 2014

› European Company Survey: Construction of the Workplace Innovation Index and Selection of Companies

Date	February 2014
Authors	S. Dhondt P.T.Y. Preenen P.R.A. Oeij A. Corral I. Isusi P. Totterdill M. Karanika-Murray
Project number	060.05165
Report number	R14131
Contact TNO	Peter Oeij
Phone	088 866 53 48
Email	peter.oeij@tno.nl

Healthy Living
Schipholweg 77-89
2316 ZL LEIDEN
P.O. Box 3005
2301 DA LEIDEN
The Netherlands
www.tno.nl

T +31 88 866 61 00
infodesk@tno.nl

All rights reserved.

No part of this publication may be reproduced and/or published by print, photoprint, microfilm or any other means without the previous written consent of TNO.

In case this report was drafted on instructions, the rights and obligations of contracting parties are subject to either the General Terms and Conditions for commissions to TNO, or the relevant agreement concluded between the contracting parties. Submitting the report for inspection to parties who have a direct interest is permitted.

© 2014 TNO
Chamber of Commerce number 27376655

Contents

- 1 Introduction.....1
- 2 Objectives of the Selection of Cases2
- 3 Procedure for the Lists3
 - 3.1 Construction of an Index for Workplace Innovation3
 - 3.2 Statistical Approach Used by TNO-IKEI (simplified explanation)4
- 4 Results6
 - 4.1 Results for Selection6
 - 4.1.1 Number of Factors (scree-plot) 6
 - 4.1.2 Construction of the Components 6
 - 4.1.3 Construction of the Sumscores 6
 - 4.1.4 Lists of the Companies..... 7
 - 4.2 What Does the WPI Deliver?7
- 5 Conclusion.....9
- Annex 1 Scree Plot.....10
- Annex 2 Factor Structure 11
- Annex 3 SPSS Syntax.....12
- Annex 4 Distribution of Companies Using the WPI.....19
- Annex 5 Selection of Companies for Each of the 14 Countries20



1 Introduction

For the selection of company cases from the ECS 2013 dataset for the Eurofound-project on workplace innovation, TNO-IKEI has developed a selection procedure. This report describes the procedure. The end result of this selection is a list of ID-numbers of the companies in the ECS that are expected to be top companies in terms of workplace innovation and could be contacted by TNO-IKEI. Based on this list of ID-numbers Gallup will provide a list of company names and addresses.

The report is organized as follows:

- › Chapter 2: discusses the objectives of our selection procedure;
- › Chapter 3: describes our statistical approach;
- › Chapter 4: shows the results of the analysis.

In the annexes, we provide the details.

2 Objectives of the Selection of Cases

In our Inception report, we described the following objectives of our case selection:

- › End-result of the selection: 60 companies; 10 large establishments (>250 employees) and 50 medium sized establishments (50-249 employees) that are willing to be interviewed and score high on workplace innovation. Sufficient spread of sectors;
- › On the basis of the discussion with Eurofound, we need between 300 and 400 addresses. The expectation is that, even with 90% of the companies that have expressed willingness to participate in follow-up research, only 1 out of 6 companies will actually do so (maximum response rate not higher than about 20%);
- › The addresses will be supplied by Gallup. TNO-IKEI will deliver a list of ID-numbers for the required establishments per country (with information about sector);
- › We expect to have a discussion with Eurofound based on the actual distribution of workplace innovating companies per country. The project goal is to have sufficient spread of companies over the different countries, company sizes and sectors. The actual results may show less spread of workplace innovation than we would wish for.

3 Procedure for the Lists

Eurofound has granted us access to the European Company Survey (ECS) 2013: a database of around 30.000 companies. To select the companies we have developed a measure for workplace innovation (WPI measure). Based on this WPI measure we will initially select 50x6 medium-sized and 10x6 large-sized companies. From here the final 360 companies will be derived. An important issue is that no specific WPI measure was available for the ECS. Hence, the WPI measure is constructed of separate items derived from the ECS. The selected items were the result of expert discussions between Eurofound, expert groups and stakeholders and reflect the items from the ECS that are considered important for workplace innovation. These items were further investigated to come to a reduced and balanced measure of WPI these items. In this Chapter, we show from which concept we develop the components of workplace innovation, how we select items from the ECS and how we make an index that can help us to rank the companies.

3.1 Construction of an Index for Workplace Innovation

We use the Fifth Element-note¹ (see Inception Report and Proposal) for the initial construction of an index for workplace innovation as a point of departure. This note has been developed by the European learning network on Workplace Innovation (EUWIN) to help companies and policy makers in identifying what they need to do to implement workplace innovation. The note describes four main elements of workplace innovation. The elements have been deducted from our experience with high performance work systems. There is, however, no tested concept that we can use for our analysis. According to the Fifth Element-note, workplace innovation is present in companies if all conditions are satisfied. This means that we need to check all elements in the companies in the list of ECS-companies.

We selected from the ECS item-list an initial pool of items that could be connected to the separate four elements of the Fifth Element and added some extra items that focus on innovation and customer orientation (see Table 1 below).

¹ The Fifth Element dimensions are configured eclectically with heuristic purposes in mind, and with a goal to be somewhat complete in defining relevant constructs. It was, however, not set up as a set of constructs to be empirically tested. At face value it can be observed that dimensions partly overlap, instead of excluding each other.

Table 1 Workplace Innovation: translation of definition into ECS-questions (see also Appendix 1)

Definition of Eurofound/DGENTR/The Fifth Element	ECS-Employer survey (first class classification)
1) Work organization <ul style="list-style-type: none"> • Job autonomy • Self-managed teams • Integration of technology • Flexible working 	<ul style="list-style-type: none"> • EPLANN (planning decision) • FTAUTON (team autonomy) • HFLEXI (flexible working times) • HACCUOV (working time) • HRINTERN (internal labour provision)
2) Learning and reflection <ul style="list-style-type: none"> • Learning and development • Shared knowledge and experience • Continuous improvement • High involvement innovation 	<ul style="list-style-type: none"> • CONJOB (learning jobs >1 year) • HRLONG (HR employment strategy) • HTRAIN (training) • HAPRAIS (performance appraisal) • ELELEDOC (lessons learned)
3) Structure and systems <ul style="list-style-type: none"> • Fairness and equality • Trust • Reducing organizational walls and ceiling • Supporting employee initiative 	<ul style="list-style-type: none"> • HVPGRPE (variable pay) • HVPPRSH (profit sharing scheme) • HVPSHOW (shared ownership) • EHIERA (hierarchical levels) • EHIERARCH (hierarchical levels)
4) Workplace partnership <ul style="list-style-type: none"> • Dialogue • Representative participation • Involvement in change • Openness and communication • Integrating tacit and strategic knowledge 	<ul style="list-style-type: none"> • IINIMWPP (participative employee representation) • IINIMPEA (employee representation commitment)
Other variables	<ul style="list-style-type: none"> • EEXTEMON (monitor external ideas, tech) • GACTEDE (product innovation) • BINNPRSE (product innovation) • BINNMAPR (marketing methods) • BINNOPROC (change products, services) • JCHALLOC (organizational innovation)

3.2 Statistical Approach Used by TNO-IKEI (simplified explanation)

The initial above item list that the Fifth element generates, is too long to make an easy selection of companies. If we can find a 'latent structure' underneath the list of items, this could then help to shorten, understand and develop a WPI index to select companies. We expect that several items will not fit in the underlying factor structure. A first and most logical (theoretical) latent structure might be in line with the elements of the Fifth Element. However, this does not necessarily have to be the case because the factor structure of the Fifth Element has not been investigated as such so far. We have taken the following steps to investigate such a latent structure:

1. We can explore this expectation of a latent structure by analysing the correlation matrix of all these items;

2. We need to recode the items for the analyses and final WPI measure. We have included the recoding in our SPSS syntax (see Annex 3);
3. The items can be reduced by using a Principal Component Analysis (PCA, factor analysis). A result of the PCA is that we can deduct the underlying factors and, if needed, reduce the amount of factors and items based on the Eigenvalues, factor loadings and expert reasoning;
4. We use a varimax-rotation. The solution shows us what the most likely latent structure is in the data: we see which items are important for each of the dimensions; we know that the varimax rotated factors show zero correlation with one another (i.e. orthogonal design). This helps us to understand the factor structure of the WPI items;
5. The next step is to check to which degree the solution compares to the dimensions presented in the Fifth Element. If the resulting factors do not fit with the Fifth Element but have a logical and explainable structure, then we can take the following step: eliminate those items that do not seem to be connected to the final solution, and build an index with the reduced set of items. We then build sum-scores from the items for each relevant factor and calculate the mean of these sumscores leading to our final WPI measure;
6. The index then can be used to calculate scores for each of the companies and its ranking. The ranking can then be used for selection purposes. In a further phase of the project, we will inspect reliability of these scores.

4 Results

In this chapter we show the final results of our analysis.

4.1 Results for Selection

4.1.1 Number of Factors (scree-plot)

In Annex 1, we show the Scree-Plot of our PCA which shows the Eigenvalues scores. As can be seen, seven factors with Eigen Values > 1 are revealed.

4.1.2 Construction of the Components

The results of the factor analysis are included in Annex 2. We removed four items (CONJOB_PERC_MS, HACCUOV_2, EHIERA_NEW_MS, EEXTEMON_2) because they didn't load on a specific factor.

The seven factors can be labeled as follows:

- › factor 1: innovation (GACTEDE_2, BINNMAPR_2, BINNPRSE_2, BINNOPROC_2, JCHALLOC_2);
- › factor 2: voice/workplace partnership (IINIMWPP_2, IINIMPEA_2);
- › factor 3: learning and reflection (HTRAIN_PERC_MS, HAPRAIS_PERC_MS, ELELEDOC_2);
- › factor 4: structure and systems (HVPGRPE_2, HVPPRS_2, HVPSHOW_2);
- › factor 5: work organization autonomy (EPLANN_2, FTAUTON_2, HFLEXI_PERC_MS);
- › factor 6: work organization career (HRLONG_2, HRINTERN_2);
- › factor 7: hierarchy (EHIERARCH_2).

When comparing the seven factor structure with the Fifth Element structure, as can be seen in Table 1, we see that the factors voice-workplace partnership, learning and reflection, and structure and systems are broadly overlapping. However, work organization is divided in two factors now (work organization autonomy and work organization career). Moreover, hierarchy has its own factor now.

It can be concluded that the WPI measure constructed from the ECS-data, has some but limited fit with the Fifth Element-dimensions.

4.1.3 Construction of the Sumscores

Our analysis revealed seven factors and did not deliver a factor structure that conformed to the Fifth Element. Apparently the selected items are represented by different factors. There can be theoretical and/or practice reasons for this. Further research is needed to look into this result. We decided to use the seven factors to construct variables for the Workplace Innovation-index (WPI) to select the companies. We calculate the WPI as a sumscore of these separate factors. This means that we give each of these elements the same weight in the final WPI measure. At this moment, we do not have any other theoretical starting point to do this differently. The final WPI score calculation can be found below:

FINAL WPI measure:

$Y_WPI_7_FINAL = Y_innovation, Y_voice, Y_learn_reflect, Y_struct_syst, Y_work_org_auton, Y_work_org_career, EHIERARCH_2.$

4.1.4 Lists of the Companies

We have summed the separate factor scores for each company in the dataset. Our next step was to rank all of the company scores in each of the countries. This gives us a list of the companies that we can select for the case study research. The full lists of ID-numbers are included in Annex 5.

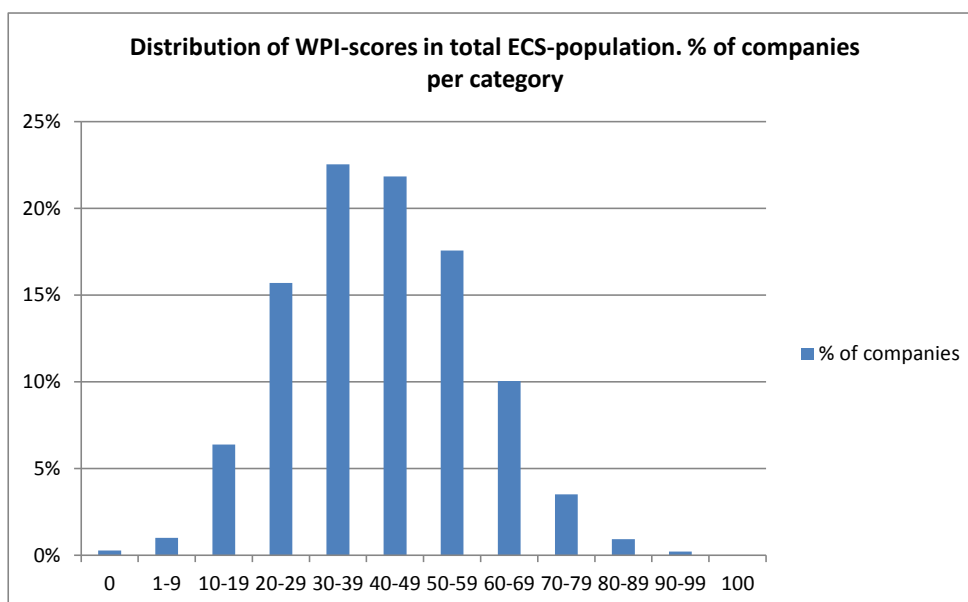
4.2 What Does the WPI Deliver?

The WPI helps us to describe the ECS-population from the perspective of workplace innovation. In the ECS, there are some 30.000 companies. The 14 countries selected for this project, represent about half of the total population of the ECS. The criteria to select companies using the WPI are the following:

- › We need to have companies that score high on the Workplace Innovation index (WPI) that we have created;
- › We need to have a reasonable distribution of countries in our selection.

With these two criteria in mind, we show which kind of selection of companies could be possible. Our proposal is to select companies from the top 10% in WPI-scores.

In the following graph, we show what the distribution (histogram) in WPI-scores is in the total ECS-population.



Graph 1 Histogram distribution WPI-scores (total ECS-population)

This graph shows that the cut-off point for 5% is at a WPI-score of 65.

Starting from the cut-off point, we have drafted the following table for the 14 countries: we show how many companies are listed in the top three categories (WPI-scores 70-79, 80-89, 90+).

Table 2 Distribution of top WPI-scores for the 14 countries

WPI-score	50 to 249 employees				250 employees plus			
	90 plus	80 to 89	70 to 79	65 to 69	90 plus	80 to 89	70 to 79	65 to 69
1,00 Belgium	1	5	11	19	1	4	11	14
2,00 Bulgaria	0	0	3	4	0	0	1	5
3,00 Czech Republic	0	0	0	5	0	0	5	13
4,00 Denmark	6	15	53	40	5	10	33	19
5,00 Germany	1	3	9	16	1	5	23	34
7,00 Ireland	1	1	8	6	0	2	7	6
8,00 Greece	1	2	3	3	0	1	1	3
9,00 Spain	1	4	24	28	4	8	21	30
15,00 Lithuania	0	0	4	8	0	2	2	4
19,00 Netherlands	1	14	44	29	5	12	38	21
21,00 Poland	0	1	16	23	0	7	13	19
22,00 Portugal	0	1	6	6	0	3	2	6
27,00 Sweden	0	7	36	29	0	14	21	22
28,00 United Kingdom	0	10	23	24	2	7	31	25

This distribution shows that we could have companies in each of the 14 countries. The number of 'reserves' would be quite limited in some of the countries. In Annex 4, we show some more information on the distribution of companies.

5 Conclusion

Our analysis of the ECS shows a clear latent structure of our WPI measure, consisting of seven factors: 1) Innovation (product and organizational innovation), 2) voice (employees /employee representatives having a say in decisions and changes), 3) learning and reflection (training and feedback), 4) structure and system (variable pay), 5) work organization autonomy (autonomy), 6) work organization career (long-term career plans), 7) hierarchy

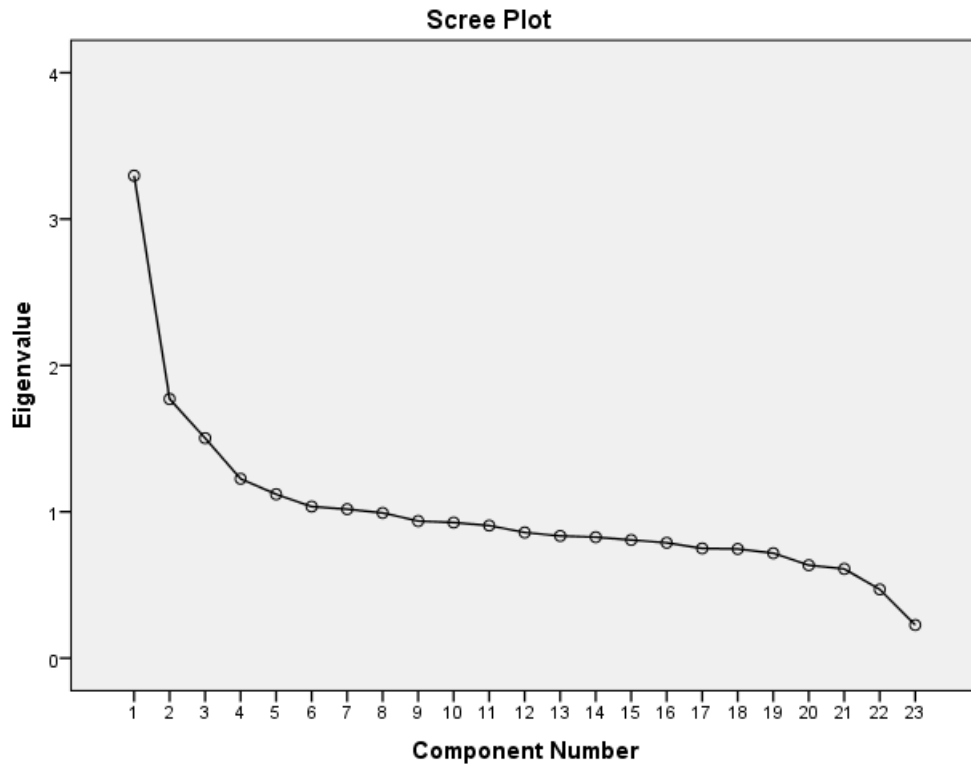
The structure shows that the main elements of the Fifth Element are somewhat correlated. Innovative culture refers to learning, customer orientation and resilient ways of dealing with change. Voice points to the importance of employees /employee representatives having a say in decisions and changes. Bottom up organizing underlines the importance of employees' job autonomy and their sovereignty regarding flexible working time arrangements.

The factor structure does not fit with the original set-up of the Fifth Element, but that is not a problem in itself. It just means that apparently our WPI measure, seems to be represented by more factors than expected. You could interpret this result in such a way that the calculated structure shows how in practice companies connect several measures to each other (so-called HR-Bundles). This insight helps us to understand better how workplace innovation works in practice. Of course, some elements of the Fifth Element's concept are not covered by the ECS items, which explain the different factor structure. Nonetheless, one could view the results as support for a 'dynamic capabilities' / 'high performance systems' approach, in the sense that a multifaceted 'bundle of resources' related to an empowering role for employees, seems to be characteristic for 'workplace innovation'.

All in all, our solution helps, based on the items available from the ECS to develop the WPI measure scores and rankings per country. We need to discuss with Eurofound if our list is acceptable.

Annex 1 Scree Plot

In the following graph, we see the reduction in the Eigenvalues. The 'rule of the thumb' is that after the 'elbow' in the plot, the Eigenvalues do not give more explanation to the variation in the dataset. The cut-off point seems to be after seven components.



Annex 2 Factor Structure

The following table shows the seven selected factors and how the separate items 'load' on these three factors. We have marked those items that show too low loadings on all of the components (<,30). Our idea is that we should eliminate these items from our final analysis. We have coloured the high loading items for each of the factors.

Rotated Component Matrix ^a								
	Component							
	1	2	3	4	5	6	7	
EPLANN_2 1=WPI, Who normally decides on the planning and execution of the daily work tasks of the employees at this establishment.	,046	,014	,102	,035	,628	,086	,095	work organiza
FTAUTON_2 1 = WPI, FTAUTON. [T3] Do the team members decide among themselves by whom the tasks are to be performed, or is there usually a superior distributing the tasks within the team?	,049	,024	,015	,014	,624	,092	,039	work organiza
CONJOB_PERC_MS 1-100% (Binned) Approximately what percentage of employees work in jobs which require at least one year of on the job learning in order for the person to become proficient in his/her.	,096	,026	,371	,058	,229	,134	-,076	work organiza
HRLONG_2 1=WPI Employees are hired with the intention to employ them for a long time - Do you agree or disagree with the following statements about the human resource management strategy in this establishment?.	-,008	-,056	-,075	,005	,169	,674	-,159	work organiza
HRINTERN_2 SI=1 When recruiting the management usually look first whether there are any suitable internal candidates - Do you agree or disagree with the following statements about the human resource management strategy in this	-,027	,127	,045	,073	-,065	,589	,306	work organiza
HFLEXI_PERC_MS 1-100% (Binned) Approximately what percentage of employees have the possibility to adapt - within certain limits - the time when they begin or finish their daily work according to their personal needs or wishes?	,042	,037	,370	,071	,487	-,058	-,020	work organiza
HACCUOV_2 1=WPI Is it possible for employees to use accumulated overtime for days off? This can be full or half days).	,013	,229	,070	,254	,346	-,110	-,146	work organiza
GACTEDE_2 1=WPI Design or development of new products or services - Please indicate if any of the following activities are carried out at this establishment?.	,487	,058	,203	,097	,060	,203	-,136	vernieuwing
HTRAIN_PERC_MS 1-100% (Binned) In the past 12 months, what percentage of employees received paid time-off from their normal duties to undertake training, either off or on your premises?.	,017	,073	,602	,139	,108	-,148	,006	learning and r
HAPRAIS_PERC_MS 1-100% (Binned) Approximately what percentage of employees have a performance appraisal or evaluation interview at least once a year?.	,041	,036	,584	,056	,134	-,027	,118	learning and r
ELELEDOC_2 1=WPI Do employees in this establishment document and keep records of their good work practices or lessons learned, with the purpose to share these with other employees?.	,131	,029	,622	,015	-,136	,131	,013	learning and r
HVPGRPE_2 1=WPI Variable extra pay linked to the performance of the team, working group or department - Could you please tell me for each of these options, whether or not they are available to at least some employees?.	,136	,000	,086	,708	-,059	,092	,024	structure and
HVPPRSH_2 1=WPI Variable extra pay linked to the results of the company or establishment (profit sharing scheme) - Could you please tell me for each of these options, whether or not they are available to at least some employees?.	,090	,087	,110	,746	,085	,007	-,002	structure and
HVPSHOW_2 1=WPI Variable extra pay in form of share ownership scheme offered by the company - Could you please tell me for each of these options, whether or not they are available to at least some employees?.	,004	,039	,045	,581	,066	,006	,061	structure and
EHIERA_NEW_MS sysmis eruit (Binned) How many hierarchical levels do you have in this establishment, including the highest and the lowest level?.	,159	,231	,273	,157	-,377	,210	,014	hierarchie
EHIERARCH_2 1=WPI Since the beginning of 2010, the number of hierarchical levels has ...	,009	,027	,035	,035	,056	-,037	,828	hierarchie
IINIMWPP_2 1=WPI, IINIMWPP. [ER15_A] The employee representation helps us in a constructive manner to find ways to improve workplace performance - Please tell me whether you agree or disagree with the following statements?	,059	,917	,086	,061	,044	,046	,024	voice
IINIMPEA_2 1=WPI, IINIMPEA. [ER15_D] Consulting the employee representation in important changes leads to more commitment of the staff in the implementation of changes - Please tell me whether you agree or disagree with the following statements?	,058	,920	,069	,072	,036	,033	,040	voice
EEXTEMON_2 1=WPI Does this establishment monitor external ideas or technological developments for new or changed products, processes or services?.	,332	,051	,265	,033	-,027	,358	-,108	cf
BINMAPR_2 1=WPI Since the beginning of 2010, has this establishment introduced any new or significantly improved marketing methods?.	,706	,018	,035	,003	,008	-,030	,032	vernieuwing
BINNRSE_2 1=WPI Since the beginning of 2010 has this establishment introduced any new or significantly changed products or services (either internally or externally)?.	,788	-,005	,032	,055	,015	-,037	,026	vernieuwing
BINNOPROC_2 1=WPI Since the beginning of 2010, has this establishment introduced any new or significantly changed processes, either for producing goods or supplying services?	,751	,072	,058	,094	,042	-,029	,105	vernieuwing
JCHALLOC_2 1=WPI Changes in ways to coordinate and allocate the work to workers - Whether any of the following changes have been made since the beginning of 2010.	,416	,014	,054	,084	,053	,050	,414	vernieuwing

Extraction Method: Principal Component Analysis.
a. Rotation converged in 6 iterations.
> .4, < .25

Annex 3 SPSS Syntax

Selected variables

Our starting point is the Fifth Element, developed for the European learning Network on Workplace Innovation. The Fifth Element indicates the main axes thru which innovation, better quality of work and better performance are possible. The following 23 possible useful variables have been selected based on the Fifth Element:

EPLANN, FTAUTON, CONJOB, HRLONG, HRINTERN, HFLEXI, HACCUOV, GACTDEDE, HTRAIN, HAPRAIS, ELELEDOC, HVPGRPE, HVPPRSR, HVPSHOW, EHIERA, EHIERACH, IINIMWPP, IINIMPEA, EEXTEMON, BINNMAPR, BINNPRSE, BINNOPROC, JCHALLOC

Recording variables for the scaling-analysis

Because many of the selected variables are already dichotomized we dichotomized (dummy coding) all the selected variables for consistency, whereby 0 indicates a low and 1 a high WPI score. Continuous variables were dichotomized by median split. The following recodes were performed:

- › *1: EPLANN. [Q27] Who normally decides on the planning and execution of the daily work tasks of the employees at this establishment.

```
RECODE EPLANN (1=1) (2=0) (3=1) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS)
INTO EPLANN_2.
VARIABLE LABELS EPLANN_2 '1 = WPI'.
EXECUTE.
```

- › *2: FTAUTON. [T3] Do the team members decide among themselves by whom the tasks are to be performed, or is there usually a superior distributing the tasks within the team?

```
RECODE FTAUTON (1=1) (2=0) (SYSMIS=0) (8=SYSMIS) (9=SYSMIS) INTO
FTAUTON_2.
VARIABLE LABELS FTAUTON_2 '1 = WPI'.
EXECUTE.
```

- › *3: CONJOB. [Q16] Approximately what percentage of employees work in jobs which require at least one year of on the job learning in order for the person to become proficient in his/her.

```
RECODE CONJOB (SYSMIS=SYSMIS) (996=100) (997=0) (998=SYSMIS)
(999=SYSMIS) (0 thru 100=Copy) INTO CONJOB_PERC.
VARIABLE LABELS CONJOB_PERC '1-100%'.
EXECUTE.
```

- › *Median Split CONJOB_PERC. Visual Binning. CONJOB_PERC.

```
RECODE CONJOB_PERC (MISSING=COPY) (LO THRU 15.0=0) (LO THRU HI=1)
(ELSE=SYSMIS) INTO CONJOB_PERC_MS.
VARIABLE LABELS CONJOB_PERC_MS '1-100% (Binned)'.
FORMATS CONJOB_PERC_MS (F5.0).
VALUE LABELS CONJOB_PERC_MS 0 '<= 15,00' 1 '16,00+'.
VARIABLE LEVEL CONJOB_PERC_MS (ORDINAL).
EXECUTE.
```

- › 4: *HRLONG. [H11_B] Employees are hired with the intention to employ them for a long time / Do you agree or disagree with the following statements about the human resource management strategy in this establishment?

```
RECODE HRLONG (1=1) (2=1) (3=0) (4=0) (7=SYSMIS) (8=SYSMIS) (9=SYSMIS)
(SYSMIS=SYSMIS) INTO HRLONG_2.
VARIABLE LABELS HRLONG_2 '1=WPI'.
EXECUTE.
```

- › 5: *HRINTERN. [H11_C] When recruiting the management usually look first whether there are any suitable internal candidates -/Do you agree or disagree with the following statements about the human resource management strategy in this establishment?

```
RECODE HRINTERN (1=1) (2=1) (3=0) (4=0) (7=SYSMIS) (8=SYSMIS) (9=SYSMIS)
(SYSMIS=SYSMIS) INTO HRINTERN_2.
VARIABLE LABELS HRINTERN_2 'WPI=1'.
EXECUTE.
```

- › *6: HFLEXI. [H14] Approximately what percentage of employees have the possibility to adapt - within certain limits - the time when they begin or finish their daily work according to their personal needs or wishes? /Een HFLEXI kiezen.

```
RECODE HFLEXI (SYSMIS=SYSMIS) (996=100) (997=0) (998=SYSMIS)
(999=SYSMIS) (0 thru 100=Copy) INTO HFLEXI_PERC.
VARIABLE LABELS HFLEXI_PERC '1-100%'.
EXECUTE.
```

- › *MS HFLEXI_PERC. Visual Binning. HFLEXI_PERC.

```
RECODE HFLEXI_PERC (MISSING=COPY) (LO THRU 20.0=0) (LO THRU HI=1)
(ELSE=SYSMIS) INTO HFLEXI_PERC_MS.
VARIABLE LABELS HFLEXI_PERC_MS '1-100% (Binned)'.
FORMATS HFLEXI_PERC_MS (F5.0).
VALUE LABELS HFLEXI_PERC_MS 0 '<= 20,00' 1 '21,00+'.
VARIABLE LEVEL HFLEXI_PERC_MS (ORDINAL).
EXECUTE.
```

- › *7: HACCUOV. [H16] Is it possible for employees to use accumulated overtime for days off? This can be full or half days).

```
RECODE HACCUOV (1=1) (2=1) (3=0) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS)
INTO HACCUOV_2.
VARIABLE LABELS HACCUOV_2 '1=WPI'.
EXECUTE.
```

- › *8: GACTDEDE. [O1_A] Design or development of new products or services - Please indicate if any of the following activities are carried out at this establishment?

```
RECODE GACTDEDE (1=1) (2=0) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS)
INTO GACTEDE_2.
VARIABLE LABELS GACTEDE_2 '1=WPI'.
EXECUTE.
```


- › *9: HTRAIN. [H3] In the past 12 months, what percentage of employees received paid time-off from their normal duties to undertake training, either off or on your premises?

```
RECODE HTRAIN (SYSMIS=SYSMIS) (998=SYSMIS) (999=SYSMIS) (997=0)
(996=100) (0 thru 100=Copy) INTO HTRAIN_PERC.
VARIABLE LABELS HTRAIN_PERC '1-100%'.
EXECUTE.
```

- › *MS HTRAIN_PERC. Visual Binning. HTRAIN_PERC.

```
RECODE HTRAIN_PERC (MISSING=COPY) (LO THRU 20.0=0) (LO THRU HI=1)
(ELSE=SYSMIS) INTO
HTRAIN_PERC_MS.
VARIABLE LABELS HTRAIN_PERC_MS '1-100% (Binned)'.
FORMATS HTRAIN_PERC_MS (F5.0).
VALUE LABELS HTRAIN_PERC_MS 0 '<= 20,00' 1 '21,00+'.
VARIABLE LEVEL HTRAIN_PERC_MS (ORDINAL).
EXECUTE.
```

- › *10) HAPRAIS. [H8] Approximately what percentage of employees have a performance appraisal or evaluation interview at least once a year?

```
RECODE HAPRAIS (SYSMIS=0) (998=SYSMIS) (999=SYSMIS) (997=0) (996=100) (0
thru 100=Copy) INTO HAPRAIS_PERC.
VARIABLE LABELS HAPRAIS_PERC '1-100%'.
EXECUTE.
```

- › *MS HAPRAIS_PERC. Visual Binning. HAPRAIS_PERC.

```
RECODE HAPRAIS_PERC (MISSING=COPY) (LO THRU 87.0=0) (LO THRU HI=1)
(ELSE=SYSMIS) INTO HAPRAIS_PERC_MS.
VARIABLE LABELS HAPRAIS_PERC_MS '1-100% (Binned)'.
FORMATS HAPRAIS_PERC_MS (F5.0).
VALUE LABELS HAPRAIS_PERC_MS 0 '<= 87,00' 1 '88,00+'.
VARIABLE LEVEL HAPRAIS_PERC_MS (ORDINAL).
EXECUTE.
```

- › *11: ELELEDOC. [T9] Do employees in this establishment document and keep records of their good work practices or lessons learned, with the purpose to share these with other employees?

```
RECODE ELELEDOC (1=1) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS) (2=0) INTO
ELELEDOC_2.
VARIABLE LABELS ELELEDOC_2 '1=WPI'.
EXECUTE.
```

- › *12: HVPGRPE. [H23_C] Variable extra pay linked to the performance of the team, working group or department - Could you please tell me, whether or not they are available to at least some employees?

```
RECODE HVPGRPE (1=1) (2=0) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS) INTO
HVPGRPE_2.
VARIABLE LABELS HVPGRPE_2 '1=WPI'.
EXECUTE.
```

- › *13: HVPPRSH. [H23_D] Variable extra pay linked to the results of the company or establishment (profit sharing scheme) - Could you please tell me for each of these options, whether or not they are available to at least some employees?

```
RECODE HVPPRSH (1=1) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS) (2=0) INTO HVPPRSH_2.
```

```
VARIABLE LABELS HVPPRSH_2 '1=WPI'.
```

```
EXECUTE.
```

- › *14: HVPSHOW. [H23_E] Variable extra pay in form of share ownership scheme offered by the company - Could you please tell me for each of these options, whether or not they are available to at least some employees?

```
RECODE HVPSHOW (1=1) (2=0) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS) INTO HVPSHOW_2.
```

```
VARIABLE LABELS HVPSHOW_2 '1=WPI'.
```

```
EXECUTE.
```

- › *15: EHIERA. [Q24] How many hierarchical levels do you have in this establishment, including the highest and the lowest level? /

```
RECODE EHIERA (SYSMIS=1) (998=SYSMIS) (999=SYSMIS) (0 thru 30=Copy) INTO EHIERA_NEW.
```

```
VARIABLE LABELS EHIERA_NEW.
```

```
EXECUTE.
```

- › *MS EHIERA_NEW. * Visual Binning. *EHIERA_NEW.

```
RECODE EHIERA_NEW (MISSING=COPY) (LO THRU 3.0=0) (LO THRU HI=1) (ELSE=SYSMIS) INTO EHIERA_NEW_MS.
```

```
VARIABLE LABELS EHIERA_NEW_MS '(Binned)'.
```

```
FORMATS EHIERA_NEW_MS (F5.0).
```

```
VALUE LABELS EHIERA_NEW_MS 0 '<= 3,00' 1 '4,00+'.
```

```
VARIABLE LEVEL EHIERA_NEW_MS (ORDINAL).
```

```
EXECUTE.
```

- › *16: EHIERACH. [Q25] Since the beginning of 2010, the number of hierarchical levels has ..

```
RECODE EHIERACH (SYSMIS=SYSMIS) (1=0) (2=0) (3=1) (8=SYSMIS) (9=SYSMIS) INTO EHIERARCH_2.
```

```
VARIABLE LABELS EHIERARCH_2 '1=WPI'.
```

```
EXECUTE.
```

- › *17: IINIMWPP. [ER15_A] The employee representation helps us in a constructive manner to find ways to improve workplace performance - Please tell me whether you agree or disagree with the following statements?

```
RECODE IINIMWPP (1=1) (2=1) (3=0) (4=0) (SYSMIS=0) (8=SYSMIS) (9=SYSMIS) INTO IINIMWPP_2.
```

```
VARIABLE LABELS IINIMWPP_2 '1=WPI'.
```

```
EXECUTE.
```

- › *18: IINIMPEA. [ER15_D] Consulting the employee representation in important changes leads to more commitment of the staff in the implementation of changes - Please tell me whether you agree or disagree with the following statements?

```
RECODE IINIMPEA (1=1) (2=1) (3=0) (4=0) (SYSMIS=0) (8=SYSMIS) (9=SYSMIS)
INTO IINIMPEA_2.
VARIABLE LABELS IINIMPEA_2 '1=WPI'.
EXECUTE.
```

- › *19: EEXTEMON. [T11] Does this establishment monitor external ideas or technological developments for new or changed products, processes or services?

```
RECODE EEXTEMON (1=1) (2=1) (3=0) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS)
INTO EEXTEMON_2.
VARIABLE LABELS EEXTEMON_2 '1=WPI'.
EXECUTE.
```

- › *20: BINNMAPR. [Q31] Since the beginning of 2010, has this establishment introduced any new or significantly improved marketing methods?

```
RECODE BINNMAPR (1=1) (2=0) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS) INTO
BINNMAPR_2.
VARIABLE LABELS BINNMAPR_2 '1=WPI'.
EXECUTE.
```

- › *21: BINNPRSE. [Q22] Since the beginning of 2010 has this establishment introduced any new or significantly changed products or services (either internally or externally)?

- › *22: BINNOPROC. [Q23] Since the beginning of 2010, has this establishment introduced any new or significantly changed processes, either for producing goods or supplying services?

- › *alledrie tegelijk.

```
RECODE BINNMAPU BINNPRSE BINNOPROC (1=1) (2=0) (SYSMIS=SYSMIS)
(8=SYSMIS) (9=SYSMIS) INTO BINNMAPU_2 BINNPRSE_2 BINNOPROC_2.
VARIABLE LABELS BINNMAPU_2 '1=WPI' /BINNPRSE_2 '1=WPI' /BINNOPROC_2
'1=WPI'.
EXECUTE.
```

- › *23: JCHALLOC. [E0A_C] Changes in ways to coordinate and allocate the work to workers - Whether any of the following changes have been made since the beginning of 2010.

```
RECODE JCHALLOC (1=1) (2=0) (SYSMIS=SYSMIS) (8=SYSMIS) (9=SYSMIS) INTO
JCHALLOC_2.
VARIABLE LABELS JCHALLOC_2 '1=WPI'.
EXECUTE.
```

Analysing the structure in the ECS-variables

To investigate the latent factor structure of the variables we performed an exploratory factor analysis. The expectation is that the factor structure consists of a limited set of orthogonal scales that correspond with the four dimensions of the Fifth Element.

*Factoranalysis 23 variables:

```
FACTOR
/VARIABLES EPLANN_2 FTAUTON_2 CONJOB_PERC_MS HRLONG_2
HRINTERN_2 HFLEXI_PERC_MS HACCUOV_2 GACTEDE_2 HTRAIN_PERC_MS
HAPRAIS_PERC_MS ELELEDOC_2 HVPGRPE_2 HVPPRS_2 HVPSHOW_2
```

```

EHIERA_NEW_MS  EHIERARCH_2  IINIMWPP_2  IINIMPEA_2  EEXTEMON_2
BINNMAPR_2 BINNPRSE_2 BINNOPROC_2 JCHALLOC_2 /MISSING LISTWISE
/ANALYSIS  EPLANN_2  FTAUTON_2  CONJOB_PERC_MS  HRLONG_2
HRINTERN_2 HFLEXI_PERC_MS HACCUOV_2 GACTEDE_2 HTRAIN_PERC_MS
HAPRAIS_PERC_MS ELELEDOC_2 HVPGRPE_2 HVPPRS_2 HVPSHOW_2
EHIERA_NEW_MS  EHIERARCH_2  IINIMWPP_2  IINIMPEA_2  EEXTEMON_2
BINNMAPR_2 BINNPRSE_2 BINNOPROC_2 JCHALLOC_2
/PRINT INITIAL EXTRACTION ROTATION
/CRITERIA MINEIGEN(1) ITERATE(25)
/EXTRACTION PC
/CRITERIA ITERATE(25)
/PLOT EIGEN
/ROTATION VARIMAX
/METHOD=CORRELATION.

```

Constructing seven factors

Our analysis revealed seven factors and did not deliver a factor structure that conformed to the Fifth Element. Apparently the selected items are represented by different factors. There can be theoretical and/or practice reasons for this. Further research is needed to look into this result. We decided to use the seven factors to construct variables for the Workplace Innovation-index (WPI) to select the companies. Four items (CONJOB_PERC_MS, HACCUOV_2, EHIERA_NEW_MS, EEXTEMON_2) were excluded because they didn't load on a specific factor. We calculate the WPI as a sumscore of these separate factors. This means that we give each of these elements the same weight in the final WPI. At this moment, we do not have any other theoretical starting point to do this differently. The factors and their items and mean score calculations as well as the final WPI score calculation can be found below:

- › *factor 1: innovation.

```

COMPUTE  Y_innovation=MEAN.4(GACTEDE_2,  BINNMAPR_2,  BINNPRSE_2,
BINNOPROC_2, JCHALLOC_2).
EXECUTE.

```

- › *factor 2: voice.

```

COMPUTE Y_voice=MEAN.2(IINIMWPP_2, IINIMPEA_2).
EXECUTE.

```

- › *factor 3: learning and reflection.

```

COMPUTE  Y_learn_reflect=MEAN.3(HTRAIN_PERC_MS,  HAPRAIS_PERC_MS,
ELELEDOC_2).
EXECUTE.

```

- › *factor 4: Structure and system.

```

COMPUTE Y_struct_syst=MEAN.3(HVPGRPE_2, HVPPRS_2, HVPSHOW_2).
EXECUTE.

```

- › *factor 5: work organization autonomy.

```

COMPUTE Y_work_org_auton=MEAN.3(EPLANN_2, FTAUTON_2,
HFLEXI_PERC_MS).
EXECUTE.

```

- › *factor 6: work organization career.

```
COMPUTE Y_work_org_career=MEAN.2(HRLONG_2, HRINTERN_2).  
EXECUTE.
```

- › *factor 7: hierarchy.

```
EHIERARCH_2
```

- › *mean 7 factors FINAL WPI measure.

```
COMPUTE Y_WPI_7_FINAL=MEAN.5(Y_innovation, Y_voice, Y_learn_reflect,  
Y_struct_syst, Y_work_org_auton, Y_work_org_career, EHIERARCH_2).  
EXECUTE.
```

Extra variables for the ID selection of companies

- › *Country variable 14 _____.

```
*1 Belgium 2 Bulgaria 3 Czech Republic 4 Denmark 5 Germany 7 Ireland 8 Greece 9 Spain  
15 Lithuania 19 Netherlands 21 Poland 22 Portugal 27 Sweden 28 United Kingdom.  
RECODE country (1=1) (2=2) (3=3) (4=4) (5=5) (7=7) (8=8) (9=9) (15=15) (19=19)  
(21=21) (22=22) (27=27) (28=28) (ELSE=SYSMIS) INTO Country_14.  
VARIABLE LABELS country_14 '14 selected countries'.  
EXECUTE.
```

- › *Establishment size 3 categories_____.

```
RECODE S_C_estabsize (1=SYSMIS) (2=SYSMIS) (3=SYSMIS) (4=1) (5=2) (6=2)  
INTO S_C_estabsize_2.  
VARIABLE LABELS S_C_estabsize_2 'sysmis < 50,1 >= 50-249, 2 >= 250'.  
EXECUTE.
```

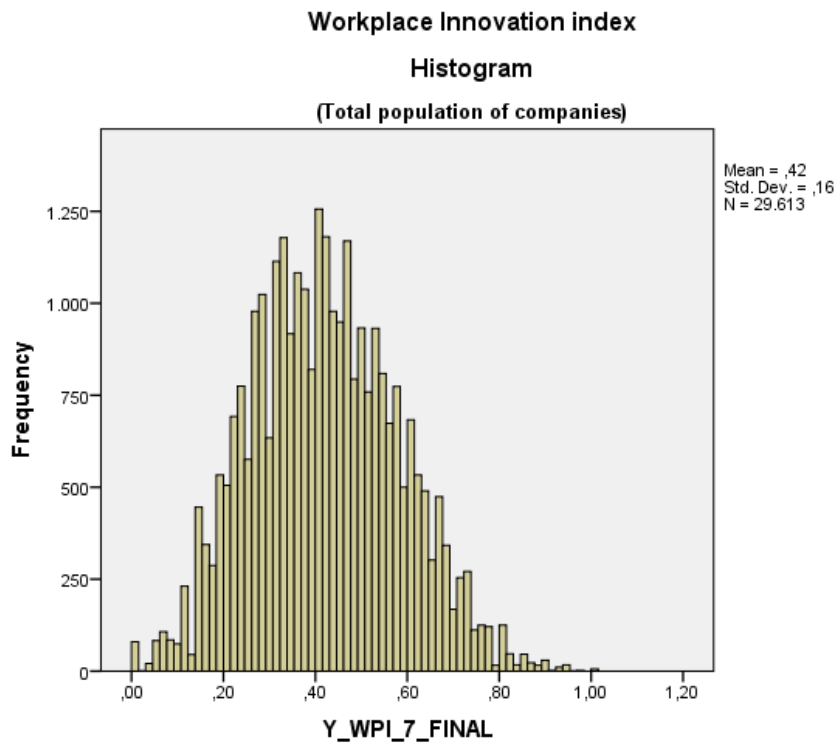
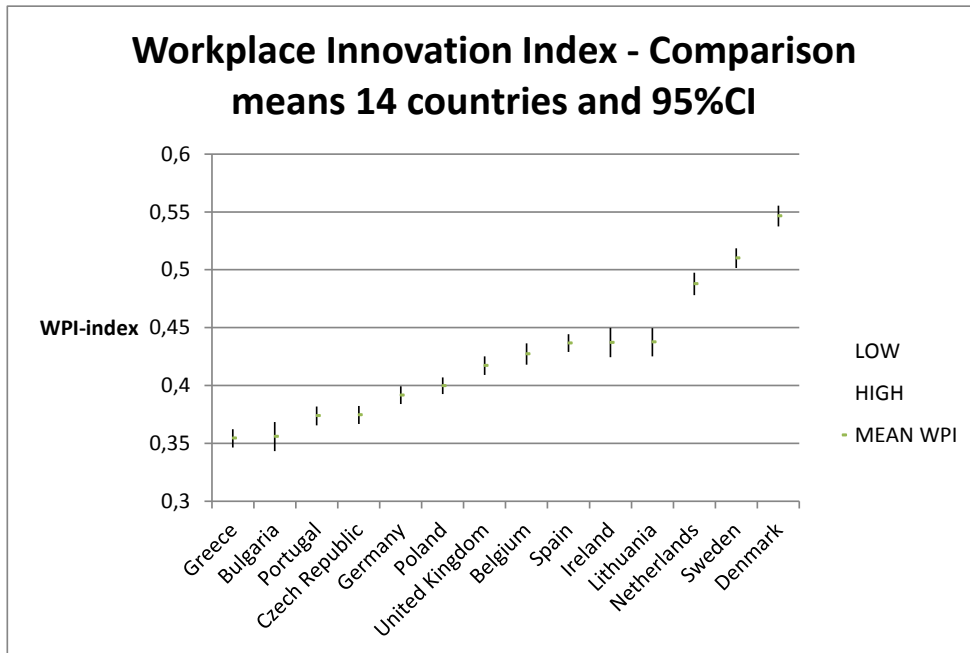
- › *only establishments willing to participate.

```
RECODE MFOLLOW (1=1) (2=SYSMIS) (8=8) (9=9) INTO MFOLLOW_2.  
VARIABLE LABELS MFOLLOW_2 '2 is missing'.  
EXECUTE.
```

- › *Selecting companies + WPI score gesorteerd op land en establishment size.

```
SUMMARIZE  
/TABLES=ID Y_WPI_7_FINAL nace_r2_1 BY S_C_estabsize_2 BY Country_14  
/FORMAT=VALIDLIST NOCASENUM TOTAL LIMIT=5000  
/TITLE='Case Summaries'  
/MISSING=VARIABLE  
/CELLS=COUNT.  
VAL Labels country_14 1 'Belgium' 2 'Bulgaria' 3 'Czech Republic' 4 'Denmark' 5 'Germany' 7  
'Ireland' 8 'Greece' 9 'Spain' 15 'Lithuania' 19 'Netherlands' 21 'Poland' 22 'Portugal' 27 'Swe-  
den' 28 'United Kingdom'.
```

Annex 4 Distribution of Companies Using the WPI



Annex 5 Selection of Companies for Each of the 14 Countries

We have only selected those companies that have agreed to be re-contacted.

a. Companies with 50 to 249 employees.

EU	BE	BG	CZ	DK	DE	EE	ES	FR	GB	GR	HR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	

b. Companies with 250+ employees

High	EU	BE	BG	CZ	DK	DE	EE	ES	FR	GB	GR	HR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	