A Validation Study of the Quality of Employment Indicators[1]

Prepared for the Task Force on the Measurement of Quality of Employment

By

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EXECUTIVE SUMMARY

This study supports the work of UNECE Task Force on the Measurement of the Quality of Employment. The main objective is the analysis of the 30 indicators proposed by the Task Force at the empirical level on a sub-set of European countries. Specifically, the study intended to evaluate first of all the actual possibility of building the variables, following the assessment of data availability and of the existence of a univocal operational definition. Secondly, it aimed at studying the relationships among variables to assess to what extent the associations among indicators hypothesised at the theoretical level were confirmed by the empirics. Lastly, as suggested by the Decent Work framework, some information related to labour market legislation and social protection in the countries of interest was also included in addition to the quantitative indicators.

The study starts from the review of data stored in several electronic databases maintained by international organizations: Eurostat, ILO, UNECE, World Bank and European Foundation. Several of the indicators requiring further processing were provided by Eurostat. Beside their availability, for each indicator we collected information on the data-source, its precise definition and the formula for its computation.

The final number of computed variables is higher than the number of proposed indicators. The indicators, in fact, are often expressed in a generic form. Thus, for some indicators we identified many suitable variables with the intent to select the best ones throughout the study. Altogether, their number amounted to 66 quantitative and 22 legislative variables. The study selected a sub-set from these original variables on the basis of the following criteria: clear and simple operational definition; fair degree of standardization of the variable; availability of the information for the majority of European countries; non-redundancy of the information; significant and easily interpretable relationship with the other variables of the same dimension.

The mono and bi-variate statistical analysis was aimed at a study of the variables, observing their frequency distributions, and their two-by-two correlation. The multivariate analysis completes the study, allowing the simultaneous and synthetic visualization of the relationships among all variables.

In general, the study pointed at a fair extent of data availability within the European countries: only eight indicators were not readily available. Data for the remaining 22 indicators were collected by nearly all countries, although not to the same extent. The preliminary screening by means of mono- and bi-variate statistical analysis identified a list of 24 quantitative and 11 legislative variables which were more suitable for the empirical study according to the above-mentioned criteria.

The multivariate analysis showed the relationships among the variables within each dimension and those among the dimensions, highlighting the multidimensionality of the concept of quality of employment. The several dimensions are, in fact, closely intertwined among them. Furthermore, it confirmed the existence at the empirical level of the associations hypothesised at the theoretical level. Additionally, it showed the complexity of the legislative contexts and the relevance of taking into account the normative frame to better interpret the meaning of quantitative indicators. As a matter of fact, countries with similar values of the quantitative variables may present distinct legislative contexts and vice-versa.

Drawing from the results of the validation study, we would recommend that efforts are directed at finding the right balance between precision and computability when constructing indicators. Moreover, with regard to the criteria of parsimony and comparability, it would be useful to distinguish between indicators of specific interest for analysis at a national level and those more suitable for international comparison in the future. In respect to the legislative indicators, a standard methodology to define them is needed, in order to translate labour regulations into indicators and variables which are comparable across countries. In this direction, valuable work is already being done by ILO.

On the whole, the empirical study confirms the multidimensionality of the concept of quality of employment and the importance to consider both quantitative and legislative indicators to achieve a satisfying representation. At a national level this does not pose a problem since the individual country will use the framework in relation to its specific market labour conditions. In this respect, the assessment of indicators variability among countries may be performed for each single country analyzing internal differences among sub-populations (gender, nationality, age

classes, etc.). The stability of the empirical model within the local contexts is a further proof of the adequacy of the theoretical framework.

INTRODUCTION[2]

This study supports the work of United Nations Economic Commission for Europe (UNECE) Task Force on the Measurement of the Quality of Employment. It reports the main findings from an in-depth analysis of the indicators proposed by this Task Force and aims at identifying those that are most suitable to measure the seven dimensions composing quality of employment.

The main objective is the analysis of the relationships among the indicators at the empirical level. To do so, we will first assess whether - and to which extent - the indicators theoretically hypothesised as associated with each dimension are empirically so and second analyse the interplay between the seven dimensions. To this end, some pre-conditions are required: (i) a clear operational definition of the indicators; (ii) a sufficient number of cases on which the analysis of the indicators' variability will be based; and (iii) the availability of homogeneous information for all considered cases. In order to attain the objective, the availability and variability of the indicators in a set of European countries has been studied. The use of more countries is thus instrumental in order to test at the empirical level the foreseen relationships among the indicators.

A first, preliminary phase of the present study consists of a careful review of data availability. Electronic databases - created and maintained by international organizations such as the International Labour Organization (ILO), UNECE and the Statistical Office of the European Union (EUROSTAT) - were explored. Then, in accordance with the Steering Committee, Eurostat was asked to provide figures for those indicators that were not available in Eurostat's online database. This phase represented a major challenge, due to the objective difficulty of measuring quality of employment: not all proposed indicators in fact were available or were so for all countries.

The subsequent phase involved a thorough examination of the reviewed indicators, performed also by means of univariate and multivariate statistical techniques.

The aim of this phase was two-fold: (i) the evaluation of the effectiveness and adequacy of the selected indicators to capture and describe each dimension of quality of employment and (ii) the identification of the most suitable indicators to ensure comprehensiveness while avoiding information redundancy.

Mono-variate and bi-variate statistical analyses aimed at a first study of the variables, observing their frequency distributions and their two-by-two correlation. The multivariate analysis completes the study, allowing the simultaneous and synthetic visualization of the relationships among all variables.

Lastly, the study also highlights the relevance of indicators for the statistical framework suggested by the Task Force as well as provides evidence of the applicability of the quality of employment indicators to ILO's approach to measure Decent Work. In particular, we will consider some legislative indicators in order to study the relationship between quality of employment indicators and the legislative framework.

1. METHODOLOGY OF THE STUDY

1.1. Comparing Quality of Employment and Decent Work frameworks

The choice of indicators to be included in the validation study followed a thorough review by the Task Force of all the documents produced for the UNECE/ILO/EUROSTAT Seminar on Quality of Work in 2007 and of the documents prepared within the framework of Decent Work of ILO.

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[2] Report prepared by Federica Pintaldi (coordinator and Introduction, section I, Sections 2.1, 2.1.8, 2.2, 2.4), Francesca Della Ratta (Sections 2.1.7, 2.3), Francesca Fiori (Sections 2.1.4, 2.1.5, 2.1.6, Annex 2) and Elisa Marzilli (Sections 2.1.1, 2.1.2, 2.1.3, Annex1) of ISTAT.

To start, we compared the dimensions proposed within the framework of quality of employment to those of the ILO framework on Decent Work in order to highlight similarities and differences. The first five dimensions proposed by quality of employment framework (consisting of Safety and ethics of employment, Income and benefits from employment, Working hours and balancing work and non-working life, Security of employment and social protection, Social dialogue) are also included in the ILO Decent Work framework. The other two dimensions (Skills development and life-long learning, Workplace relationships and intrinsic nature of work)[3] are specific of the quality of employment framework, whereas the dimension Employment opportunities is only included within the ILO framework. Table 1 provides a comparison of the two frameworks at the dimension and indicator levels.

The Quality of Employment framework includes 30 main indicators while ILO framework on Decent Work includes 18 main indicators and some additional normative information on working rights. The two frameworks present 5 indicators in common. Furthermore, there are some other indicators of fundamental relevance within one framework but playing an additional role within the other.

In the following phases of the study the focus had mainly been on the 30 indicators proposed by the framework on the Quality of Employment.

[3] Regarding dimensions 6 and 7, we should consider that the structure of the dimensions of the quality of employment framework follow a logic that reflects a priority for human needs that may be satisfied through employment. Therefore, these dimensions have less to do with the provision of basic human needs of safety and sustenance but, rather, describe many modern-day expectations from work. In the latest version of the conceptual paper, dimension 6 was renamed as Skills development and training and dimension 7 was renamed Workplace relationships and work motivation.

Table 1. Comparison between Quality of Employment framework and Decent Work framework: dimensions and indicators

Quality of employment	Decent Work	Indicators (main and fully accepted)
Safety and ethics of employment Safety at work Child labour and forced labour Fair treatment in employment (exceptional case: statistics should be produced across all dimensions for as many indicators of quality of employment as possible for the groups which may be relevant for individual countries)	8. Safe work environment 5. Work that should be abolished 7. Equal opportunity and treatment in Employment	**QE and DW** Fatal occupational injury rate (Workplace fatalities per 100,000 employees) **QE** Non-fatal occupational injury rate (Workplace accidents per 100,000 employees) Share of employees working in "hazardous" conditions Employment of persons who are below the minimum age specified for the kind of work performed Employment of persons below 18 years in designated hazardous industries and occupations. Employment of persons below 18 years for hours exceeding a specified threshold **DW** Child labour (draft ICLS resolution) Occupational segregation by sex Female share of employment in ISCO-88 groups 11 and 12 [L] Child labour (incl. public policies to combat it) [L] Forced labour (incl. public policies to combat it) [L] Anti-discrimination law based on sex of worker [L] Anti-discrimination law based on race, ethnicity, religion or national origin [L] Occupational safety and health insurance [L] Labour inspection

Income and benefits from employment Income Non-wage pecuniary benefits	2. Adequate earnings and productive work	**QE and DW** Low pay (share of employed with below 2/3 of median hourly earnings) **QE** Average weekly earnings of employees Share of employees using paid annual leave in the previous year Average number of days paid annual leave used in the previous year Share of employees using sick leave **DW** Working poor [L] Statutory minimum wage
Quality of employment	**Decent Work**	**Indicators (main and fully accepted)**
Working hours and balancing work and non-working life Working hours Working time arrangements Balancing work and non-working life	3. Decent hours 4. Combining work, family and personal life	**QE and DW** Share of employed persons working 49 hours and more per week **QE** Average annual (actual) hours worked per person Share of employed persons working less than 30 hours per week involuntarily Percentage of employed people who usually work at

		night/evening Percentage of employed people who usually work on weekend or bank holiday Share of people with flexible work schedule Ratio of employment rate for women with children under compulsory school age to the employment rate of all women aged 20-49 Share of people receiving maternity/ paternity/family leave benefits **DW** [L] Maximum hours of work [L] Paid annual leave [L] Maternity leave (incl. weeks of leave, replacement rate and coverage)
Security of employment and social protection Security of employment Social protection	6. Stability and security of work 9. Social security	**QE and DW** Public social security expenditure as share of GDP **QE** Percentage of employees 25 years and older with temporary jobs Percentage of employees 25 years and older with job tenure (< 1 yr, 1-3 yrs, 3-5 yrs, ≥ 5yrs) Share of employees covered by unemployment insurance Share of economically active population contributing to a pension fund **DW** Share of population aged 65 and above benefiting from a pension

		Stability and security of work (developmental work to be done by the Office). Incapacity for work due to sickness / sick leave Incapacity for work due to invalidity [L] Employment protection legislation (including notice of termination in weeks) [L] Pension (public / private)
Quality of employment	**Decent Work**	**Indicators (main and fully accepted)**
Social dialogue	10. Social dialogue, workers' and employers' representation	**QE and DW** Share of employees covered by collective wage bargaining **QE** Average number of days not worked due to strikes and lockouts (per 1,000 employees) **DW** Union density rate Enterprises belonging to employer organization Indicator for Fundamental Principles and Rights at Work [L] Freedom of association and right to organize [L] Collective bargaining right [L] Tripartite consultations
Skills development and life-long learning	-	**QE** Share of employed persons in high skilled occupations

		Share of employees who received job training within the last 12 months Share of employed who have more education than is normally required in their occupation Share of employed who have less education than is normally required in their occupation
7. Workplace relationships and intrinsic nature of work a) Workplace relationships b) Intrinsic nature of work	-	No indicators proposed
-	1. Employment opportunities	**DW** Employment-to-population ratio, 15-64 years Unemployment rate Youth not in education and not in employment, 15-24 years Informal employment [L] Government commitment to full employment [L] Unemployment insurance
-	11. Economic and social context for decent work	**DW** Children not in school (% by age) % of working-age population who are HIV positive Labour productivity (GDP per employed person) Income inequality (percentile ratio P90/P10) Inflation rate

		Employment by branch of economic activity Education of adult population Labour share in GDP

1.2. Indicators included in the validation study

As mentioned in the introduction, the project's first step involved the assessment of the indicators' availability. We started from the review of the data stored in several electronic databases maintained by recognized international organizations: Eurostat, ILO, UNECE, World Bank and the European Foundation. Beside their availability, for each indicator we collected information on the data-source, on the dimension of the framework, its precise definition and the formula to compute it. Space was also dedicated for additional clarifying comments (Annex 1). As regards the European countries, only eight of the proposed indicators were not available. Data for the other 22 indicators were collected by nearly all countries, although not to the same extent (Table 2). The indicators were thus classified into five groups according to their degree of availability: those directly available from online databases, those requiring further processing and elaboration, those replaceable by similar information, those completely unavailable. Several of the indicators requiring further processing were made available by Eurostat, which computed all the variables we needed for the validation study.[4]

Table 2. Availability of indicators

Availability	**N**
Yes, directly from electronic database or publication	6
Yes, with an elaboration from electronic database	5
Yes, but a specific elaboration is needed (not from electronic database)	6
No, but available similar data	5
No, data not available	8
Total	**30**

With specific regard to the dimension 7 *Workplace relationships and intrinsic nature of work*, however, the Task Force has not yet reached a commonly accepted set of indicators. Therefore, we decided to consider some of the variables proposed by the members of the Task Force. Specifically, the selected variables come from the Fourth European Working Conditions Survey.

We should highlight that the final number of computed variables is higher than the number of proposed indicators. The indicators, in fact, are often expressed in a generic form that may point at several variables. We identified for some indicators many suitable variables with the intent to select the best throughout the study. For instance, the indicator "Share of employed persons in high-skilled occupation". Depending on the choice of occupations classified as highly skilled, the variable referred to this specific indicator could be one of the following:

(i) Incidence of employed in ISCO1

(ii) Incidence of employed in ISCO2

(iii) Incidence of employed in ISCO3

(iv) Incidence of employed in ISCO1_2_3

(v) Incidence of employed in ISCO2_3

With specific regard to the above-described example and, following the principle of parsimony, we decided to include only the last variable, as it did not present any difficulty in its computation and at the same time is strongly correlated with the others (Section 2.1.6).

4 Eurostat calculates several variables from LFS and SES.

Furthermore, the reference population used as the denominator may also vary. The incidence rate could be computed over total population, or over population in employment only, thus yielding to differing variables. It thus becomes clear that every single indicator may be operationalized in different ways, thus requiring different variables. Altogether, the number of computed variables originally amounted to 66. It should be born in mind that the required information was not always available for all selected countries.

In addition to the quantitative indicators, some information related to labour market legislation and social protection was also included. As a matter of fact, the normative framework on working conditions is deeply connected to the quality of employment and, we believe that the inclusion of this additional information may provide useful insights for the measurement of the quality of employment itself.

The great majority of indicators derive from the proposals of the Task Force on the Measurement of Quality of Employment or from the ILO framework on decent work. Following international recommendations, they are practical, simple and produced from data programs common in many countries. Several indicators were drawn from the database Condition of Work and Employment Laws of the ILO. Other indicators related to working conditions laws were collected from Doing Business of the World Bank.

1.3. Selected countries

This project aims at the evaluation of a set of indicators related to the quality of employment. In particular the project had to test the covariance among some quality of employment indicators surveyed by twenty countries that are members of UNECE. Not all countries, however, were included in the study. The criteria of selection were:

Eurostat database: a group of 32 countries that belong to the European area were selected. This selection concerned both EU Member States and non-EU member states;

Availability of indicators: the selection was restricted to those European countries for which almost all indicators were available;

Comparability of indicators: only those European countries which adopted the same methodology and standard to collect the data were selected;

Consistency of employed population: those countries with a number of employed population smaller than 500,000 were not considered;

Variability: a robustness analysis may be needed to ascertain whether the contexts are sufficiently different. We paid particular attention to take into consideration both EU Member States and non-EU member states, in order to verify the indicators in different contexts.

Based on a first review, we selected 22 countries for the analysis (Table 3). For each country we tested the variables selected about the quality of employment dimensions.

Table 3. Countries selected for analysis

Austria	Finland	Italy	Portugal
Belgium	France	Latvia	Slovakia
Czech Republic	Germany	Lithuania	Slovenia
Denmark	Greece	Netherlands	Spain
Estonia	Hungary	Norway	Sweden
		Poland	United Kingdom

1.4. The steps of analysis

The core part of the analysis was aimed at selecting the best variables for the measurement of the seven dimensions of quality of employment drawing from the originally identified 66 quantitative variables. It should be noted that we do not mean to express any judgement on the suitability of the variables from a theoretical point of view - as this has already been done by the Taskforce; rather our efforts had the intent of evaluating empirically their interdependence.

We started from computing the univariate summary statistics (mean, minimum, maximum, standard deviation). Those indicators with scarce variability across countries (nearly constant values) have been excluded, as No significant association to the other variables could be detected. Furthermore, according to the criteria of comparability, those variables with anomalous distributions or outliers have also been excluded, as they were often consequence of different operational definitions and thus were difficult to interpret.

Then, we calculated the correlations. The intent was to further select the variables, observing their relationships and eliminating those highly correlated to avoid redundancy of information. As a matter of fact, when two variables are strongly correlated this often implies that they express approximately the same information. Moreover, when an indicator presented more than one operational definition, the analysis of correlations helped us in selecting the most significant variable. All other conditions being equal, the selected variable is the one that is easier to compute.

Through this preliminary screening, we were able to distinguish between the examined indicators, a list of 24 core variables on the quality of employment with the advantage of: (i) being available for the majority of countries; (ii) having a sufficiently significant variability across countries; and (iii) being not excessively correlated among themselves.

Lastly, by means of a Principal Components Analysis (PCA) we observed simultaneously the performance and the relationship of the quantitative variables in the 22 countries. At this stage, we had restricted the scope of our study to 22 selected variables. Besides the variables with anomalous or constant distribution and those providing redundant information, we had to exclude also those which were not available for all analysed countries. The main purpose of the PCA is to synthetically show the relationships among variables in a graphically intuitive way, thus facilitating the comparison between the theoretical model and the empirical findings.

With regard to the legislative variables on the countries' normative framework, we started form the analysis of their univariate frequency distributions, in order to assess their variability. Similar categories with too few cases were collapsed. Subsequently we carried out Multiple Correspondence Analysis (MCA) to summarize the group of legislative indicators. MCA is a technique of factorial analysis, whose approach and findings are analogous to the PCA, but applied to categorical qualitative variables.

2. EMPIRICAL STUDY

2.1. Variables collected for each dimension of Quality of Employment

For reasons of data availability and comparability, the variables used in the validation study come mainly from the Labour Force Survey (LFS). Other sources are: European Working Conditions Survey (EWCS), Structure of Earnings Survey (SES), National Account (NA) and, administrative data.

This section presents main findings from the statistical analysis carried out on the collected variables. Their availability and ease of interpretation will also be discussed. Annex 1 and Annex 2 report for each indicator and for each variable a more detailed theoretical and operational definition and its data source. The selection of the most relevant variables is based on the following criteria: (i) a clear and simple operational definition; (ii) availability of the information for the majority of countries; (iii) a fair degree of standardization of the variable (absence of anomalous distribution and of outliers); (iv) non-redundancy of the information (redundancy refers to a high correlation with other variables which are easier to compute); and (v) significant and easily interpretable relationship with the other variables of the same dimension.

2.1.1. Dimension 1. Safety and ethics of employment

Safety and ethics of employment consists of three sub-dimensions: *a) Safety of work; b) Child labour and forced labour; c) Fair treatment in employment*.

The sub-dimension *Safety of work* refers to unsafe job, risk of injury or death. Three indicators are proposed to measure it. As regards the first two indicators (Fatal occupational injuries rate and Non-fatal occupational injuries rate), the variables are available for most countries. There are No significant differences between the variables referring to all persons in employment and those referring to employees only (Table 4).

Table 4. Variables for dimension 1 Safety and ethics of employment

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Fatal occupational injuries rate					
Fatal injuries (per 100 000 in employment)	3.1	1.8	0.7	7.6	22
Fatal injuries (per 100 000 employees)	3.7	2.2	0.8	9.2	22
Non- fatal occupational injuries rate					
Standardized incidence rate of serious accidents at work (per 100 000 in employment)	2 970.0	1 224.0	1 130.0	5 715.0	14
Non-fatal injuries (per 100 000 in employment)	1 602.0	1 267.0	162.0	4 534.0	21
Non-fatal injuries (per 100 000 employees)	1 915.0	1 547.0	182.0	5 507.0	21
Work-related health problems in the past 12 months (per 100 in employment)	10.9	10.8	2.7	52.0	22
Work-related health problems in the past 12 months (per 100 employees)	10.7	10.6	2.4	51.6	22
Accidental injuries at work in the past 12 months (per 100,000 in employment)	3.1	1.6	0.9	6.8	22

However, there is currently No available data to build the third indicator (Share of employees working in hazardous conditions).

Figure 1. Fatal injuries (per 100 000 employees) and Non-fatal injuries (per 100 000 employees)

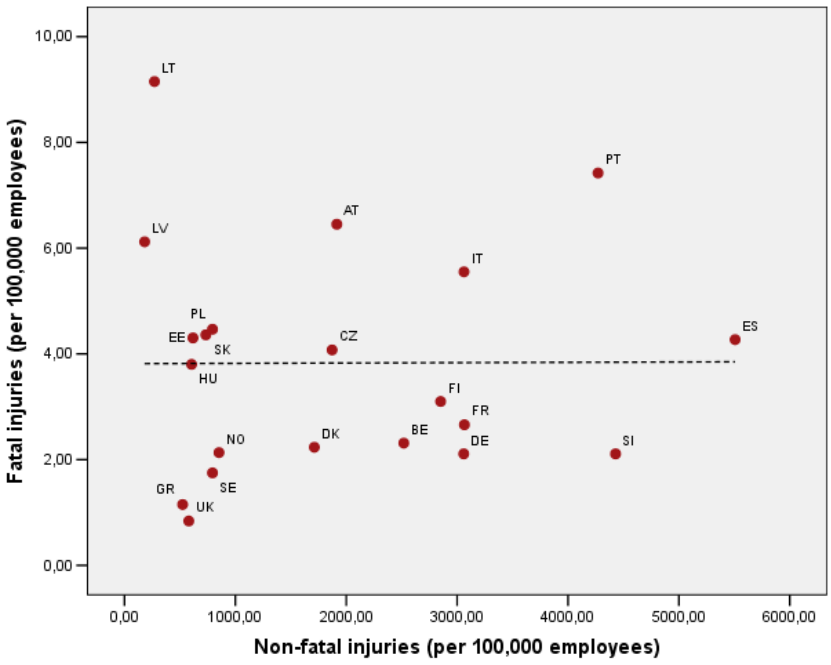
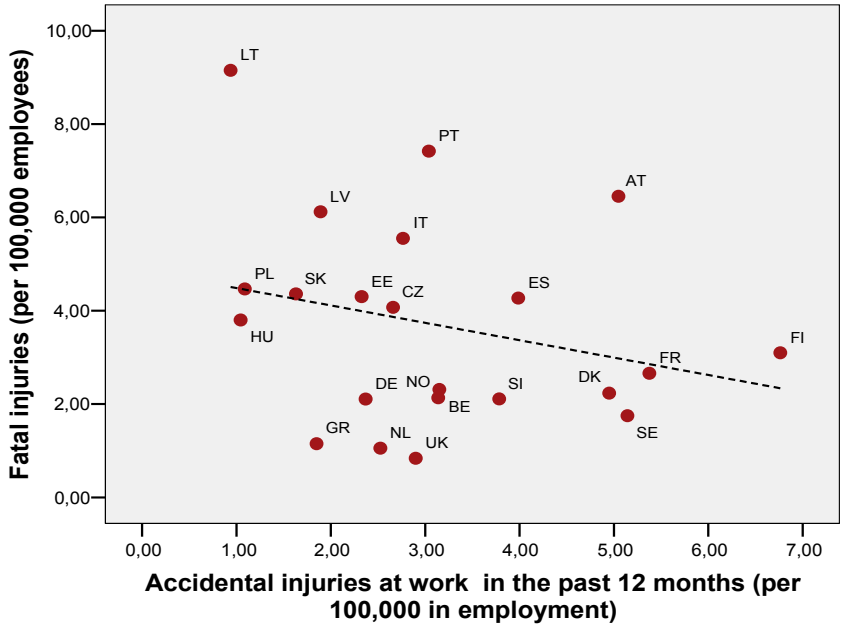


Figure 2. Fatal injuries (per 100 000 employees) and Accidental injuries at work in the past 12 months (per 100 000 in employment)



With respect to the comparability of indicators, often there was No standard definition. For instance, the variables related to the indicator Non-fatal occupational injuries rate proved not easy to compare. Standardized incidence rate of serious accidents at work is undoubtedly the best variable; unfortunately it was not available for all selected countries. Among the variables from LFS ad-hoc module 2007, Accidental injuries at work in the past 12 months is more homogeneous compared to Work-related health problems in the past 12 months.

As regards the second sub-dimension *(Child labour and forced labour*), the ILO Statistical Information and Monitoring Programme on Child Labour (SIMPOC) provides ample statistics on child labour. Data are available for several countries, but not for European countries.

The last proposed sub-dimension should have been *Fair treatment in employment*. However the most recent recommendation of the Task Force suggested adopting a different approach: rather than identifying specific indicators, it was recommended to produce as many quality of employment indicators as possible disaggregated by gender, race, ethnic minority and by any other sub-groups for which there might be fair treatment concerns.[5] Therefore, this sub-dimension is not considered in this study as a specific dimension on its own. It will rather be analyzed as a cross-cutting sub-dimension across all proposed indicators.

5 UNECE Task Force on the Measurement of Quality of Employment. Introduction of the Conceptual Framework for Measuring the Quality of Employment. Statistical Measurement of Quality of Employment: Conceptual framework and indicators. Note by the Task Force on the Measurement of Quality of Employment, ECE/CES/GE.12/2009/1, 2 September 2009. p. 10.

2.1.2. Dimension 2. Income and benefits from employment

Dimension 2 includes two sub-dimensions: *a) Income from employment; b) Non-wage pecuniary benefits*. The first should provide information on any compensation paid to employees, or on income from self-employment. The remuneration should be calculated on a gross basis. The indicators proposed by the task force are two: Average weekly earnings of employees and Low pay (Share of employed with below 2/3 of median hourly earnings). From the Structure of Earnings Survey we calculated three variables for the first proposed indicator and two variables with regard to the second indicator; they include only employees in enterprises with at least ten employees excluding some NACE branches (agriculture, fishing, public administration, private households and extra-territorial).

The first three variables (mean monthly earning and median hourly earning full-time and part-time) show a high correlation (about .98). Thus, we may consider sufficient to keep only one of them. The other two (below ½ of median hourly earnings full time and part-time) have a lower correlation (.69). However, we preferred the variable referring to full-time employees rather than to part-time employees, since it presents a less concentrated distribution (Figure 3). This implies that income inequalities are captured to a greater extent.

As expected, the value of the correlation coefficient between the two selected variables is negative (-.55). Moreover, low pay is a useful indicator to differentiate countries with similar mean earnings (Figure 4).

Table 5. Variables for dimension 2a Income from employment

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Average weekly earnings of employees					
Mean monthly earnings, €	1 631.0	960.0	421.0	3 504.0	22
Median hourly earnings FT, €	9.8	6.5	2.0	22.5	22
Median hourly earnings PT, €	8.0	5.2	1.6	18.0	22
Low pay					
Below ½ of median hourly earnings FT, per cent	5.0	4.7	0.0	18.3	22
Below ½ of median hourly earnings PT, per cent	3.8	5.2	0.0	18.3	22

Figure 3. Below ½ of median hourly earnings full time and Below ½ of median hourly earnings part-time

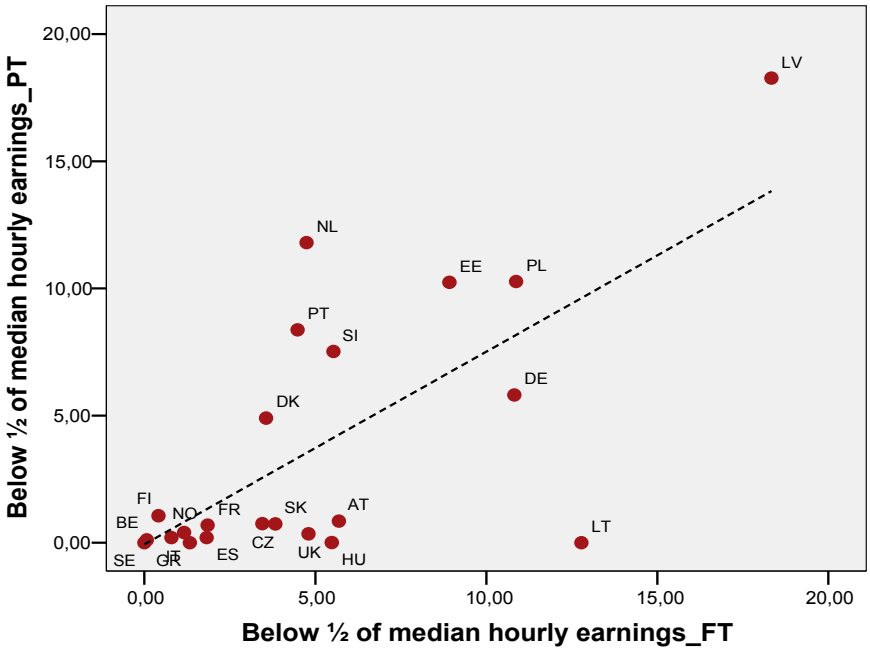
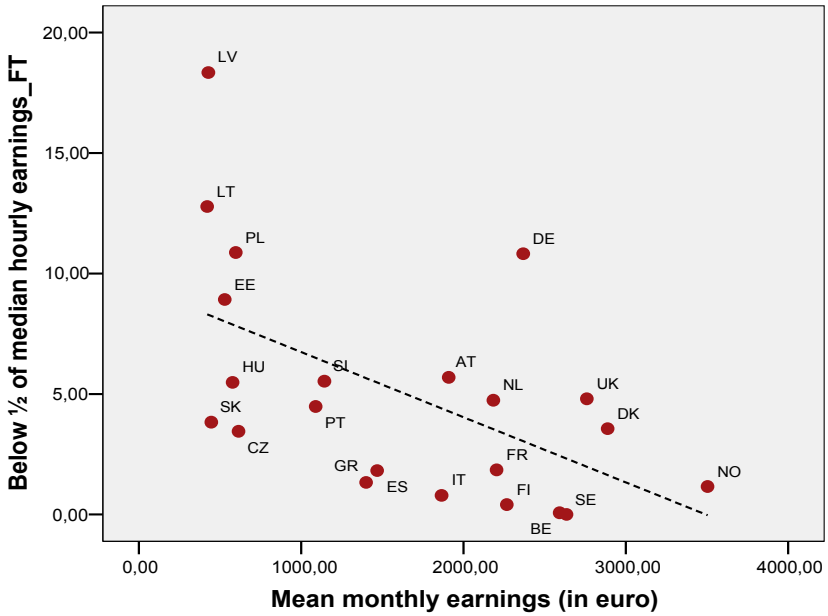


Figure 4. Mean monthly earnings and Below ½ of median hourly earnings full time



The sub-dimension *Non-wage pecuniary benefits*, that covers information on non-monetary remuneration, includes three indicators: (i) Share of employees using paid annual leave in the previous year, (ii) Share of employees using sick leave and (iii) Average number of days paid for annual leave used in the previous year. We found information only for the last indicator. In particular, the variable paid annual vacation comes from Doing Business[6] while Mean annual holiday comes from SES. Both surveys consider only some employees.

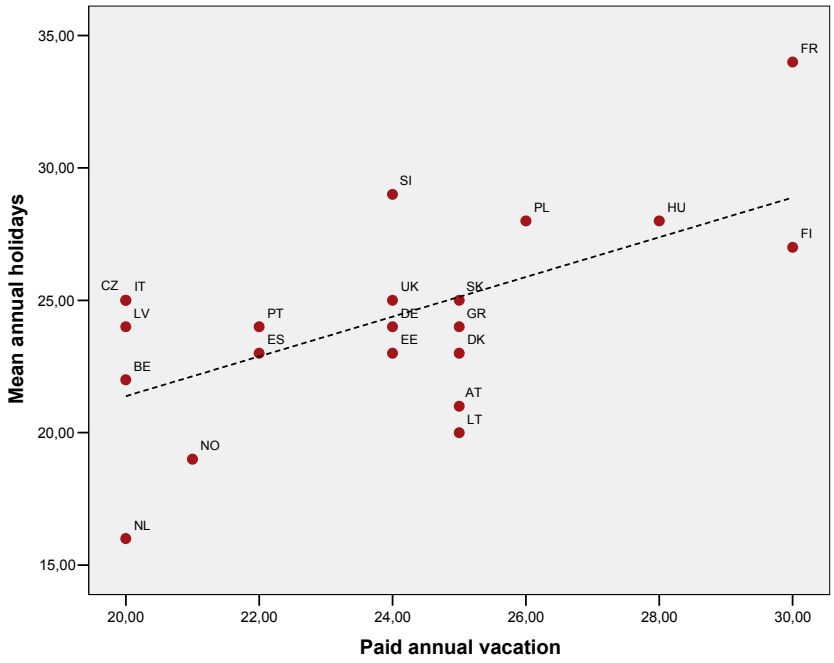
The two variables have the same mean but different range (Table 6). The first has only a few values; the second presents some outliers (Figure 5). Therefore we have decided to exclude both variables from the multivariate analysis.

Table 6. Variables for dimension 2b Non-wage pecuniary benefits

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Average number of days paid annual leave used in the previous year					
Paid annual vacation	24	3	20	30	22
Mean annual holidays	24	4	16	34	21

Figure 5. Paid annual vacation and Mean annual holidays

6 See footnote 10.



2.1.3. Dimension 3. Working hours and balancing work and non-working life

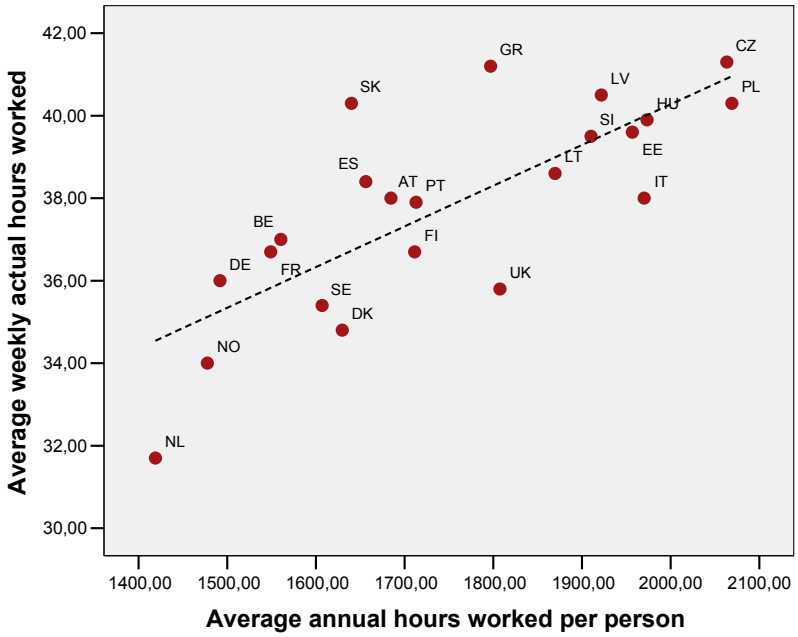
Dimension 3 consists of three sub-dimensions: *a) Working hours b) Working time arrangements; and c) Balancing work and non-working life*. Several indicators regarding the number of hours worked were proposed for the first sub-dimension (Table 7).

Table 7.Variables for dimension 3a hours worked

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Average annual (actual) hours worked per person					
Average annual hours worked per person	1 749.0	196.0	1 419.0	2 069.0	22
Average weekly actual hours worked	37.8	2.5	31.7	41.3	22
Share of employed persons working 49 hours and more per week					
Persons in employment working 49hours and more	10.4	4.5	1.8	17.1	22
Employees working 49hours and more	6.0	3.2	0.5	13.0	22
Self-employed working 49hours and more	35.2	13.0	5.0	58.2	22
Share of employed persons working less than 30 hours per week involuntarily					
Involuntary part-time (per 100 part-time workers)	20.7	10.2	4.9	42.8	22
Wishing to work more hours (per 100 in employment)	6.8	4.7	0.8	22.7	22

High correlation (r = .77) was observed between the two variables proposed for the indicator on average annual hours worked. We selected Average weekly actual hours worked as the data come from the LFS. Concerning long hours, we should always bear in mind the significant difference between employees and self-employed (Figure 7). Moreover, to improve the relevance of this indicator, it would be useful to consider also the involuntariness of the long hours.

Figure 6. Average annual (actual) hours worked per person and Average annual hours worked per person



The involuntariness is the aspect that defines the last indicator: Share of employed persons working less than 30 hours per week involuntarily. In this case we calculated two variables: Involuntary part-time (per 100 part-time) and Wishing more hours (per 100 in employment). The two variables show un-correlated distributions (Figure 8), also due to the different incidence of part-time workers in total employment among countries. Therefore we decided to use both variables.

Figure 7. Employees working 49 hours and more and Self-employed working 49 hours and more

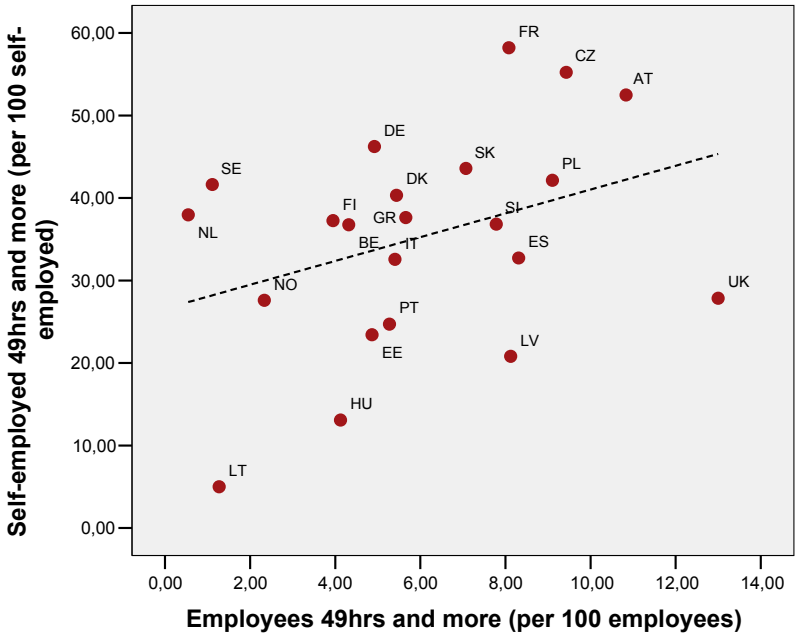
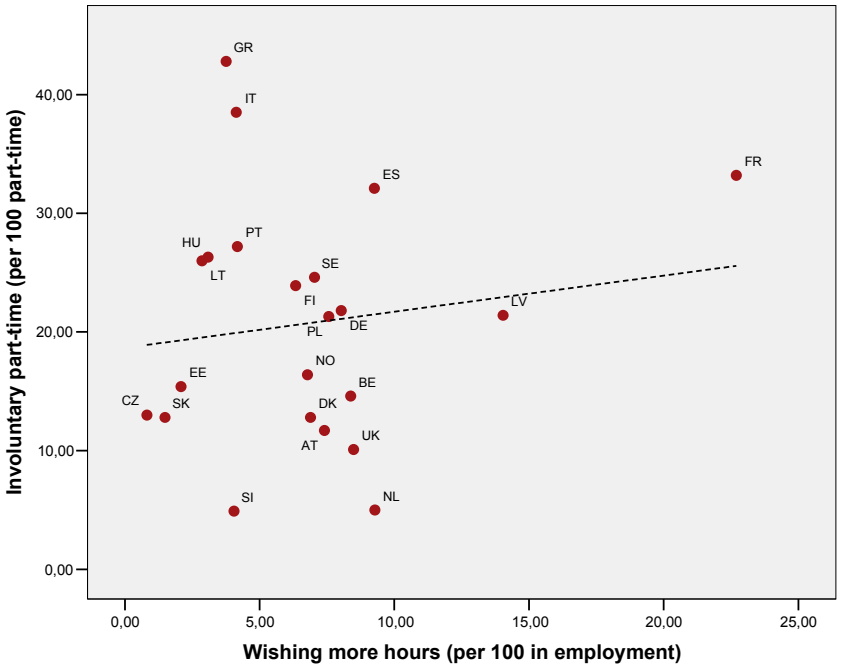

Self-employed 49hrs and more (per 100 self-employed)
60,00
50,00
40,00
30,00
20,00
10,00
0,00
FR
CZ
AT
DE
SK
PL
SE
DK
FI
GR
NL
BE
IT
ES
UK
NO
PT
LV
EE
HU
LT
0,00
2,00
4,00
6,00
8,00
10,00
12,00
14,00
Employees 49hrs and more (per 100 employees)

Figure 8. Involuntary part-time (per 100 part-time workers) and Wishing more hours (per 100 in employment)



The second sub-dimension, *Working time arrangements*, highlights unusual and flexible working schedules. Its first two indicators refer to employed people who usually work at night and/or in the evening and on weekend. The concept of unusual hours includes various working arrangement, from working on Saturdays to the heavier schedules involving working at nights. We selected the variables Usually work at night and Usually work on Saturday and Sunday. Again, we should not disregard the great difference between working arrangements of employees and of the self-employed.[7]

Table 8. Variables for dimension 3b Working time arrangements

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Share of employed people who usually work at night/evening, per cent					
Usually work at evening	17.9	6.5	7.3	31.4	22
Usually work at night	6.9	3.2	3.1	17.2	22
Share of employed people who usually work on weekend or bank holiday, per cent					
Usually work on Saturday	24.4	6.9	11.4	38.2	22
Usually work on Sunday	13.4	3.0	7.0	20.2	22
Usually work on Saturday and Sunday	12.3	3.0	6.8	19.8	22

7 For further details: "Dimension 3 - Working hours and balancing work and non-working life: working time arrangements" Federica Pintaldi, Task Force document for the meeting June 12 and 13 2008, Paris. http://www.unece.org/stats/documents/ece/ces/ge.12/2008/zip.6.e.pdf

Employees usually work on Saturday and Sunday	10.4	3.6	5.0	21.1	22
Self-employed usually work on Saturday and Sunday	23.9	9.8	6.3	41.8	22
Share of people with flexible work schedule, (per 100 in employment)					
Flexible working schedule	32.5	15.7	16.8	62.5	22

Figure 9. Employees usually working on Saturday and Sunday and Self-employed usually work on Saturday and Sunday

With respect to the indicator Flexible work schedule we did not find any variables that were systematically collected. Some information may possibly be found in the LFS Ad-Hoc Module 2004, Work organisation and working time arrangements. In particular, we considered the share of employees whose working days did not a fixed start and end. This variable shows a negative correlation with average weekly actual hours worked (-.69).

The last sub-dimension *Balancing work and non-working life* considers the role played by women in unpaid work and child care including two indicators (Table 9). The first indicator was computed using two different denominators: all women and women without children. The result is similar for both (r=.98). Unfortunately, there was No information for three of the selected countries (Denmark, Norway and Sweden).

Figure 10. Ratio of employment rate for women aged 20-49 with children 0-5 to the employment rate of women aged 20-49 without children and Parental leave taken by employees, women aged 15-64

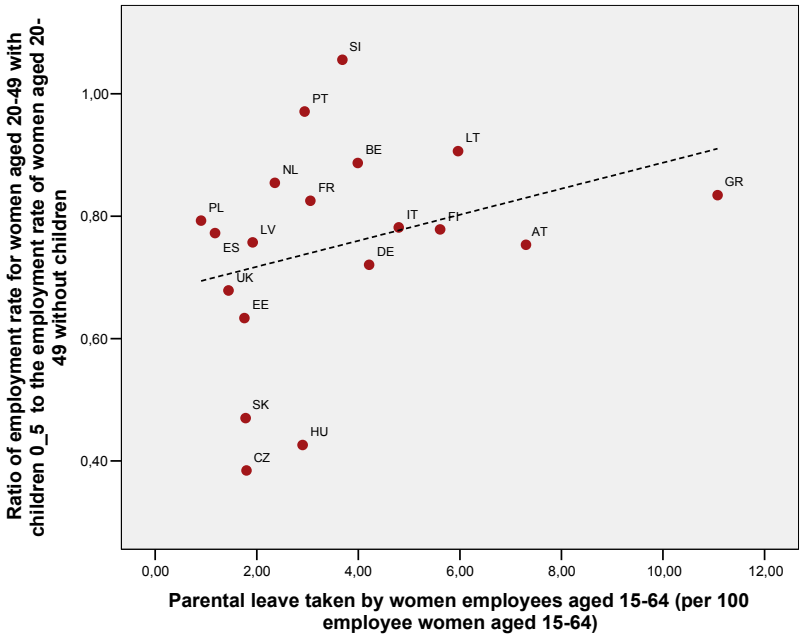

Ratio of employment rate for women aged 20-49 with children 0_5 to the employment rate of women aged 20-49 without children
1,00
0,80
0,60
0,40
SI
PT
LT
BE
NL
GR
FR
PL
IT
FI
LV
AT
ES
DE
UK
EE
SK
HU
CZ
0,00
2,00
4,00
6,00
8,00
10,00
12,00
Parental leave taken by women employees aged 15-64 (per 100 employee women aged 15-64)

Table 9. Variables for dimension 3c Balancing work and non-working life

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Ratio of employment rate for women with children under compulsory school age to the employment rate of all women aged 20-49					
Ratio of employment rate for women aged 20-49 with children 0_5 to the employment rate of women aged 20-49	0.80	0.15	0.45	0.99	19
Ratio of employment rate for women aged 20-49 with children 0_5 to the employment rate of women aged 20-49 without children	0.75	0.17	0.38	1.06	19
Share of people receiving maternity/ paternity/family leave benefits					
Parental leave taken by persons aged 15-64 (per 100 in employment aged 15-64)	2.5	2.6	0.4	13.0	22
Parental leave taken by women aged 15-64 (per 100 women in employment aged 15-64)	3.7	2.8	0.8	13.1	22
Parental leave taken by men aged 15-64 (per 100 men in employment aged 15-64)	1.5	2.7	0.0	12.9	22
Parental leave taken by employees aged 15-64 (per 100 employees aged 15-64)	2.8	2.8	0.4	13.6	22
Parental leave taken by women employees aged 15-64 (per 100 employee women aged 15-64)	4.2	3.1	0.9	13.4	22

The second indicator considers people receiving family leave benefits. In this respect, information was obtained from the LFS Ad-Hoc Module 2005, Reconciliation between work and family life. We calculated four variables relating to parental leave by sex and status in employment. The correlations between the more generic variable Parental leave taken by persons aged 15-64 (per 100 in employment aged 15-64) and all the others are very high (nearly .90). Moreover, this variable is not easy to interpret since the share of employed people with children varies significantly among countries. It would be better to use only employed people involved in family care as the denominator. We also controlled for the relationship between the first and the second indicator, the latter considered with reference to employees women only (Figure 10).

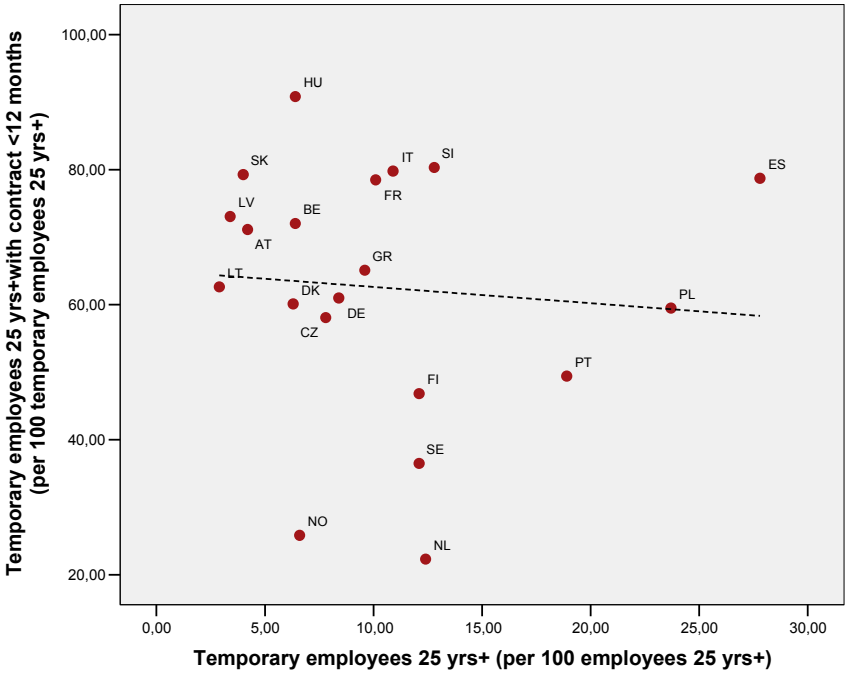
2.1.4. Dimension 4. Security of employment and social protection

Dimension 4 includes *a) Security of employment and b) Social protection*. For the first sub-dimension, two indicators were proposed and they both refer to employees in temporary positions: Share of employees aged 25 years and older with temporary jobs and Share of employees aged 25 years and older with different job tenure. The variables were computed both with reference to all employees and to those aged 25 and older, in order to highlight any differences. The results are similar in both cases (Table 10). The relationship between the share of temporary employee and job tenure is not particularly strong (Figure 11). Classifying job tenure of the last job in four temporal categories (less than 12 months, 1-3 years, 3-5 years, more than 5 years) the results does not change the results. The first three variables are positively correlated among themselves, whereas they show negative correlation with the fourth variable. Thus, a deeper analysis would be necessary to understand which temporal category with regards to the length of job tenure plays the greater role in relation to quality of employment.

Table 10 .Variables for dimension 4 security of employment and social protection

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Share of employees 25 years and older with temporary jobs, per cent					
Temporary employees (rate for 100 employees)	12.6	7.8	2.1	31.7	22
Temporary employees aged ≥25 years (per 100 employees aged ≥25 years)	9.7	6.7	1.5	27.8	22
Share of employees 25 years and older with job tenure (< 1 yr, 1-3 yrs, 3-5 yrs, ≥ 5 years), per cent					
Temporary employees with contract ≤12 months (rate per 100 temporary)	62.1	19.2	23.9	91.9	20
Temporary employees aged ≥25 years with contract <12 months (per 100 temporary employees aged ≥25 years)	62.5	18.6	22.3	90.8	20
Persons in employment aged ≥25 years with job tenure <12 months	11.8	3.0	6.8	19.7	21
Persons in employment aged ≥25 years with job tenure 1-3 years	12.3	2.6	9.1	19.6	21
Persons in employment aged ≥25 years with job tenure 3-5 years	8.9	2.0	6.7	14.3	21
Persons in employment aged ≥25 years with job tenure >5 years	66.4	6.2	54.1	76.3	21
Public social security expenditure as share of GDP					
Public social security expenditure as share of GDP	16.3	4.0	8.4	22.2	22

Figure 11. Temporary employees aged ≥ 25 years (per 100 employees ≥ 25 years) and Temporary employees ≥ 25 years with contract <12 months



The second sub-dimension has three indicators: Public social security expenditure as share of GDP, Share of employees covered by unemployment insurance and, Share of economically active population contributing to a pension fund'. Unfortunately information was available only for the first indicator.

2.1.5. Dimension 5. Social dialogue

Social dialogue is a dimension related to the freedom of association and to the right to organize and bargain collectively. It is measured by two indicators: 'Average number of days not worked due to strikes and lockouts' and 'Share of employees covered by collective wage bargaining'. As concerns the first indicator, information was available only for 14 countries and it varies over countries. The second indicator even ranges from 0 to 100 per cent due to huge differences among countries in labour legislation. Thus, the relationship between these indicators and the quality of employment is not clear.

Table 11. Variables for dimension 5 Social dialogue

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Average number of days not worked due to strikes and lockouts					
Working days lost (per 1000 employed people)	30.6	30.7	1.7	116.0	14
Share of employees covered by collective wage bargaining					
Employees covered by collective wage bargaining	15.4	32.1	0.0	100.0	18

2.1.6. Dimension 6. Skills development and life-long learning

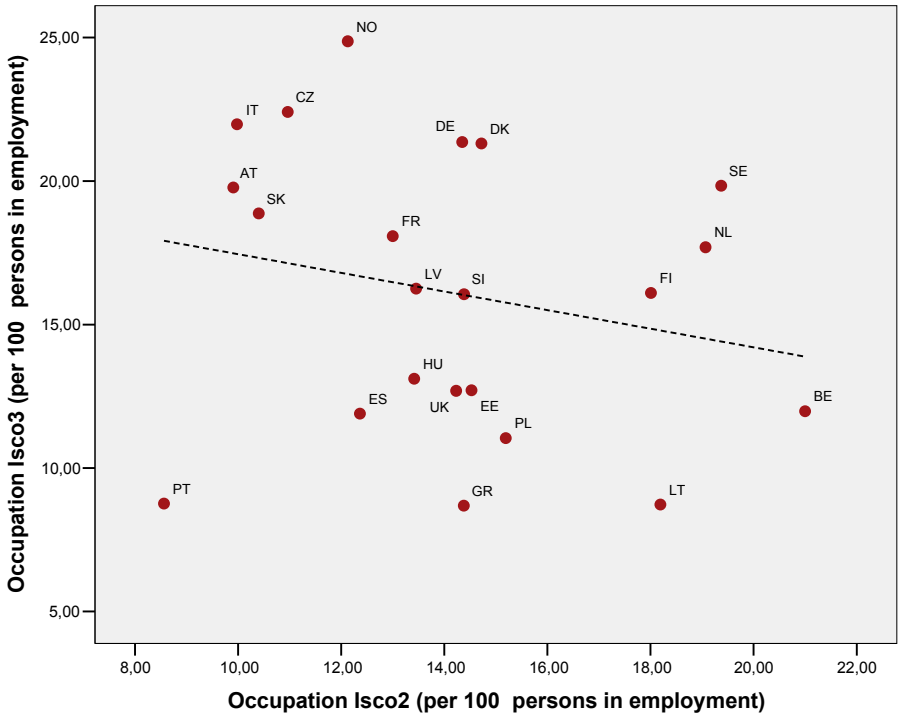
This dimension measures workers' qualification and skill development, with particular focus on over- or under-qualification. Specifically four indicators were proposed: Share of workers in high-skilled occupations, Share of workers receiving specific training and, 'Share of over-qualified and under-qualified workers'. Information was collected for the first three indicators only, since No operational definition was proposed to build variables related to under-qualification.

As concerns the indicator on high-skilled occupations, we calculated several variables considering different aggregations of ISCO-88 at the first digit (Table 12). Lastly we decided to select variable "Occupation ISCO2_3 (per 100 persons in employment)" since the major group 1 does not consider a specific skill level. Additionally, we believe that considering separately major groups 2 and 3 could be misleading because these variables have a negative correlation (Figure 12). Probably, this distinction is too specific within the quality of employment framework.

Table 12. Variables for dimension 6 Skills development and life-long learning

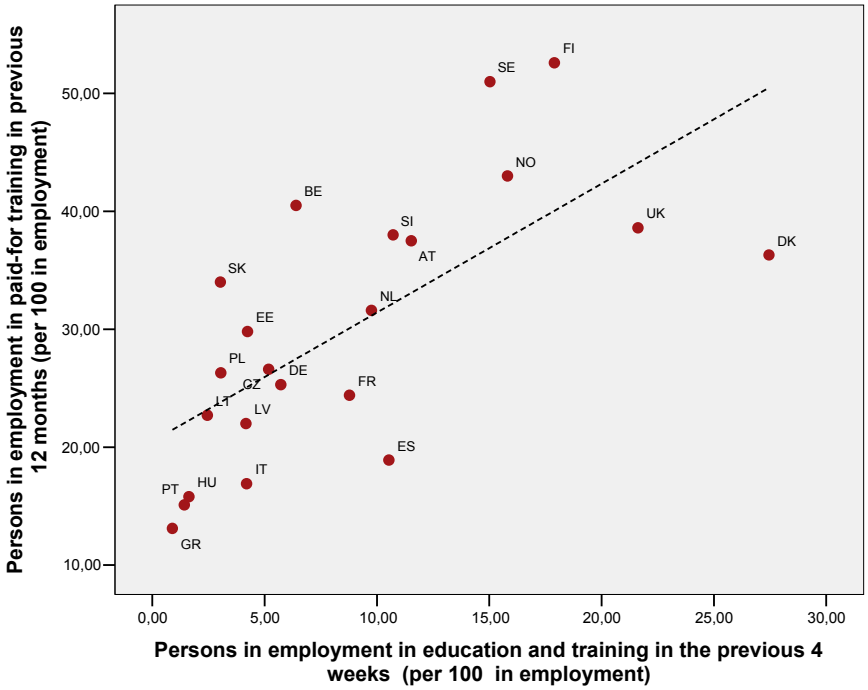
Variable	Mean	Standard Deviation	Minimum	Maximum	N
Share of employed persons in high-skilled occupations					
Occupation ISCO1 (per 100 persons in employment)	8.3	2.5	5.2	15.0	22
Occupation ISCO2 (per 100 persons in employment)	14.2	3.3	8.6	21.0	22
Occupation ISCO3 (per 100 persons in employment)	16.1	4.9	8.7	24.9	22
Occupation ISCO1_3 (per 100 persons in employment)	38.5	5.4	24.0	47.3	22
Occupation ISCO2_3 (per 100 persons in employment)	30.3	5.3	17.3	39.2	22
Share of employees who received job training within the last 12 months					
Persons in employment aged 15-64 in education and training in the previous four weeks	8.7	7.1	0.9	27.5	22
Employees aged 15-64 in education and training in the previous four weeks	9.0	7.3	1.1	28.1	22
Persons in employment in paid-for training in previous 12 months (per 100 in employment)	30.0	11.3	13.1	52.6	22
Share of employed who have more education than is normally required in their occupation					
Overeducation (per 100 in employment with ISCED5-6)	17.0	6.7	6.1	34.7	22
Overeducation (per 100 in employment)	4.8	2.7	0.9	11.4	22

Figure 12. Occupation ISCO2 and Occupation ISCO 3



In relation to job training, we calculated three variables. The first two come from LFS and consider all persons in employment or employees only who were in education or had some training in the previous four weeks; the values do not differ. The last variable, which comes from EWCS, counts persons in employment who were in paid-for training in the previous 12 months. The variable has the advantage of referring to a large interval of time, but the survey sample size is very limited. Anyway the variables are highly correlated (Figure 13).

Figure 13. Persons in employment aged 15-64 in education and training in the previous four weeks and Persons in employment in paid-for training in previous 12 months



Lastly we classified as over-educated workers with educational level ISCED 5-6 but working in occupations ISCO 4-9. We computed the rate both as percent of total number of persons in employment and of persons in employment with educational level ISCED 5-6. We believe that the second variable is preferable as its denominator includes only the potentially overeducated population.

2.1.7. Dimension 7. Workplace relationships and intrinsic nature of work

This last dimension concerns two aspects: *a) Workplace relationships and b) Intrinsic nature of work*. Unfortunately, the task force did not entirely agree on a list of fully accepted indicator regarding this dimension, which is the most difficult to measure as it often implies subjective evaluations. However, we conducted an exploratory study on potentially relevant variables from EWCS. For the first sub-dimension we considered three variables on the possibility of getting assistance from colleagues and superiors and the presence of a team job (Table 13). The first two variables are highly correlated so we selected only the first one (Table 14). Moreover, these variables are available with reference to all persons in employment, whereas it would be better if they were referred to employees only.

Table 13. Variables for dimension 7a Workplace relationships

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Can get assistance from colleagues	73.6	12.1	49.2	87.7	22
Can get assistance from superiors	62.1	12.9	33.6	78.7	22
Teamwork job (per 100 in employment)	60.3	12.1	38.5	84.8	22

Table 14. Correlation matrix for dimension 7a Workplace relationships

	Can get assistance from colleagues	Can get assistance from superiors	Teamwork job
Can get assistance from colleagues	-	0.96	0.68
Can get assistance from superiors	0.96	-	0.65
Teamwork job	0.68	0.65	-

The sub-dimension *Intrinsic nature of work* is probably the most difficult to measure. We considered four variables from EWCS and the variable Share of employed people looking for another job from LFS as a proxy of dissatisfaction (table 15).

Table 15. Variables for dimension 7b Intrinsic nature of work

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Employed people looking for another job	4.5	2.5	0.8	10.6	22
Satisfied with working conditions	81.0	9.1	59.9	93.4	22
Job offers good prospects for career advancement	29.3	6.4	18.0	42.4	22
Able to apply own ideas in work	60.4	7.6	46.0	73.1	22
Learning new things	73.0	10.0	56.6	90.0	22

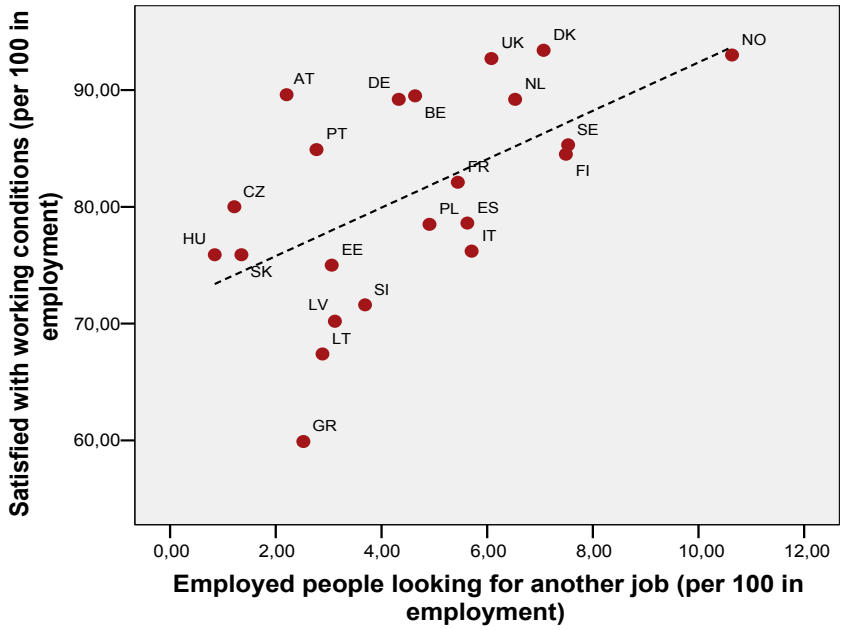
We found an unexpected relationship between the variable from LFS and the others: countries in which employed persons most frequently are looking for another job are also those with higher percentage of employed people satisfied with their working conditions (Table 16). Furthermore, positive correlations are also observed with other indicators associated to good working conditions, such as mean monthly earnings (r = 0.81), share of persons in employment in education and training in the previous four weeks (r = 0.69), share of occupation ISCO2_3 (r = 0.56).

This could mean that people look more frequently for other jobs in those countries with greater probability to find new and better jobs. However, when comparing countries at the macro level, the percentage of employed people looking for another job cannot be regarded as an indicator on job dissatisfaction (rather, at the empirical level, it seems - quite paradoxically - to be the opposite).

Table 16. Correlation matrix for dimension 7b Intrinsic nature of work

	Employed people looking for another job	Satisfied with working conditions	Job offers good prospects for career advancement	Able to apply own ideas in work	Learning new things
Employed people looking for another job	-	0.56	0.42	0.61	0.66
Satisfied with working conditions	0.56	-	0.61	0.47	0.56
Job offers good prospects for career advancement	0.42	0.61	-	0.50	0.39
Able to apply own ideas in work	0.61	0.47	0.50	-	0.75
Learning new things	0.66	0.56	0.39	0.39	-

Figure 14. Employed people looking for another job and Satisfied with working conditions



2.1.8. Selected variables

Following the aforementioned criteria (see Section 2.1.1), the empirical study yielded to the choice of 24 variables among the 66 originally computed. Table 17 reports the main outcomes from the empirical assessment of the following aspects for each variable: availability, significance i.e. existence of a clear relationship between variable and indicator, comparability, i.e. standardization of operational definition and, non-redundancy of information. With respect to these requisites, for the 22 countries over which the empirical study has been conducted, the more relevant variables have been selected.

With regards to dimension 7, due to the lack of commonly accepted indicators, the number of variables kept for the following phases had to be rather high (five) in order to maintain a larger set of variables to conduct of deeper analyses by each single country. Thus, the selected variables for dimension 7 have to be considered still as provisional. In this respect, it is also important to assess the existence of alternative data sources and of further indicators.

Table 17. Relevance of indicators in the empirical study

Indicator	Variable	Availability	Significance	Comparability	Redundancy	Chosen
Dimension 1. Safety and ethics of employment: a) Safety at work						
Fatal occupational injuries rate (Workplace fatalities per 100,000 employees)	Fatal injuries (per 100,000 in employment)	X	X	X	X	-
	Fatal injuries (per 100,000 employees)	X	X	X	-	X
Non-fatal occupational injuries rate (Workplace accidents per 100,000 employees)	Non-fatal injuries (per 100,000 in employment)	X	X	-	X	-
	Non-fatal injuries (per 100,000 employees)	X	X	-	X	-
	Standardized incidence rate of serious accidents at work (per 100,000 in employment)	-	X	X	-	X
	Work-related health problems in the past 12 months(per 100 in employment)	X	-	-	X	-
	Work-related health problems in the past 12 months (per 100 employees)	X	-	-	X	-
	Accidental injuries at work in the past 12 months (per 100,000 in employment)	X	-	X	-	-
Share of employees working in "hazardous" conditions	not available	-	-	-	-	-
Dimension 1. Safety and ethics of employment: b) Child labour and forced labour						
Employment of persons who are below the minimum age specified for the kind of work performed	not available	-	X	-	-	-
Employment of persons below 18 years in designated hazardous industries and occupations	not available	-	-	-	-	-

Employment of persons below 18 years for hours exceeding a specified threshold	not available	-	-	-	-	-
Dimension 2. Income and benefits from employment: a) Income						
Average weekly earnings of employees	Mean monthly earnings in Euro	X	X	X	-	X
	Median hourly earnings in Euro full-time	X	X	X	X	-
	Median hourly earnings in Euro part-time	X	X	X	X	-
Low pay (Share of employed with below 2/3 of median hourly earnings)	Share of employees with below ½ of median hourly earnings (%)_full-time	X	X	X	-	X
	Share of employees with below ½ of median hourly earnings (%)_part-time	X	-	X	X	-
Dimension 2. Income and benefits from employment: b) Non-wage pecuniary benefits						
Share of employees using paid annual leave in the previous year	not available	-	X	-	-	-
Share of employees using sick leave	not available	-	X	-	-	-
Average number of days paid annual leave used in the previous year	Paid annual vacation	X	-	-	X	-
	Mean annual holidays	X	-	-	-	-

Indicator	Variable	Availability	Significance	Comparability	Redundancy	Chosen
Dimension 3. Working hours and balancing work and non-working life: a) Working hours						
Average annual (actual) hours worked per person	Average annual hours worked per person	X	X	X	X	-
	Average weekly actual hours worked	X	X	X	-	X
Share of employed persons working 49 hrs and more per week	Employees 49hrs and more (per 100 employees)	X	X	X	-	X
	Self-employed 49hrs and more (per 100 self-employed)	X	X	X	X	-
	Persons in employment working 49hrs and more (per 100 in employment)	X	X	X	X	-
Share of employed persons working less than 30 hours per week involuntarily	Involuntary part-time (per 100 part-time)	X	X	X	-	X
	Wishing more hours (per 100 in employment)	X	X	-	-	X
Dimension 3. Working hours and balancing work and non-working life: b) Working time arrangements						
Percentage of employed people who usually work at night/evening	Usually work at evening (per 100 in employment)	X	-	X	X	-
	Usually work at night (per 100 in employment)	X	X	X	-	X
Percentage of employed people who usually work on weekend or bank holiday	Usually work on Saturday (per 100 in employment)	X	-	X	X	-
	Usually work on Sunday (per 100 in employment)	X	-	X	X	-
	Usually work on Saturday and Sunday (per 100 in employment)	X	X	X	-	X
	Employees usually work on Saturday and Sunday (per 100 employees)	X	X	X	X	-
	Self-employed usually work on Saturday and Sunday (per 100 self-employed)	X	X	X	X	-
Share of people with flexible work schedule	Flexible work schedule (per 100 in employment)	X	X	X	-	X
Dimension 3. Working hours and balancing work and non-working life: c) Balancing work and non-working life						

Ratio of employment rate for women with children under compulsory school age to the employment rate of all women aged 20-49	Ratio of employment rate for women aged 20-49 with children 0_5 to the employment rate of women aged 20-49	-	X	X	X	-
	Ratio of employment rate for women aged 20-49 with children 0_5 to the employment rate of women aged 20-49 without children	-	X	X	-	X
Share of people receiving maternity/ paternity/family leave benefits	Parental leave taken by persons aged 15-64 (per 100 in employment aged 15-64)	X	-	X	-	X
	Parental leave taken by women aged 15-64 (per 100 women in employment aged 15-64)	X	-	X	X	-
	Parental leave taken by men aged 15-64 (per 100 men in employment aged 15-64)	X	-	X	X	-
	Parental leave taken by employees aged 15-64 (per 100 employees aged 15-64)	X	-	X	X	-
	Parental leave taken by women employees aged 15-64 (per 100 employee women aged 15-64)	X	-	X	X	-

Indicator	**Variable**	**Availability**	**Significance**	**Comparability**	**Redundancy**	**Chosen**
Dimension 4. Security of employment and social protection: a) Security of employment						
Percentage of employees 25 years and older with temporary jobs	Temporary employees (per 100 employees)	X	X	X	X	-
	Temporary employees aged ≥25 years (per 100 employees aged ≥25 years)	X	X	X	-	X
Percentage of employees 25 years and older with job tenure (< 1 yr, 1-3 yrs, 3-5 yrs, >= 5yrs)	Temporary employees with contract <12 months (per 100 temporary employees)	X	X	X	X	-
	Temporary employees aged ≥25 years with contract <12 months (per 100	X	X	X	-	X

	temporary employees aged ≥25 years)					
	Persons aged ≥25 years with job tenure < 1year (per 100 persons in employment)	X	-	X	X	-
	Persons aged ≥25 years with job tenure 1-3 year (per 100 persons in employment)	X	-	X	X	-
	Persons aged ≥25 years with job tenure 3-5 year (per 100 persons in employment)	X	-	X	X	-
	Persons aged≥25 years with job tenure >5 years (per 100 persons in employment)	X	-	X	X	-
Dimension 4. Security of employment and social protection: b) Social protection						
Public social security expenditure as share of GDP	Public social security expenditure as share of GDP	X	-	X	-	X
Share of employees covered by unemployment insurance	not available	-	X	-	-	-
Share of economically active population contributing to a pension fund	not available	-	-	-	-	-
Dimension 5. Social dialogue						
Share of employees covered by collective wage bargaining	Employees covered by collective wage bargaining (per 100 employees)	X	-	-	-	-
Average number of days not worked due to strikes and lockouts	Working days lost (per 1000 persons in employment)	-	-	-	-	-
Dimension 6. Skills development and life-long learning						
Share of employed persons in high-skilled occupations	Occupation ISCO1 (per 100 persons in employment)	X	-	X	-	-
	Occupation ISCO2 (per 100 persons in employment)	X	X	-	X	-

	Occupation ISCO3 (per 100 persons in employment)	X	X	-	X	-
	Occupation ISCO1_3 (per 100 persons in employment)	X	-	X	X	-
	Occupation ISCO2_3 (per 100 persons in employment)	X	X	X	-	X
Share of employees who received job training within the last 12 months	Persons in employment aged 15-64 in education and training in the previous 4 weeks (per 100 in employment)	X	X	X	-	X
	Employees aged 15-64 in education and training in the previous 4 weeks (per 100 employees)	X	X	X	X	-
	Persons in employment in paid-for training in previous 12 months (per 100 in employment)	X	X	X	X	-

Indicator	**Variable**	**Availability**	**Significance**	**Comparability**	**Redundancy**	**Chosen**
Dimension 6. Skills development and life-long learning						
Share of employed who have more education than is normally required in their occupation	Overeducation (per 100 in employment with ISCED5-6)	X	X	X	-	X
	Overeducation (per 100 in employment)	X	X	X	X	-
Share of employed who have less education than is normally required in their occupation	not available	X	-	-	-	-
Dimension 7. Workplace relationships and intrinsic nature of work: a) Workplace relationships						
No indicators proposed	Can get assistance from colleagues (per 100 in employment)	X	-	X	-	X
	Can get assistance from superiors (per 100 in employment)	X	-	X	X	-
	Teamwork job (per 100 in employment)	X	-	X	X	-

Dimension 7. Workplace relationships and intrinsic nature of work: b) Intrinsic nature of work						
No indicators proposed	Employed people looking for another job (per 100 in employment)	X	-	-	-	-
	Satisfied with working conditions (per 100 in employment)	X	X	X	-	X
	Able to apply own ideas in work (rate per 100 employed people)	X	-	X	-	X
	Job offers good prospects for career advancement (per 100 in employment)	X	-	X	-	X
	Learning new things (per 100 in employment)	X	-	X	X	-

2.2. Principal Components Analysis

The preliminary descriptive analysis carried within each dimension of the Quality of Employment framework allowed us to perform a selection of the variables. The selection process was guided by the following criteria: availability, relevance, comparability, ease of computation and non redundancy.

The second step of our analysis examines the variables' performance by using Principal Components Analysis (PCA), a method of factorial analysis that provides a synthetic and comprehensive view of the relationships among all variables. It is thus possible to highlight to what extent the relationships among indicators as hypothesised at the theoretical level are actually confirmed at the empirical level.

The main advantage of this statistical technique is that it is a simple, non-parametric method for extracting relevant information from confusing data sets. With minimal effort PCA provides a way to reduce a complex data set to a lower number of dimensions (the so-called principal components) without much loss of information, often revealing the sometimes hidden, simplified underlying structures.

Through the PCA, the original correlation matrix[8] is reproduced by a number of uncorrelated variables called principal components, which are a linear combination of the original variables and reproduce the original variability in a hierarchically decreasing way: the first principal component, in fact, accounts for as much of the variability of correlation matrix and, each succeeding component accounts for as much of the residue variability as possible. As specified, the obtained principal components are uncorrelated, i.e. their correlation is equal to 0.

The amount of variability reproduced by each component is expressed by the eigen-value. Therefore, in the analysis only the component with eigen-values greater than one are retained, as they reproduce more variability than the original variables (which by construction all have variance equal to 1).

The components may be interpreted through the analysis of their correlation (component loadings) with the original variables. The component loadings allow highlighting which variables contribute to a greater extent to define the meaning of each component and the direction (positive or negative) of their relationship.

We should however always bear in mind the intrinsic multi-dimensionality of the concept of quality of employment. Thus, our analysis should never aim at producing a synthetic index of quality of employment neither a ranking of the countries. Rather, we are interested in understanding the relationships among the proposed variables within each dimension and those among the dimensions.

For the specific purpose of the multivariate analysis, beyond the previously selected 24 variables (Section 2.1.8) we had to exclude also those whose information was not available for all countries[9] (as the technique does not accept missing values).

Altogether we identified 22 variables (Table 18). Unfortunately, we were not able to collect data for the sub-dimensions 1b *Child labour and forced labour*, 2b *Non-wage pecuniary benefits* and the dimension 5 *Social dialogue*.

8 The correlation matrix corresponds to a matrix of variance and covariance among standardized variables. Being all standardized, they all have variance equal to 1, so that the total variance is equivalent in value to the number of variables in the matrix.

9 We have excluded "Standardized incidence rate of serious accidents at work (per 100,000 in employment)" and "Ratio of employment rate for women aged 20-49 with children 0-5 to the employment rate of women aged 20-49 without children".

Table 18. Variables used in Principal Component Analysis

Dimension	Variable	Source
1a. Safety at work	Fatal injuries (per 100.000 employees)	Administrative
2a. Income	Mean monthly earnings (in euro)	SES
	Below ½ of median hourly earnings_full time	SES
3a. Working hours	Persons in employment working 49hrs and more (per 100 in employment)	LFS
	Involuntary part-time (per 100 part-time)	LFS
	Wishing more hours (per 100 in employment)	LFS
	Average weekly actual hours worked	LFS
3b. Working time arrangements	Usually work at night (per 100 in employment)	LFS
	Usually work on Saturday and Sunday (per 100 in employment)	LFS
	Flexible work schedule (per 100 in employment)	LFS ad-hoc module
3c.. Balancing work and non-working life	Parental leave taken by persons aged 15-64 (per 100 in employment aged 15-64)	LFS ad-hoc module
4a. Security of employment	Temporary employees 25 yrs+ (per 100 employees 25 yrs+)	LFS
	Temporary employees 25 yrs+ with contract <12 months	LFS
4b. Social protection	Public social security expenditure as share of GDP	NA
6. Skills development and life-long learning	Overeducation (per 100 in employment with ISCED5-6)	LFS
	Persons in employment in education and training in the previous 4 weeks (per 100 in employment)	LFS
	Occupation ISCO2_3 (per 100 persons in employment)	LFS
7a. Workplace relationships	Can get assistance from colleagues (per 100 in employment)	EWCS
	Teamwork job (per 100 in employment)	EWCS
7b. Intrinsic nature of work	Satisfied with working conditions (per 100 in employment)	EWCS
	Job offers good prospects for career advancement (per 100 in employment)	EWCS
	Able to apply own ideas in work (per 100 in employment)	EWCS

The first four components have eigen-values significantly greater than one (Table 19). Altogether, they explain the 67 per cent of the total variance, i.e. they reproduce more than two thirds of the original information.

Table 19. Total Variance Explained

Component	Eigenvalues		
	Total	Percentage of variance	Cumulative, per cent
1	7.3	33.1	33.1
2	3.5	15.7	48.8
3	2.2	10.1	58.9
4	1.7	7.9	66.8
5	1.1	5.1	71.8
6	1.1	4.8	76.7
7	1.0	4.6	81.3
8	0.8	3.6	84.9
9	0.7	3.0	87.9
10	0.6	2.8	90.7
11	0.6	2.6	93.3
12	0.4	1.8	95.1
13	0.3	1.3	96.4
14	0.3	1.2	97.7
15	0.2	0.9	98.6
16	0.1	0.5	99.1
17	0.1	0.4	99.5
18	0.1	0.3	99.8
19	0.0	0.2	99.9
20	0.0	0.1	100.0
21	0.0	0.0	100.0
22	0.0	0.0	100.0

The first component, explaining one third of the overall variance, is highly associated with a list of indicators which depict the main characteristics of **quality of employment** (Figure 15).

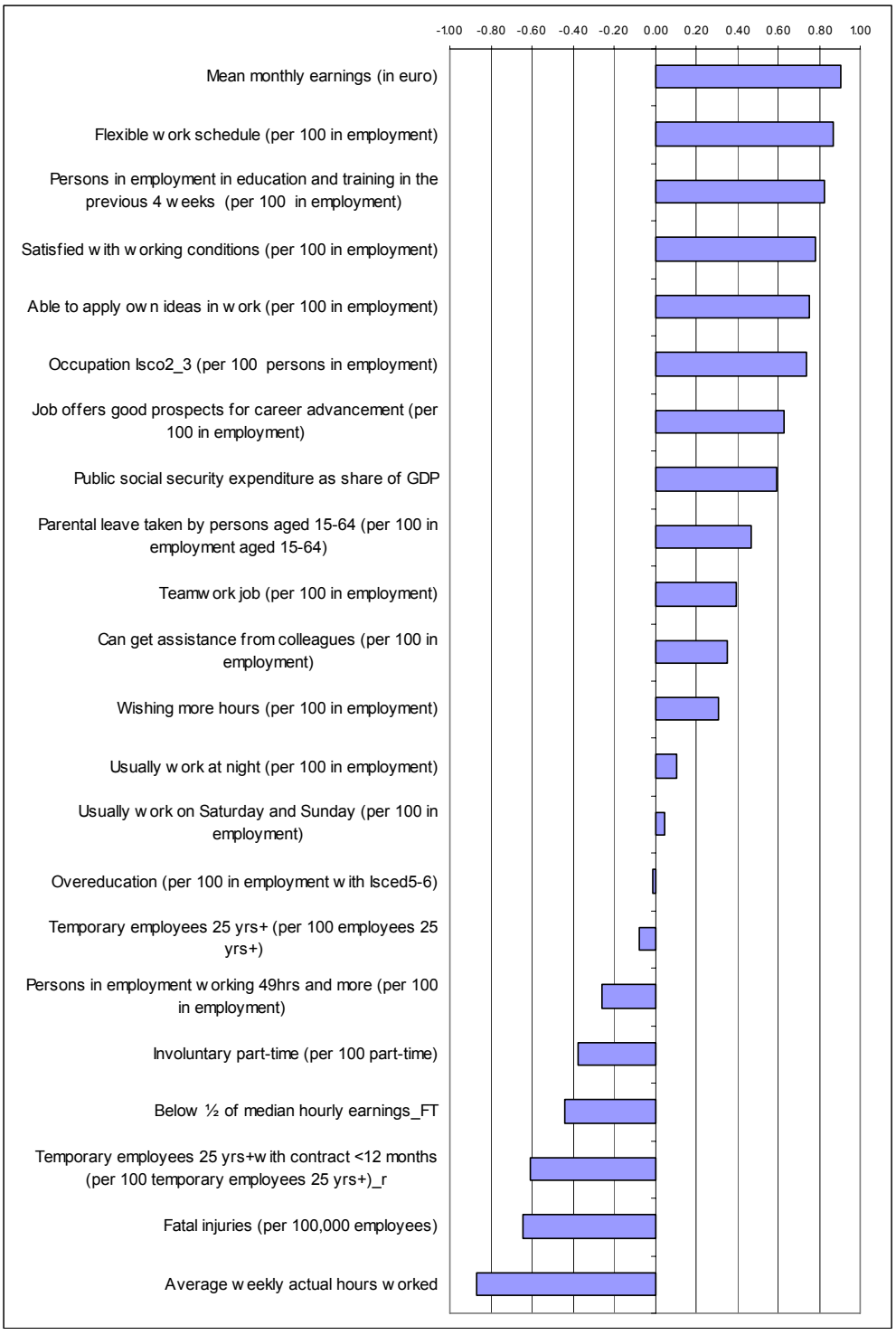
This component, in fact, is positively associated with the mean monthly earning, the share of persons in employment with flexible working schedules, the share of employed people participating in education and training, the share of skilled occupations, workers' satisfaction with working conditions and, with public social security expenditure.

On the other hand, it is negatively correlated to the average weekly actual hours worked per person, to the number of fatal accident, to the share of temporary employees with contract less of 12 months, to the share of employees with low earning and, to the share of involuntary part-time.

Summing up, on the right side of the factorial plan, placed along the first component, we find variables pointing at situations of positive working condition, whereas the variables placed on the left draw a negative picture characterized by precariousness, unsafeness and unpleasant working schedules.

Indicators which are poorly correlated with the first component are placed close to the barycentre of the factorial plan (over-education, atypical working hours, temporary employees, workplace relationships and excessive hours of work).

Figure 15. Component loading of the first component



The other components reproduce the residual variance of correlation matrix and they are related to fewer variables (Table 20). The second component, that explains 16 per cent of the variance, is basically related to the two variables expressing **workplace relationships** (Teamwork job per 100 in employment and Can get assistance from colleagues per 100 in employment).

The third component, that explains 10 per cent of variance, is strongly associated with variables describing **working time arrangements**, being positively correlated to the percentage of employed people who work at night and

on weekends and, to the share of those working long hours. On the other hand, it is negatively associated with the share of employed people who have taken parental leave.

Lastly, the fourth component, explaining eight per cent of the total variance, demonstrates that **overeducation** arises when the supply of highly educated labour force exceeds demand for high-skilled employment; moreover the component is also correlated to the share of employees with low pay.

Table 20. Component matrix

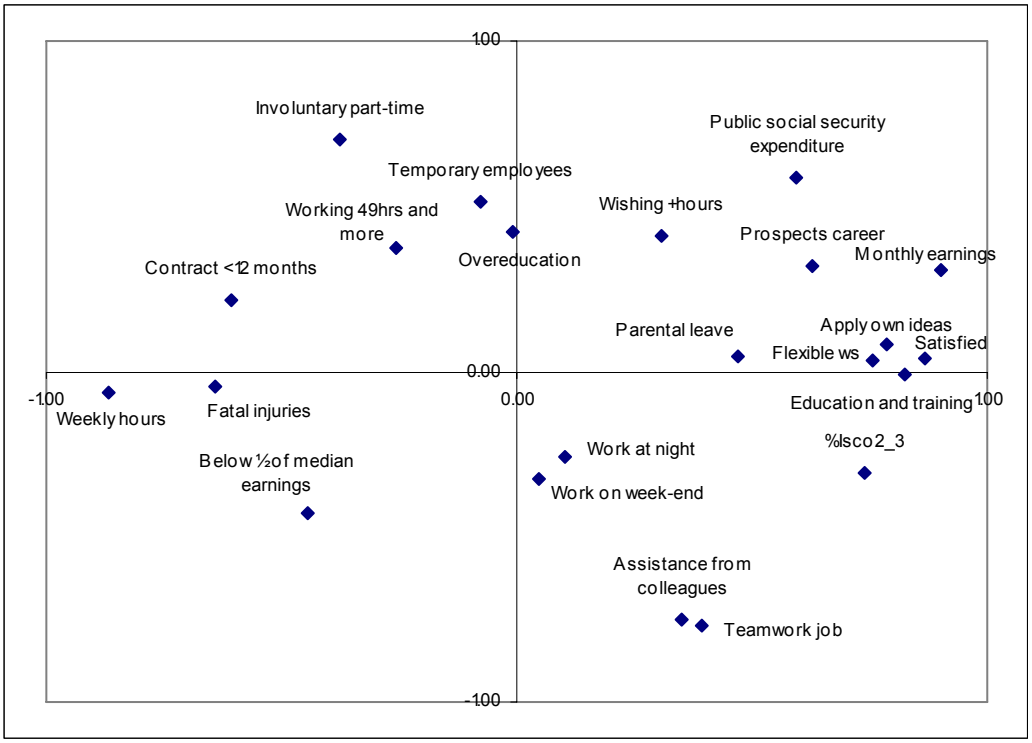
Variable	Component			
	1	2	3	4
Fatal injuries (per 100 000 employees)	-0.64	-0.05	-0.10	0.24
Mean monthly earnings (in Euros)	0.90	0.31	0.00	0.03
Below ½ of median hourly earnings_FT	-0.44	-0.43	0.03	0.54
Persons in employment working 49hrs and more	-0.26	0.37	0.59	-0.29
Involuntary part-time (per 100 part-time)	-0.38	0.70	-0.38	-0.13
Wishing more hours (per 100 in employment)	0.31	0.41	0.27	0.40
Average weekly actual hours worked	-0.87	-0.06	0.01	-0.22
Flexible work schedule (per 100 in employment)	0.87	0.04	-0.09	-0.12
Usually work at night (per 100 in employment)	0.10	-0.26	0.70	-0.35
Usually work on Saturday and Sunday (per 100 in employment)	0.04	-0.32	0.64	-0.33
Parental leave taken by persons aged 15-64 years	0.47	0.05	-0.59	-0.34
Temporary employees aged ≥ 25 years (per 100 employees aged ≥ 25 years)	-0.08	0.51	0.04	-0.06
Temporary employees aged ≥ 25 years with contract < 12 months	-0.61	0.21	0.28	-0.07
Public social security expenditure as share of GDP	0.59	0.59	-0.05	-0.30
Overeducation (per 100 in employment with ISCED5-6)	-0.01	0.42	0.08	0.62
Persons in employment in education and training in the previous 4 weeks (per 100 in employment)	0.82	-0.01	0.14	0.13
Occupation ISCO2_3 (per 100 persons in employment)	0.74	-0.31	-0.10	-0.18
Can get assistance from colleagues (per 100 in employment)	0.35	-0.75	-0.12	0.07
Teamwork job (per 100 in employment)	0.39	-0.77	-0.02	0.12
Satisfied with working conditions (per 100 in employment)	0.78	0.08	0.25	0.18
Job offers good prospects for career advancement (per 100 in employment)	0.63	0.32	0.42	0 .34
Able to apply own ideas in work (per 100 in employment)	0.75	0.04	-0.15	-0.02

The first two components may be represented as a Cartesian plan: each axis corresponds to a component, divided in two semi-axes according to the polarity (negative and positive). The units and the variables positively correlated to the component are projected along the positive semi-axis; the others are placed along the negative semi-axis. The plot of component loadings allows detecting which variables within the same dimension are close to each other on the factorial plan (Figure 16). For instance, we observe the closeness on the plan of all variables associated with Workplace relationships (assistance from colleagues and teamwork job), or the proximity among the

variables of Working time arrangements (usually work at night and usually work on weekends). Furthermore, the relationships among variables pertaining to different dimensions may also be highlighted according to their relative position on the plan (for instance, the right area of the plan shows that the indicators of the dimensions Skills development and life-long learning and Intrinsic nature of work, are closely related).

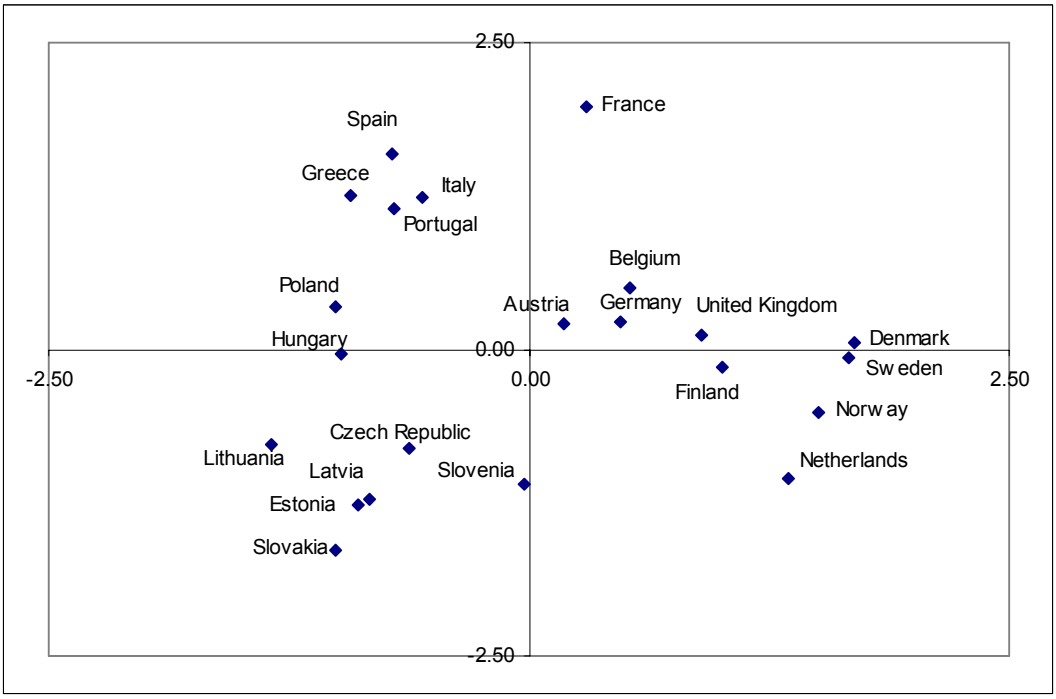
These results provide evidence to the necessity of employing more indicators to achieve a satisfactory representation of the quality of employment. Several aspects, in fact, are closely related: better educational opportunities (persons in employment in education and training) are associated to higher skill jobs (occupation ISCO2_3), to higher earnings (mean monthly earnings), as well to a greater subjective satisfaction with the performed job (satisfied with working conditions).

Figure 16. Component loadings of first and second principal component



On the factorial plan it is then possible to project the position of the countries, according to their coordinates (Figure 17). For instance, the countries placed on the right side of the plan (Denmark, Sweden, Norway and Netherlands) are those with the highest values of the variables projected on that side of the plan and, conversely lower values of the variables placed on the left side (Figure 16). The factorial plan, thus, also allows a synthetic view of the countries values with respect to the analyzed variables. Neighbouring countries in the factorial plan show similar values of the variables involved in the analysis.

Figure 17. Countries' component scores on first and second components



In conclusion, the multivariate analysis allows highlighting simultaneously all the existing relationships among variables and the similarities/differences among countries, even those that are not immediately manifest and evident. We should not forget that the relationships observed through the PCA refer to the 22 examined countries only.

2.3. Legislative indicators

2.3.1. Variables collected

In addition to the quality of employment indicators we considered some indicators related to labour market legislation and social protection. We looked at the database Condition of Work and Employment Laws of International Labour Organization[10] (ILO) that contains comprehensive legal information from countries around the world. The ILO database covers legislation on minimum wages, working time and maternity protection, which are three of the most significant aspect of working conditions. We considered the following indicators:

ILO Database on Condition of Work and Employment Laws

Monthly minimum wages: is the lowest monthly wage that employers may legally pay to employees or workers. Equivalently, it is the lowest wage at which workers may sell their labour. Minimum wages are designed in the laws of almost all counties and at the international level.

Minimum wage fixing mechanism: the mechanism by which minimum wage rate are set. Generally the Government plays a central role in setting minimum wage rates. These could be set in consultation with a specialized body.

10 http://www.ilo.org/public/english/protection/condtrav/database/index.htm

Minimum wage fixing levels: a minimum wages can be introduced as a single national rate or a range of different rates that vary among sectors and /or occupations. Between these extremes, a range of approaches are possible. It is possible to identify five levels at which the minimum wage can be set: : a) by sector and/or occupation; b) national – single rate; c) national by sector and/or occupation; d) regional – single rate and e) regional by sector and/or occupation.

Normal weekly hours limits: the hours that can be worked each week before overtime payments become due.

Maximum weekly hours limits: a kind of maximum limit on weekly working hours

Overtime limits: most labour laws place an upper limit on overtime hours (beyond the weekly hours limit). These laws limit overtime by a) placing direct limits on overtime hours (usually on a daily, weekly or annual basis, or as a combination of these limits; b) limiting total working hours; c) specifying minimum daily rest periods.

Minimum annual leave: working time laws generally provide for minimum holidays period to allow workers to take longer periods of rest. These legislated standards are minimums and can be extended by workplace policies. They are also in addition to days that are designated as public holidays.

Length of maternity leave: is a period (not shorter than 14 weeks) in which mothers are allowed to take time off work in order to follow the birth of a child.

Amount of maternity leave benefits: the level of benefits available during the maternity leave. Two elements are considered: a) the proportion of the worker's earning to be paid and; b) the period over which they are to be paid.

Source of maternity leave benefits**:** the source of funding for maternity leave benefits. The system for funding maternity leave is classified in three forms: a) employer-funded (employers are solely responsible); b) social insurance or other public funds and; c) mixed systems (contributions from both employers and public fund).

Other indicators related to laws regulating working conditions are collected from the research Doing Business of World Bank. In particular, referring to the dimension *Employing Workers* we considered simple indicators (not a composite index) that measure the regulation of employment, specifically with regards to the recruitment and dismissal of workers and to the rigidity of working hours.[11] Altogether, we selected the following fourteen questions:

Doing Business – Dimension Employing Workers

Are fixed-term contracts prohibited for permanent tasks? *(Yes. No)*

What is the maximum duration of fixed-term contracts (including renewals)? (*12-24 months. 25-60 months. >60 months. No limit)*

Can the workweek extend to 50 hours (including overtime) for two months per year to respond to a seasonal increase in production? *(Yes. No)*

What is the maximum number of working days per week? *(Five days. six days)*

Are there restrictions on night work? *(Yes. No)*

Are there restrictions on "weekly holiday" work? *(Yes. No)*

Is the termination of workers due to redundancy legally authorized? *(Yes. No)*

11 The data on employing workers are based on a survey of employment regulations that is completed by local lawyers and public officials. Employment laws and regulations as well as secondary sources are reviewed to ensure accuracy. To make the data comparable across economies, several assumptions about the worker and the business are used. Assumptions about the worker are the following: being 42 years old, non executive, full-time, male employee; having worked at the same company for 20 years; earning a salary and benefits equal to the economy's average wage during the entire period of his employment; being a lawful citizen who belongs to the same race and religion as the majority of the economy's population; residing in the economy's largest business city; not being a member of a labour union, unless membership is mandatory. For more information see the website http://www.doingbusiness.org/MethodologySurveys/EmployingWorkers.aspx

Must the employer notify a third party before terminating one redundant worker? *(Yes. No)*

Does the employer need the approval of a third party to terminate one redundant worker? *(Yes. No)*

Must the employer notify a third party before terminating a group of 25 redundant workers? *(Yes. No)*

Does the employer need the approval of a third party to terminate a group of 25 redundant workers? *(Yes. No)*

Is there a retraining or reassignment obligation before an employer can make a worker redundant? *(Yes. No)*

Are there priority rules applying to redundancies? *(Yes. No)*

Are there priority rules applying to re-employment? *(Yes. No)*

For the 22 selected countries, we analysed the frequency distribution of the legislative variables in order to choose the more relevant ones (Table 21). We excluded the indicators with low variability. In some cases we reduced the number of modalities.

Table 21. Frequency of the legislative variables

ILO Monthly minimum wages					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	100-499 USD	7	31.8	31.8	31.8
	500-1 000 USD	4	18.2	18.2	50.0
	over 1 000 USD	11	50.0	50.0	100.0
	Total	22	100.0	100.0	
ILO Minimum wage-fixing mechanism					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Government consulting social partners	2	9.1	9.1	9.1
	Government following specialized body recommendation	9	40.9	40.9	50.0
	Specialized body	4	18.2	18.2	68.2
	Collective bargaining	7	31.8	31.8	100.0
	Total	22	100.0	100.0	
ILO Minimum wage-fixing levels					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	National	12	54.5	54.5	54.5
	National by sector and/or occupation	3	13.6	13.6	68.2
	Regional by sector and/or occupation	2	9.1	9.1	77.3
	By sector and/or occupation	5	22.7	22.7	100.0
	Total	22	100.0	100.0	

ILO Normal weekly hours limits

		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	No universal national limit	3	13.6	13.6	13.6
	35-39 hours	3	13.6	13.6	27.3
	40 hours*	16	72.7	72.7	100.0
	48 hours	3	13.6	13.6	13.6
	Total	3	13.6	13.6	27.3
Total		22	100.0		

** Greece value was missing: the modal case was imputed*

ILO Maximum weekly hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	40 hours	1	4.5	4.5	4.5
	41-47 hours	4	18.2	18.2	22.7
	48 hours*	16	72.7	72.7	95.5
	49-59 hours	1	4.5	4.5	100.0
	Total	22	100.0	100.0	

** Greece value was missing: the modal case was imputed*

ILO Overtime limits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No universal national limit	1	4.5	4.5	4.5
	Overtime limits included in maximum weekly hours limits	4	18.2	18.2	22.7
	Overtime limits ≤150 hours per year	4	18.2	18.2	40.9
	151<Overtime limits<300*	10	45.5	45.5	86.4
	Overtime limits> 300 hours per year	3	13.6	13.6	100.0
Total		22	100.0		

** Greece value was missing: the modal case was imputed*

ILO Minimum annual leave

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	20-23 days	16	72.7	72.7	72.7
	24-25 days	5	22.7	22.7	95.5
	More than 25 days	1	4.5	4.5	100.0
Total		22	100.0		

ILO Length of maternity leave

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	14 weeks	1	4.5	4.5	4.5
	15 to 17 weeks	10	45.5	45.5	50.0
	18 weeks or more	11	50.0	50.0	100.0
	Total	22	100.0	100.0	

ILO Maternity leave benefits

		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Less than two-thirds pay for a minimum of 14 weeks	2	9.1	9.1	9.1
	At least two-thirds but less than 100 per cent for 14 weeks	6	27.3	27.3	36.4
	Full pay for 14 weeks or more	14	63.6	63.6	100.0
	Total	22	100.0	100.0	

ILO Source of maternity leave benefits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Social insurance or other public funds	19	86.4	86.4	86.4
	Mixed system	3	13.6	13.6	100.0
	Total	22	100.0	100.0	

DB Are fixed-term contracts prohibited for permanent tasks?

		Frequency	Per cent	Valid per cent	Cumulative, per cent
Valid	Yes	11	50.0	50.0	50.0
	No	11	50.0	50.0	100.0
	Total	22	100.0	100.0	

DB maximum duration of fixed-term contracts

		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	12-24 months	6	27.3	27.3	27.3
	25-60 months	7	31.8	31.8	59.1
	over 60 months	2	9.1	9.1	68.2
	No limit	7	31.8	31.8	100.0
	Total	22	100.0	100.0	

DB possibility to extend to 50 hours to respond to a seasonal increase in production

		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	50 hours_Yes	20	90.9	90.9	90.9
	50 hours_No	2	9.1	9.1	100.0
	Total	22	100.0	100.0	

DB maximum number of working days per week

		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Five days	3	13.6	13.6	13.6
	Six days	19	86.4	86.4	100.0
	Total	22	100.0	100.0	

DB restrictions on night work

		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Night work restrictions	19	86.4	86.4	86.4
	Night work No limits	3	13.6	13.6	100.0
	Total	22	100.0	100.0	

DB restrictions on weekly holiday work

		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Weekly holiday restrictions	20	90.9	90.9	90.9
	Weekly holiday No limits	2	9.1	9.1	100.0
	Total	22	100.0	100.0	

DB legally authorized termination of workers due to redundancy					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Yes	22	100.0	100.0	100.0

DB Does the employer need the approval of a third party to terminate one redundant worker?					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Yes	1	4.5	4.5	4.5
	No	21	95.5	95.5	100.0
	Total	22	100.0	100.0	
DB Must the employer notify a third party before terminating a group of 25 redundant workers?					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Yes	22	100.0	100.0	100.0
DB Does the employer need the approval of a third party to terminate a group of 25 redundant workers?					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Yes	4	18.2	18.2	18.2
	No	18	81.8	81.8	100.0
	Total	22	100.0	100.0	
DB Is there a retraining or reassignment obligation before an employer can make a worker redundant?					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Reassignment obligations	15	68.2	68.2	68.2
	No reassignment obligations	7	31.8	31.8	100.0
	Total	22	100.0	100.0	
DB Are there priority rules applying to redundancies?					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Priority for redundancies	14	63.6	63.6	63.6
	No priority for redundancies	8	36.4	36.4	100.0
	Total	22	100.0	100.0	

DB Are there priority rules applying to re-employment?					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Priority for re-employment	11	50.0	50.0	50.0
	No priority for re-employment	11	50.0	50.0	100.0
	Total	22	100.0	100.0	
DB Must the employer notify a third party before terminating one redundant worker?					
		Frequency	Per cent	Valid, per cent	Cumulative, per cent
Valid	Third part notify	10	45.5	45.5	45.5
	No notify	12	54.5	54.5	100.0
	Total	22	100.0	100.0	

2.3.2. Multiple Correspondence Analysis

In order to synthesize the associations among the legislative indicators we used the Multiple Correspondence Analysis (MCA). The MCA is a descriptive technique designed to analyze multi-way tables containing some measure of correspondence between the rows and columns. Results provide information similar to those produced by PCA that allow exploring the structure of categorical variables. Also the MCA identifies a limited number of independent factors expressing the associations contained by the original data matrix. The factors are hierarchically ordered according to their explanatory power.

We carried out an MCA on 11 variables for a total of 23 modalities (Table 22). We excluded the indicators about working time (Maximum weekly hours, Overtime limits, Maximum number of working days per week, Restriction on night and on weekly holiday work) and some other indicators due to their excessively low variability. In other cases we reduced the number of modalities.[12]

12 For MCA to be performed, the original matrix undergoes some transformations. The most relevant is that each categorical variable is recoded into as many dichotomized variables as the number of its categories, expressing absence/presence of that item. Therefore the number of categories in the initial matrix should be kept under control, avoiding an unbalanced distribution across categories of the same (i.e. categories with frequencies which are either too high or too low).

Table 22. List of variables used for Multiple Correspondence Analysis

ILO	Monthly minimum wages (*less than 1000 $ /over than 1000 $*)
	Minimum wage-fixing mechanism (*Government consulting social partners of collective bargaining / Government without consulting social partners*)
	Minimum wage-fixing levels (n*ational fixing-wage / others fixing-wage*)
	Minimum annual leave (*10-23 days / more than 23 days*)
	Length of maternity leave (*18 weeks or more /14 to 17 weeks*)
DB	Are fixed-term contracts prohibited for permanent tasks? (*Yes / No*)
	Maximum duration of fixed-term contracts (*12-24 months / 25-60 months / over 60 months*)
	Is there a retraining or reassignment obligation before an employer can make a worker redundant? (*Yes / No*)
	Are there priority rules applying to redundancies? (*Yes / No*)
	Are there priority rules applying to re-employment? (*Yes / No*)
	Must the employer notify a third party before terminating one redundant worker? (*Yes / No*)

The system of associations among variables is well represented by the factorial plan and, the position of the variables on the plan helps to interpret the factors' meaning. The countries may also be projected on the factorial plan and their position depends on the values assumed by the categorical variables. The first two factors explain together the 48 per cent of the general variance. The first factor can be related to the industrial relations system, in particular as it concerns the **level of social negotiation** (Table 23).

On one side, in fact, there are countries where governments decide wage-fixing mechanisms consulting social partners or through collective bargaining, where the monthly minimum wage is over 1,000 USD, the minimum of annual leave is longer than 23 days and the length of maternity leave is 18 weeks or more. Furthermore, also variables related to social labour protection, such as limits for using fixed-term contracts for permanent tasks, are associated to this dimension. As concerns the supplementary variables, we observe that in these countries maternity leave benefits are not entirely paid (less than 100 per cent for a minimum of 14 weeks) and overtime limits are included in maximum weekly hours limits.

On the other side, there are countries where governments decide wage-fixing mechanism without consulting social partners, monthly minimum wage is lower than 1,000 $, the limit to use fixed-term contracts for permanent tasks does not exist, the length of maternity leave is between 14 and 17 weeks and the minimum annual leave is between 10 and 23 days. Moreover, in these countries some priority rules are applied to redundancies and reassignments. Maternity leave benefits are fully paid for 14 weeks. The second factor can be related to the **labour protection system**, particularly to the regulations concerning redundancies and the length of fixed-term contracts (Table 24). On one extreme of the factorial axis there are countries where specific rules in cases of redundancies do not exist (priority for re-employment, priority for redundancies, reassignment obligation) and these variables are associated with the lowest minimum wage (less than 1,000 USD), shorter minimum annual leave (ten-23 days) and the maximum length of fixed-term contracts is between 25 and 60 months.

On the opposite side, there are countries with some guaranties in case of redundancies, minimum annual leave at least equal to 23 days and minimum wage higher than 1,000$. Furthermore, fixed-term contracts must not be longer than 24 months. The value test for supplementary variables is not significant.

Table 23. Active variables-modalities associated to the first factor: level of development of industrial relations systems (high or low)

Variables	Modalities	Coordinate	Absolute contribution	V-test
ILO Minimum wage-fixing levels	Other fixing-wage	-0.87	10.55	0.62
ILO Minimum wage-fixing mechanism	Government consulting social partners o collective bargaining	-0.84	9.05	0.49
DB Is there a retraining or reassignment obligation before a	No reassignment obligation	-0.87	7.39	0.35
ILO Minimum annual leave	More than 23 days	-0.87	6.35	0.28
ILO Monthly minimum wages	Over than 1000 $	-0.63	6.07	0.39
DB Are fixed-term contracts prohibited for permanent tasks?	Not fixed-term for permanent tasks	-0.61	5.83	0.38
DB Are there priority rules applying to redundancies?	No priority for redundancies	-0.70	5.47	0.28
ILO Length of maternity leave	18 weeks or more	-0.43	2.85	0.18
CENTRAL ZONE				
ILO Minimum wage-fixing levels	National fixing-wage	0.72	8.79	0.62
ILO Minimum wage-fixing mechanism	Government without consulting	0.58	6.26	0.49
ILO Monthly minimum wages	Less than 1 000 USD	0.63	6.07	0.39
DB Are fixed-term contracts prohibited for permanent tasks?	No limits for fixed-term contracts for permanent tasks	0.61	5.83	0.38
DB Is there a retraining or reassignment obligation before a	Reassignment obligation	0.40	3.45	0.35
DB Are there priority rules applying to redundancies?	Priority for redundancies	0.40	3.13	0.28
ILO Length of maternity leave	14 to 17 weeks	0.43	2.85	0.18
ILO Minimum annual leave	10-23 days	0.33	2.38	0.28
DB Must the employer notify a third party before terminating one redundant worker?	Third part notify	0.39	2.12	0.13

Table 24. Active variables-modalities associated to the second factor: low or high level of labour protection

Variables	Modalities	Coordinate	Absolute contribution	V-test
DB Are there priority rules applying to redundancies?	No priority for redundancies	-0.94	13.04	0.51
DB Are there priority rules applying to re-employment?	No priority for re-employment	-0.74	11.16	0.55
DB Is there a retraining or reassignment obligation before a	No reassignment obligation	-0.79	7.95	0.29
ILO Minimum annual leave	10-23 days	-0.40	4.72	0.43
ILO Monthly minimum wages	less than 1 000 USD	-0.45	4.09	0.20
DB maximum duration of fixed-term contracts	25-60 months	-0.41	2.17	0.08
CENTRAL ZONE				
ILO Minimum annual leave	more than 23 days	1.07	12.58	0.43
DB Are there priority rules applying to re-employment?	priority for re-employment	0.74	11.16	0.55
DB Are there priority rules applying to redundancies?	priority for redundancies	0.54	7.45	0.51
ILO Monthly minimum wages	over than 1 000 USD	0.45	4.09	0.20
DB Is there a retraining or reassignment obligation before a	reassignment obligation	0.37	3.71	0.29
DB maximum duration of fixed-term contracts	12-24 months	0.44	2.16	0.07

In the factorial plans it is possible to project countries to check their position in relation to categorical variables (Figures 18 and 19).

Figure 18. Factorial plan of the first and second factor - variables

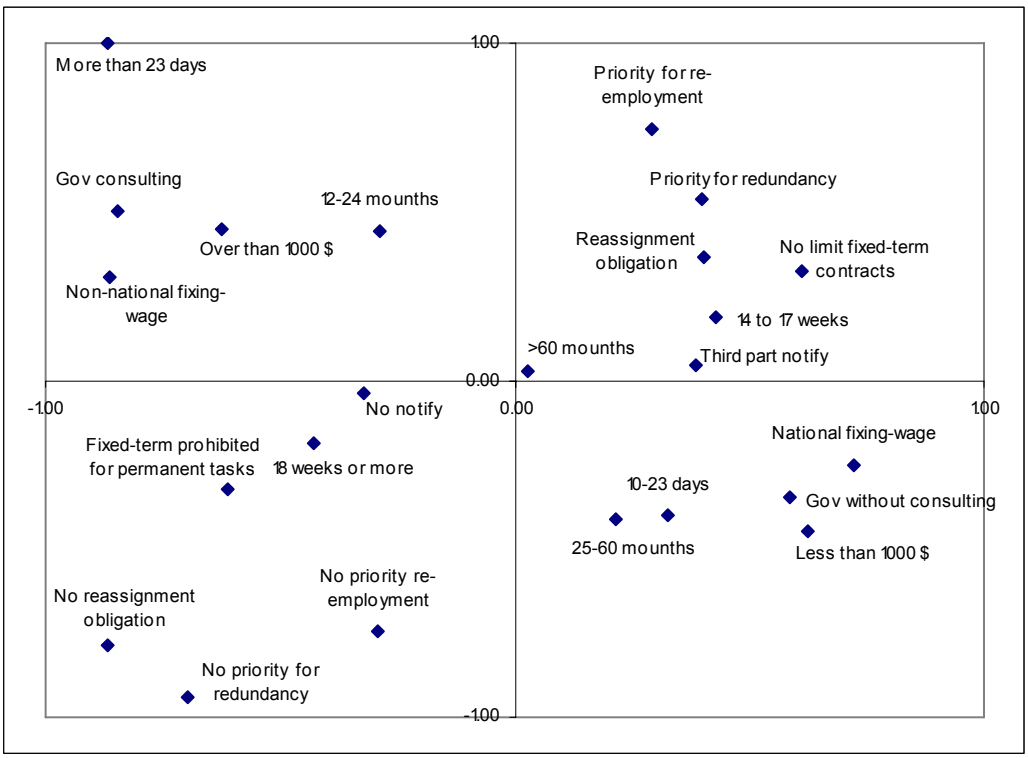
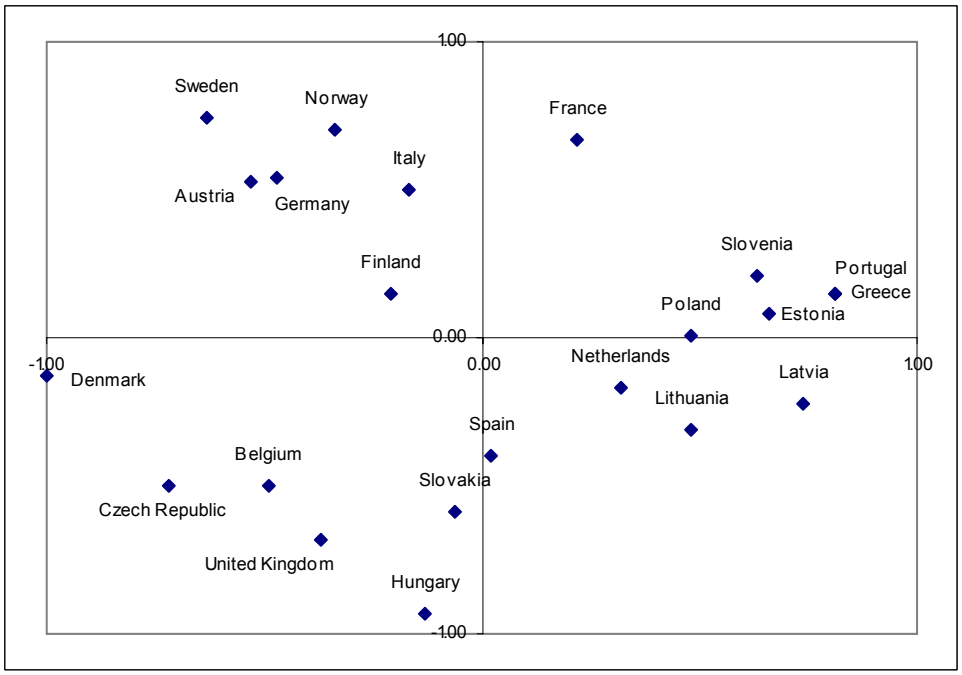


Figure 19. Factorial plan of the first and second factor - countries



Summing up, the analysis shows the relevance of legislative indicators to give a more complex overview of the quality of employment. As a matter of fact, the proximity among countries is not identical to what we found carrying out the PCA with quantitative variables. This is to say that countries which are similar in terms of quantitative variables present distinct legislative contexts and vice-versa.

However, a deep knowledge of the legislative context would be desirable in order to assure effective data comparability and to interpret the findings correctly. Furthermore, more detailed information on welfare schemes, such as unemployment benefits or measures to increase female participation in the labour market, would also prove very useful.

2.4 Conclusions

This study supports the work of UNECE Task Force on the Measurement of the Quality of Employment by means of an empirical analysis on the proposed indicators for measuring quality of employment. Summing up, its main objectives were:

(i) Assessing whether the proposed indicators could be operationalized with currently available data;

(ii) Verifying the degree of standardization of the operational definitions;

(iii) Exploring the role of legislative indicators, as suggested by the Decent Work framework;

(iv) Studying the relationships among variables to assess to the degree of redundancy among the proposed indicators.

The project's first step involved the assessment of the indicators' availability. The focus was mainly on the 30 indicators proposed by the framework on the Quality of Employment. We started from the review of the data stored in several electronic databases maintained by recognized international organizations.

A second important step consisted of evaluating the existence of an operational definition of the indicators. Some proposed indicators, in fact, were expressed in a generic form (e.g. Share of employees working in "hazardous" conditions, Share of people with flexible work schedule, Share of employed who have less education than is normally required in their occupation) while others were clearly defined (Fatal occupational injuries rate, Share of employed persons working 49 hours and more per week, Percentage of employees aged 25 years and older with temporary jobs). For some indicators we identified many suitable variables with the intent to select the best throughout the study. In some circumstances it was not possible to calculate the proposed indicator because data were not available.

With reference to the Decent Work framework, some information related to labour market legislation and social protection was also included in addition to the quantitative indicators. The normative framework on working conditions is deeply connected to the quality of employment and, we believe that the inclusion of this additional information may provide useful insights for understanding and measuring quality of employment.

The core part of the analysis was aimed at testing the variables for the measurement of the seven dimensions of quality of employment drawing from the originally identified 66 quantitative and 21 legislative variables.

In conclusion, drawing from the results of the validation study we may express some recommendations and point at guidelines for future developments of the Task Force work:

First, efforts should aim at finding the right balance between precision and ease of calculation when proposing an indicator. When an indicator may be expressed through several operational definitions, all significant from a theoretical perspective, we should opt for the most practical one. When it is possible to derive the data from various sources, it would be preferable to use those from international surveys with standard definitions and large samples.

With regards to the criteria of parsimony and comparability, it is useful to distinguish between indicators that are more suitable for international comparison and those of specific interest for the analysis of individual countries. From this analysis, for instance, the variable Fatal accidents is highly comparable among countries, whereas Non-fatal accidents are not easily comparable (Section 2.1.1). A further example is provided by the percentage of employed

people looking for another job (Section 2.1.7). This indicator is useful within each country to differentiate the various occupational positions, but the usefulness is not clear when used for cross- country comparison.

In general, given that the aim of the framework is to identify a set of indicators which are broadly applicable across countries, it is preferable to define indicators in a more aggregated way For example, with regards to the share of employed people in high-skilled occupations, under Dimension 6, the specification of the indicators aggregates together in ISCO-88 groups 2 and 3 is preferred rather than considering separately the two groups (Section 2.1.6). Within each country, more detailed specification of indicators would prove very useful.

In Section 2.1.8 a synthesis of the indicators that at the European level present the best comparability is included. The analysis of the specific country may then be further specified at the local level (by gender, ethnicity, geographical differences, age-class, etc.).

The study also highlighted the relevance of legislative indicators for the statistical framework suggested by the Task Force. The multivariate analysis shows the complexity of the legislative context which classifies the countries in a different way than the quantitative variables. Thus, it is relevant to take into account the normative frame of reference, in order to better interpret the meaning of quantitative indicators (for instance, the different meaning of the percentage of temporary work depending on the more or less extended diffusion of social “shock absorbers” and, and/or to the possibility of temporary contracts for every typology of work). In this respect, it is important to develop a standard methodology to define the legislative indicators in order to translate labour regulations into indicators and variables which are comparable across countries. In this direction, valuable work is already being done by ILO.

On the whole the empirical study confirms the multidimensionality of the concept of quality of employment and the importance of considering several indicators. Of course, each country will fit the framework in relation to its specific market labour conditions.

In this respect, the assessment of indicator variability among countries may also be performed for each country analyzing internal differences (gender, ethnicity, age groups, etc.). With this analysis it is possible to evaluate to what extent the indicators specified for the general framework (Section 2.2) are confirmed within a single country. The stability of the empirical model is a further proof of the adequacy of the theoretical framework.

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ANNEX I. LIST OF INDICATORS

col. 1	col. 2	col. 3	col. 4a	col. 4b	col. 5	col. 6	col. 7	col. 8	col. 9	col. 10	col. 11
Indicator	**QE dimension**	**DW dimension**	**Availability**	**Availability**	**Source**	**Database**	**Last years**	**Countries**	**Definition**	**Formula**	**Comments**
Fatal occupational injury rate (Workplace fatalities per 100,000 employees)	1a	8	Yes	1	Administrative source	Eurostat	2005	29	A fatal accident is defined as an accident which leads to the death of a victim within one year of the accident.	(Number of fatal injuries/ Number of employees) *100,000	- Which denominator to take? Rate per hour of work, per employed, per employee? Important to take into account how long workers are exposed to risks and the disparities of exposure (TF). - The fatal injury rate is proposed as a safe work indicator rather than the non-fatal injuries rate, because the reporting of fatalities is believed to be more complete and has fewer definitional problems compared to non-fatal injuries (i.e. a fatal injury can be relatively easily identified as such). Data normally cover the formal sector only; administrative records are often an inadequate data source; data quality issues due to under-reporting (DW). - Suitable indicator (Brian Pink comments).

Non-fatal occupational injury rate (Workplace accidents per 100,000 employees)	1a	8	Yes	1	Administrative source	Eurostat	2005	17	Standardised incidence rate of accidents at work. Serious accidents at work is the number of accidents at work resulting in longer than a three-day absence.	(Number of accidents at work with more than 3 days' absence that occurred during the year/Number of persons in employment in the reference population) *100,000	- Suitable indicator although one might question the international comparability in terms of quality of such measures (Brian Pink comments).
Share of employees working in "hazardous" conditions	1a	No	No	-	-	-	-	-	-	-	- How to define "hazardous"? Use a list from ILO convention (objective) or use subjective indicators (feeling of danger)? How people feel is a good way to measure the degree of exposure. But people are more and more sensitive to danger so it can be forked (more and more people saying they are at risk even if objectively risks decrease because of the stiffening of legislation) Perhaps the title can be changed for "hazardous conditions", so it includes the subjective dimension (TF). - Measurable? What are "hazardous" conditions? (Brian Pink comments). In International Hazard

											Datasheets on Occupations provided by ILO, information on the hazards and risks related to occupations are not directly connected to a specific ISCO code. Another option will be to use information of the 2007 LFS ad-hoc module on accidents at work and work-related health problems.
Employment of persons who are below the minimum age specified for the kind of work performed	1b	No	No	-	-	Child labour statistics (ILO/SIMPOC)	2008	Data are not available for European countries	-	-	-
Employment of persons below 18 years in designated hazardous industries and occupations	1b	No	No	-	-	-	-	-	-	-	-

Employment of persons below 18 years for hours exceeding a specified threshold	1b	No	No	-	-	Child labour statistics (ILO/SIMPOC)	-	Data are not available for European countries	-	-	-
Low pay	2a	2	No, but similar data	3	Structure of earnings survey	Eurostat	2006	29	Employees with below 2/3 of median hourly earnings. All NACE branches except agriculture, fishing, public administration, private households and extra-territorial organizations in enterprises with at least ten employees.	(Number of employees with below 2/3 of median hourly earnings/Number of employees)*100	A minimum age limit is needed (i.e. above 20 or 25 years old). By quintile could be a good idea to see the polarization. Complementary with average. Median is an indicator of inequality not of quality. Why 1/2 of median and not 2/3? (TF). - Income is undoubtedly relevant to quality of employment from an individual perspective however the relevance of this indicator to that issue is not obvious. It implies income equality equals quality in employment - At the individual level that is unlikely to be true. Why wouldn't average earnings per hour and median earnings per hour be a more relevant indicator (Brian Pink comments)?

Average weekly earnings of employees	2a	No	No, but similar data	1	Structure of earnings survey	Eurostat	2006	29	Monthly earnings in the reference month cover remuneration in cash paid before any tax deductions and social security contributions. All NACE branches except agriculture, fishing, public administration, private households and extra-territorial organizations in enterprises with at least ten employees.	Mean monthly earnings in Euro	-
Average number of days paid annual leave used in the previous year	2b	No	No, but similar data	1	Working Condition Laws	ILO	2007	168	Minimum annual leave that is the minimum number of annual holiday entitlements.	Number of minimum annual leave	- Important for comparing the theoretical legislative framework with reality (TF) - Relevant to pay and conditions of employees (Brian Pink comments).
Average number of days paid annual leave used in the previous year	2b	No	No, but similar data	1	Doing Business	World Bank	2008	181	Paid annual vacation for an employee with 20 years of service	Number of working days	
Average number of days paid annual leave used in the previous year	2b	No	No, but similar data	1	Structure of earnings survey	Eurostat	2006	28	Annual holidays of employees all NACE branches except agriculture, fishing, public administration, private households and extra-territorial organizations in enterprises with at least ten employees.	Mean annual holidays	

Share of employees using paid annual leave in the previous year	2b	No	No	-	-	-	-	-	-	-	- Not sufficient. Could be a good background indicator (TF). -Relevant to pay and conditions for employees. At the same time there is often an offset between having annual leave entitlements and a loading on pay in lieu - so again an issue of interpretability of the data (Brian Pink comments).
Share of employees using sick leave	2b	No	No	-	-	-	-	-	-	-	-
Share of employed persons working 49 hrs and more per week	3a	3	Yes	3	Labour Force Survey	Eurostat	2008	32	In line with ILO Convention No. 1 which specifies that hours of work per week should not exceed 48, the excessive hours indicator is defined here as the percentage of employed persons whose usual hours of work at all jobs are more than 48 hours per week.	(Persons in employment who usually work 49hrs or more per week / Persons in employment)*100	- There are differences between self-employed and employees and between high and low qualified employees (TF). - Relevant to quality of employment - although value judgement that working long hours (presumably) reduces the quality of employment even though you might be recompensed admirably for doing so (Brian Pink comments).

Average annual (actual) hours worked per person	3a	3	Yes	2	National Account	Eurostat	2008	30	The definition of total hours worked is based on the European System of Accounts (ESA 1995). The indicator comprises the hours actually worked by all persons engaged in economic activity who perform some gainful activity as employees (wage earners, salaried employees, public officials, marginal part-time workers, soldiers), as self-employed persons or as unpaid family workers. This includes the hours worked by persons performing several jobs at the same time	Number of hours actually worked by all persons in employment in one year/ Number of persons in employment	-Relevant to quality of employment but again there is often an offset between hours worked and pay. Also reduced hours may not necessarily a good thing - if that is how one is meant to interpret it. Currently, in Australia there is evidence of reduced hours and increasing underemployment as employers reduce hours of available work due to the GFC - it would not seem that is improving quality of employment (Brian Pink comments).
Involuntarily part-time	3a	No	Yes	1	Labour Force Survey	Eurostat	2008	31	Share of employed persons working less than 30 hours per week involuntarily	(Number of persons working on an involuntary part-time basis / Number of persons in a part-time job or total person in employment)*100	- It comes across as if time-related underemployment is more about the quantity of employment than quality. But it can reflect some workers' state of contentment. It is relevant also because the indicator is related with wage (TF). - Relevant like underemployed. Why you would measure this and not

											worry about the unemployed? (Brian Pink comments).
Involuntarily part-time: Time-related underemployment rate	3a	3	Yes	3	Labour Force Survey	Eurostat	2008	32	"Insufficient hours of work in relation to an alternative employment situation that a person is willing and available to engage in" (16th ICLS, 1998). Operationally, it identifies employed persons who in the reference period: a) were willing to work additional hours; b) were available to work additional hours; c) had worked less than a threshold relating to working time in the reference week.	(Number of persons in time-related underemployment / total person in employment)*100	Overlap between involuntary part-time and time-related underemployed is not much. The variable hours worked is more stringent and homogenous compared to the definition of part-time/full-time work.

Percentage of employed people who usually work at night/evening	3b	No	Yes	3	Labour Force Survey	Eurostat	2008	31	Concept of working arrangement should be strictly interpreted. Employed people only occasionally work on some atypical hours should be not included.	(Number of persons in employment who usually work at night and evening/Number of persons in employment) *100	-In database there is not the combination together night/evening (Brian Pink comments).
Percentage of employed people who usually work on weekend or bank holiday	3b	No	Yes	3	Labour Force Survey	Eurostat	2008	31	Concept of working arrangement should be strictly interpreted. Employed people only occasionally work on some atypical hours should be not included.	(Number of persons in employment who usually work on Saturday and Sunday/ Number of persons in employment) *100	-Possibly measurable - not sure of the significance of bank holidays! In database there is not the combination Saturday/Sunday (Brian Pink comments).
Share of people with flexible work schedule	3b	No	Yes	2	Labour Force Survey ad-hoc module Work organisation and working time arrangements	Eurostat	2004	30	Number of employees with not fixed start and end of a working day	(Number of employees with not fixed start and end of a working day/ Number of employees)*100	

Ratio of employment rate for women with children under compulsory school age to the employment rate of all women aged 20-49	3c	No	Yes	2	Labour Force Survey	Eurostat	2008	26	The employment rate is the share of employed persons aged 25 to 49 in the population of the corresponding sex and age group. Data are reported according to the age of the youngest child living in the household. Children living outside the household are not considered.	Employment rate for women aged 20-49 with children 0_5 / Employment rate of women aged 20-49	-Given the multitude of factors that may contribute to changes in this ratio the interpretability of this measure is questionable (Brian Pink comments). -In Italy is more relevant for women aged 25-34 and 35-44
Share of people receiving maternity/ paternity/family leave benefits: persons who can take whole days off for family reasons	3c	No	No, but similar data	3	LFS 2005 ad-hoc module on Reconciliation between work and family life	Eurostat	2005	28	Number of employed women aged between 15 and 64 years old who can take whole days off for family reasons.	(Number of person in employment between 15 and 64 years old who can take whole days off for family reasons/Total person in employment)*100	-Should be proportion women employees entitled to maternity leave, etc.. The actual length of maternity leave would be relevant to international comparability exercises i.e. may have the same percentages but 4 weeks in one country and 52 weeks in another country (Brian Pink comments).

Share of people receiving maternity/ paternity/family leave benefits: persons taking time off over the last 12 months for family sickness or emergencies	3c	No	No, but similar data	3	LFS 2005 ad-hoc module on Reconciliation between work and family life	Eurostat	2005	28	Number of employed women aged between 15 and 64 years old taking time off over the last 12 months for family sickness or emergencies.	(Number of persons in employment between 15 and 64 years old taking time off over the last 12 months for family sickness or emergencies/Total person in employment)100	
Share of people receiving maternity/ paternity/family leave benefits: length of maternity leave	3c	No	No, but similar data	3	Working Condition Laws	ILO	2007	168	Is a period (not shorter than 14 weeks) in which mothers are allowed time off work in order to follow the birth of a child.	From sources in legislation (calendar days, weeks, months) to number of weeks	-
Share of people receiving maternity/ paternity/family leave benefits: amount of maternity leave benefits	3c	No	No, but similar data	3	Working Condition Laws	ILO	2007	165	The level of benefits available during the maternity leave.	The percentage of wage available during the maternity leave considering: a) the proportion of the worker's earning to be paid; b) the period over which they are to be paid	-

Percentage of employees 25 years and older with temporary jobs	4a	6	Yes	1	Labour Force Survey	Eurostat	2008	32	Employees with temporary contracts are those who declare themselves as having a fixed term employment contract or a job which will terminate if certain objective criteria are met, such as completion of an assignment or return of the employee who was temporarily replaced.	(Number of Temporary employees aged 25 and older/ Number of Employees aged 25 and older) *100	-This has not always a negative impact in terms of flexicurity approach (work life cycle). Therefore such indicator needs to be supplemented by indicators on transitions of persons (from temporary work into other status - see below). An alternative indicator: involuntary temporary contracts (TF). - Comparability problems to measure temporary positions. Counter-cyclical; value rises with economic upturn as newer workers hired. Data may be limited (DW). - Measurable but the presumption is that temporary work is bad-not sure that is necessarily true (Brian Pink comments).
Percentage of employees 25 years and older with job tenure (< 1 yr, 1-3 yrs, 3-5 yrs, >= 5yrs)	4a	6	Yes	2	Labour Force Survey	Eurostat	2008	31	Employees with temporary contracts are those who declare themselves as having a fixed term employment contract or a job which will terminate by one year.	Number of Employees 25 years and older with job tenure(< 1 yr, 1-3 yrs, 3-5 yrs, >= 5yrs)/ Employees 25 years and older*100	- The indicator needs to be complemented by a split between “voluntary and involuntary” mobility. Proxies need to be found/tested (transitions, split between permanent/temporary contracts, jobs turnover, persons actively looking for another job) (TF). - Measurable but premised on an assumption (value judgement) that staying in

											one job for a long time increases the quality of employment. There would be plenty of gen x/y who would argue with that (Brian Pink comments).
Public social security expenditure as share of GDP	4b	6	Yes	1	National Account	Eurostat	2008	31	The standard followed is the European System of Accounts (ESA 95). Annual national accounts comprise the main aggregates on annual national accounts, including: GDP and its components, employment, final consumption aggregates, income, saving and net lending/borrowing, exports and imports. Breakdowns exist for variables by economic activity (industries), asset types and final consumption purpose (COICOP).	Government expenditure on Social protection / GDP *100	Interpretability? Is an increase good or bad for quality of employment? (Brian Pink comments).

Share of economically active population contributing to a pension fund	4b	No	No	-	-	-	-	-	-	-	-Not sure why you would want this? Isn't the question whether there is a social security net for people irrespective of the source of funding i.e. employee, employer or government (Brian Pink comments).
Share of employees covered by unemployment insurance	4b	No	No	-	-	-	-	-	-	-	-Not sure what relevance to quality of employment (Brian Pink comments).

Average number of days not worked due to strikes and lockouts	5	No	Yes	1	Trade unions, social security officers, employers' confederations and employment offices.	Eurostat	2007	21	A strike is a temporary work stoppage affected by one or more groups of workers with a view to enforcing or resisting demands or expressing grievances, or supporting other workers in their demands or grievances. A lockout is a total or partial temporary closure of one or more places of employment, or the hindering of the normal work activities of employees, by one or more employers with a view to enforcing or resisting demands or expressing grievances, or supporting other employers in their demands or grievances.	(Number of days lost due to strikes and lockouts/Number of persons in employment) *1000	-Generally would accept as an indicator of quality of work but robust negotiation including strikes might be indicative of good social dialogue and quality of employment (Brian Pink comments).

Share of employees covered by collective wage bargaining	5	10	No, but similar data	2	Structure of earnings survey	Eurostat	2006	24	Number of employees with national level or interconfederal agreement. All NACE branches except agriculture, fishing, public administration, private households and extra-territorial organizations in enterprises with at least ten employees	(Number of employee with national level or interconfederal agreement/Numbe r of employee)*100	-Developments in the coverage of collective bargaining around the world are more contrasted. In many countries collective bargaining is low and decreasing due to a variety of factors, including the increase in the number of workers in smaller firms or under atypical forms of contracts.
Share of employed persons in high skilled occupations	6	No	Yes	2	Labour Force Survey	Eurostat	2008	32	Share of employed persons in ISCO88 1, 2, 3 occupations.	(Number of persons in ISCO88 1,2,3 occupations /Number of persons in employment) *100	-Again, one might argue that this is a quantitative measure rather than qualitative. No doubt many highly skilled people, e.g. doctors, have a poor quality of employment, e.g. long hours, etc. and vice versa low skilled people may have high quality of employment (Brian Pink comments).

Share of employees who received job training	6	-	Yes	3	Labour Force Survey	Eurostat	2008	32	Life-long learning refers to persons who stated that they received education or training in the four weeks preceding the survey (numerator). The information collected relates to all education or training whether or not relevant to the respondent's current or possible future job.	(Number of employees aged 15-64 stating to have received education or training in the 4 weeks preceding the survey/ Number of employees aged 15-64)*100	-One of the most important indicators. Perhaps the period should be reduced to 4 weeks only. Not only is the amount of training important but also the relevance with the job. Lifelong learning should be split into training offered by firms and training followed by persons. The last indicator opens the option to then refer to those 'job-related' in the later case. The main question about this indicator is the definition: firms or persons? Self-employed can be a large group in certain countries (TF). - Relevant to quality of employment but difficulty in defining and measuring (Brian Pink comments).
Share of employed who have more education than is normally required in their occupation	6	-	Yes	2	Labour Force Survey	Eurostat	2008	32	Employed people with high level of education and working in not skilled occupations. Overeducation indicates mismatch between demand and supply of skilled employment. Overeducation reveals waste of human capital for the economic system as a	(Number of persons in employment with educational level ISCED 5-6 and working in occupations ISCO 4-9/ Number of persons in employment with educational level ISCED 5-6)*100	-The definition in a national context needs to be assessed although such indicators are very relevant. The definition of the matrix of over and under-qualified jobs with respect to educational level has to be carefully determined. More than one digit of the ISCED and ISCO classifications has to be used. Use of the matrix ISCO/ISCED is a very good idea to define over-qualified persons (TF).

									whole, whereas from an individual perspective it would presumably turns into job dissatisfaction		
Share of employed who have less education than is normally required in their occupation	6	-	Yes	3	Labour Force Survey	Eurostat	2008	32	No operational definition	No operational definition	-It is very difficult to define under- qualified persons, especially among the elderly. Job-related skills are more relevant than diploma. The use of subjective indicators could be a solution (TF).
No indicators proposed	7a	-	No, but similar data	2	European Working Conditions Survey	European Foundation	2005	27	No operational definition	No operational definition	Some indicators related to workplace relationships with colleagues and superiors
No indicators proposed	7b	-	No, but similar data	2	European Working Conditions Survey	European Foundation	2005	27	No operational definition	No operational definition	Some indicators related to satisfaction on work

ANNEX II. LIST OF VARIABLES

Dimension 1. Safety and ethics of employment: a) Safety at work						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Fatal occupational injuries rate (Workplace fatalities per 100,000 employees)	Fatal injuries (per 100,000 in employment)	(Number of fatal injuries /Number of persons in employment) *100,000	Administrative source	Eurostat	2005	22
	Fatal injuries (per 100,000 employees)	(Number of fatal injuries/ Number of employees) *100,000	Administrative source	Eurostat	2005	22
Non-fatal occupational injuries rate (Workplace accidents per 100,000 employees)	Non-fatal injuries (per 100,000 in employment)	(Number of non fatal injuries / Number of persons in employment) *100,000	Administrative source	ILO	2005	21
	Non-fatal injuries (per 100,000 employees)	(Number of non fatal injuries/ Number of employees) *100,000	Administrative source	ILO	2005	21
	Standardized incidence rate of serious accidents at work (per 100 000 in employment)	(Number of accidents at work with more than 3 days' absence that occurred during the year/Number of persons in employment in the reference population) *100,000	Administrative source	Eurostat	2005	14
	Work-related health problems in the past 12 months(per	(Persons in employment suffering from work-related health problems during the past 12	LFS ad-hoc module	Eurostat	2007	22

	100 in employment)	months (except accidental injuries) / Number of persons in employment) *100				
	Work-related health problems in the past 12 months (per 100 employees)	(Number of employees suffering from work-related health problems during the past 12 months (except accidental injuries) / Number of employees*100	LFS ad-hoc module	Eurostat	2007	22
	Accidental injuries at work in the past 12 months (per 100,000 in employment)	(Number of accidental injuries at work occurred during the past 12 months / Number of persons in employment)*100,000	LFS ad-hoc module	Eurostat	2007	22
Share of employees working in "hazardous" conditions	not available	-	-	-	-	-
Dimension 1. Safety and ethics of employment: b) Child labour and forced labour						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Employment of persons who are below the minimum age specified for the kind of work performed	not available	-	-	-	-	
Employment of persons below 18 years in designated hazardous industries and occupations	not available	-	-	-	-	
Employment of persons below 18 years for hours exceeding a specified threshold	not available	-	-	-	-	-

Dimension 2. Income and benefits from employment: a) Income						
Indicator	**Variable**	**Formula***	**Source**	**Database**	**Year**	**N**
Average weekly earnings of employees	Mean monthly earnings in Euro	Mean monthly earnings in Euro	SES	Eurostat	2006	22
	Median hourly earnings in Euro full-time	Median hourly earnings in Euro full-time	SES	Eurostat	2006	22
	Median hourly earnings in Euro part-time	Median hourly earnings in Euro part-time	SES	Eurostat	2006	22
Low pay (Share of employed with below 2/3 of median hourly earnings)	Share of employees with below ½ of median hourly earnings (%)_full-time	(Number of employees full-time with below 1/2 of median hourly earnings/Number of employees)*100	SES	Eurostat	2006	22
	Share of employees with below ½ of median hourly earnings (%)_part-time	(Number of employees part-time with below 1/2 of median hourly earnings/Number of employees)*100	SES	Eurostat	2006	22
**all NACE branches except agriculture, fishing, public administration, private households and extra-territorial organizations in enterprises with at least 10 employees*						
Dimension 2. Income and benefits from employment: b) Non-wage pecuniary benefits						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Share of employees using paid annual leave in the previous year	not available	-	-	-	-	-
Share of employees using sick leave	not available	-	-	-	-	

Average number of days paid annual leave used in the previous year	Paid annual vacation	Number of paid annual vacation for an employee with 20 years of service	Doing Business	World Bank	2007	22
	Mean annual holidays	Annual holidays of employees all NACE branches except agriculture, fishing, public administration, private households and extra-territorial organizations in enterprises with at least 10 employees	SES	Eurostat	2006	21
Dimension 3. Working hours and balancing work and non-working life: a) Working hours						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Average annual (actual) hours worked per person	Average annual hours worked per person	Number of hours actually worked by all persons in employment in one year/ Number of persons in employment	NA	Eurostat	2007	22
	Average weekly actual hours worked	Number of actual weekly working hours in main job by all persons in employment / Number of persons in employment	LFS	Eurostat	2007	22
Share of employed persons working 49 hrs and more per week	Employees 49hrs and more (per 100 employees)	Number of employees who usually work 49hrs or more per week / Number of	LFS	Eurostat	2007	22

		employees*100				
	Self-employed 49hrs and more (per 100 self-employed)	(Number of persons in self-employment who usually work 49hrs or more per week / Number of persons in self-employment)*100	LFS	Eurostat	2007	22
	Persons in employment working 49hrs and more (per 100 in employment)	(Persons in employment who usually work 49hrs or more per week / Persons in employment)*100	LFS	Eurostat	2007	22
Share of employed persons working less than 30 hours per week involuntarily	Involuntary part-time (per 100 part-time)	(Number of persons working on an involuntary part-time basis / Number of persons in a part-time job)*100	LFS	Eurostat	2007	22
	Wishing more hours (per 100 in employment)	(Number of persons in employment wishing to work more than the current number of hours / Number of persons in employment)*100	LFS	Eurostat	2007	22
Dimension 3. Working hours and balancing work and non-working life: b) Working time arrangements						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Percentage of employed people who usually work at night/evening	Usually work at evening (per 100 in employment)	(Number of persons in employment who usually work at evening/Number of	LFS	Eurostat	2007	22

		persons in employment) *100				
	Usually work at night (per 100 in employment)	(Number of persons in employment who usually work at night/Number of persons in employment) *101	LFS	Eurostat	2007	22
Percentage of employed people who usually work on weekend or bank holiday	Usually work on Saturday (per 100 in employment)	(Number of persons in employment who usually work on Saturday/Number of persons in employment) *100	LFS	Eurostat	2007	22
	Usually work on Sunday (per 100 in employment)	(Number of persons in employment who usually work on Sunday/Number of persons in employment) *100	LFS	Eurostat	2007	22
	Usually work on Saturday and Sunday (per 100 in employment)	(Number of persons in employment who usually work on Saturday and Sunday/ Number of persons in employment) *100	LFS	Eurostat	2007	22
	Employees usually work on Saturday and Sunday (per 100 employees)	(Number of Employees who usually work on Saturday and Sunday/ Number of Employees)*100	LFS	Eurostat	2007	22
	Self-employed usually work on Saturday and Sunday (	(Number of persons in self-employment who usually work on Saturday and Sunday/	LFS	Eurostat	2007	22

	per 100 self-employed)	Number of persons in Self-employment) *100				
Share of people with flexible work schedule	Flexible work schedule (per 100 in employment)	(Number employees with not fixed start and end of a working day/ Number of employees)*100	LFS ad-hoc module	Eurostat	2004	22
Dimension 3. Working hours and balancing work and non-working life: c) Balancing work and non-working life						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Ratio of employment rate for women with children under compulsory school age to the employment rate of all women aged 20-49	Ratio of employment rate for women aged 20-49 with children 0_5 to the employment rate of women aged 20-49	Employment rate for women aged 20-49 with children 0_5 / Employment rate of women aged 20-49	LFS	Eurostat	2007	18
	Ratio of employment rate for women aged 20-49 with children 0_5 to the employment rate of women aged 20-49 without children	Employment rate for women aged 20-49 with children 0_5 / Employment rate of women aged 20-49 without children	LFS	Eurostat	2007	18

Share of people receiving maternity/ paternity/family leave benefits	Parental leave taken by persons aged 15-64 (per 100 in employment aged 15-64)	(Number of persons aged 15-64 taking parental leave over the last 12 months/ Number of persons in employment aged 15-64)*100	LFS ad-hoc module	Eurostat	2005	22
	Parental leave taken by women aged 15-64 (per 100 women in employment aged 15-64)	(Number of women aged 15-64 taking parental leave over the last 12 months/ Number of women in employment aged 15-64)*100	LFS ad-hoc module	Eurostat	2005	22
	Parental leave taken by men aged 15-64 (per 100 men in employment aged 15-64)	(Number of men aged 15-64 taking parental leave over the last 12 months/ Number of men in employment aged 15-64)*100	LFS ad-hoc module	Eurostat	2005	22
	Parental leave taken by employees aged 15-64 (per 100 employees aged 15-64)	(Number of employees aged 15-64 taking parental leave over the last 12 months/ Number of employees in employment aged 15-64)*100	LFS ad-hoc module	Eurostat	2005	22
	Parental leave taken by women employees aged 15-64 (per 100 employee	(Number of employee women aged 15-64 taking parental leave over the last 12 months/ Number of employee women in aged 15-64)*101	LFS ad-hoc module	Eurostat	2005	22

	women aged 15-64)					
Dimension 4. Security of employment and social protection: a) Security of employment						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Percentage of employees 25 years and older with temporary jobs	Temporary employees (per 100 employees)	(Number of Temporary employees aged 25 and older/ Number of Employees aged 25 and older) *100	LFS	Eurostat	2007	
	Temporary employees 25 yrs+ (per 100 employees 25 yrs+)	(Number of Temporary employees aged 25 and older/ Number of Employees aged 25 and older) *100	LFS	Eurostat	2007	22
Percentage of employees 25 years and older with job tenure (< 1 yr, 1-3 yrs, 3-5 yrs, >= 5yrs)	Temporary employees with contract <12 months (per 100 temporary employees)	(Number of Temporary employees aged 25 and older with contract <12 months / Number of Temporary employees aged 25 and older)*100	LFS	Eurostat	2007	
	Temporary employees aged ≥ 25 years with contract < 12 months (per 100 temporary employees ≥	(Number of Temporary employees aged ≥ 25 years with contract < 12 months / Number of Temporary employees aged ≥ 25 years)*100	LFS	Eurostat	2007	19

	25 years)					
	Persons aged ≥ 25 years with job tenure < 1yr (per 100 persons in employment)	(Number of persons aged ≥ 25 years with job tenure < 1 year / Number of persons in employment aged ≥ 25 years)*100	LFS	Eurostat	2007	21
	Persons aged ≥ 25 years with job tenure 1-3 year(s) (per 100 persons in employment)	(Number of persons aged ≥ 25 years with job tenure 1-3 year(s) / Number of persons in employment 25 years and older)*100	LFS	Eurostat	2007	21
	Persons aged ≥ 25 years with job tenure 3-5 years (per 100 persons in employment)	(Number of persons aged ≥ 25 years with job tenure 3-5 years / Number of persons in employment aged ≥ 25 years)*100	LFS	Eurostat	2007	21
	Persons aged ≥ 25 years with job tenure > 5 years (per 100 persons in employment)	(Number of persons aged ≥ 25 years with job tenure > 5 years / Number of persons in employment aged ≥ 25 years)*100	LFS	Eurostat	2007	21

Dimension 4. Security of employment and social protection: b) Social protection						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Public social security expenditure as share of GDP	Public social security expenditure as share of GDP	Government expenditure on Social protection / GDP *100	NA		2007	22
Share of employees covered by unemployment insurance	not available	-	-	-	-	-
Share of economically active population contributing to a pension fund	not available	-	-	-	-	-
Dimension 5. Social dialogue						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Share of employees covered by collective wage bargaining	Employees covered by collective wage bargaining (per 100 employees)	(Number of employee with national level or interconfederal agreement/Number of employee)*100	SES	Eurostat	2006	18
Average number of days not worked due to strikes and lockouts	Working days lost (per 1000 persons in employment)	(Number of days lost due to strikes and lockouts/Number of persons in employment) *1000	Trade unions, social security officers, employers' confederations and employment offices	Eurostat	2007	14

Dimension 6. Skills development and life-long learning						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
Share of employed persons in high-skilled occupations	Occupation ISCO1 (per 100 persons in employment)	(Number of persons in ISCO1 /Number of persons in employment) *100	LFS	Eurostat	2007	22
	Occupation ISCO2 (per 100 persons in employment)	(Number of persons in ISCO2 /Number of persons in employment) *100	LFS	Eurostat	2007	22
	Occupation ISCO3 (per 100 persons in employment)	(Number of persons in ISCO3 /Number of persons in employment) *100	LFS	Eurostat	2007	22
	Occupation ISCO1_3 (per 100 persons in employment)	(Number of persons in ISCO1-3 /Number of persons in employment) *100	LFS	Eurostat	2007	22
	Occupation ISCO2_3 (per 100 persons in employment)	(Number of persons in ISCO2-3 /Number of persons in employment) *100	LFS	Eurostat	2007	22
Share of employees who received job training within the last 12 months	Persons in employment in education and training in the previous 4 weeks (per 100 in employment)	(Number of persons in employment aged 15-64 stating to have received education or training in the 4 weeks preceding the survey/ Number of persons in employment aged 15-64)*100	LFS	Eurostat	2007	22

	Employees in education and training in the previous 4 weeks (per 100 employees)	(Number of employees aged 15-64 stating to have received education or training in the 4 weeks preceding the survey/ Number of employees aged 15-64)*100	LFS	Eurostat	2007	22
	Persons in employment in paid-for training in previous 12 months (per 100 in employment)	(Number of persons in employment in paid-for training in the previous 12 months / Number of persons in employment) *100	EWCS	European Foundation	2005	22
Share of employed who have more education than is normally required in their occupation	Overeducation (per 100 in employment with ISCED5-6)	(Number of persons in employment with educational level ISCED 5-6 and working in occupations ISCO 4-9/ Number of persons in employment with educational level ISCED 5-6)*100	LFS	Eurostat	2007	22
	Overeducation (per 100 in employment)	(Number of persons in employment with educational level ISCED 5-6 and working in occupations ISCO 4-9/ Number of persons in employment)*100	LFS	Eurostat	2007	22
Share of employed who have less education than is normally required in their occupation	not available	-	-	-	-	-

Dimension 7. Workplace relationships and intrinsic nature of work: a) Workplace relationships						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
No indicators proposed	Can get assistance from colleagues (per 100 in employment)	(Number of persons in employment who can get assistance from colleagues (often or almost always)/Number of persons in employment) *100	EWCS	European Foundation	2005	22
	Can get assistance from superiors (per 100 in employment)	(Number of persons in employment who can get assistance from superiors (often or almost always) / Number of persons in employment) *100	EWCS	European Foundation	2005	22
	Teamwork job (per 100 in employment)	(Number of persons in employment whose job involves team work/ Number of persons in employment) *100	EWCS	European Foundation	2005	22
Dimension 7. Workplace relationships and intrinsic nature of work: b) Intrinsic nature of work						
Indicator	**Variable**	**Formula**	**Source**	**Database**	**Year**	**N**
No indicators proposed	Employed people looking for another job (per 100 in employment)	(Number of persons in employment looking for another job / Number of persons in employment) *100	LFS	Eurostat	2007	
	Satisfied with working conditions	(Number of persons in employment satisfied or very satisfied with	EWCS	European Foundation	2005	22

	(per 100 in employment)	working conditions in the main paid job / Number of persons in employment) *100				
	Job offers good prospects for career advancement (per 100 in employment)	(Number of persons in employment agreeing with the statement “My job offers good prospects for career advancement”/ Number of persons in employment)*100	EWCS	European Foundation	2005	22
	Able to apply own ideas in work (rate per 100 employed people)	(Employed people able to apply own ideas in work (often or almost always) / Employed people) *100	EWCS	European Foundation	2005	22
	Learning new things (rate per 100 employed people)	(Employed people able learning new things / Employed people)*100	EWCS	European Foundation	2005	22