walqing

Work and Life Quality in New & Growing Jobs

walqing working paper 2011.1

Working with business functions

How occupational groups provide insight in Labour Force Survey statistics

Sem Vandekerckhove
HIVA-K.U.Leuven

Monique Ramioul
HIVA-K.U.Leuven

Version 1: May 2011

EUROPEAN COMMISSION
European Research Area

SEVENTH FRAMEWORK PROGRAMME

www.walqing.eu

Funded under Socio-economic Sciences & Humanities

walqing working paper 2011.1

Working with business functions: How occupational groups provide insight in Labour Force Survey statistics

Sem Vandekerckhove, HIVA-K.U.Leuven
Monique Ramioul, HIVA-K.U.Leuven

Leuven, May 2011

www.walqing.eu

Content

List of Tables

List of Figures

1   Introduction

The overall objective of the WALQING project is to map employment growth and to measure the quality of the new jobs in an EU comparative perspective. A major challenge is to take account of the reality that job creation (and destruction) as exhibited in macro-economic statistics hides substantial employment shifts beneath the surface of the national picture. And even sector employment figures do not do justice to the structural changes in the job compositions within the firms of which these sectors are composed. Economic change and the re-organisation of work today can only be understood fully when one takes into account a simultaneous decomposition and recomposition of sectors, organisations and labour processes. Hence, we need a method to investigate structural employment change not only between sectors and nations, but also within sectors. To do so in international comparative analysis makes the endeavour all the more complex. Over time, national bureaus for statistics or research institutes have been converging and data gathering has been internationalised (Huws, 2006). The possibilities for advanced research, such as analyses of time series and comparative studies, are vast. At the same time, the more data becomes available, the more questions and complications arise. We now face a situation where one of the largest surveys in the world, the European Union Labour Force Survey (EU-LFS), is stretched to its limits. Over time, cracks appear in the data, with politically inspired changes, methodological interventions and new countries joining the European Union.

In an attempt to overcome some of these issues, this paper elaborates on the business function, a unit of analysis that is situated in between the individual level or the occupation and the sector level. We argue that, as a cluster of occupations, a business function forms a meaningful unit in the structure of employment. In the first place because it enables us to analyse within-sector structural employment change, and thus the business function approach opens up possibilities for more in-depth knowledge on the quality of jobs in times of restructuring. In the second place because it is with business functions in mind that managers take decisions on their company's activities and labour input, and therefore the business function analysis improves the way statistics reflect reality. Consequently, a proper understanding of business functions will allow us to retrieve the trends in the labour market as aimed for in WALQING.

In the next section, we discuss the theoretical base of the business function typology and the value chain. Then we propose a revised model of business functions, apply this typology to four selected sectors and compare the use of business functions with alternative methods. In the final part, the business functions provide a new way to identify new and growing jobs and we have a look at vulnerable groups from the business function perspective. We conclude the paper with some reflections on data gathering and questions for further qualitative research.

2 Global value chains and business functions: theory

The acceleration of globalisation in the 1990s led to shifts in employment and its structure due to intensified outsourcing, offshoring and restructuring (Gereffi et al., 2001; Kaplinsky & Morris, 2001, 15). On this occasion, researchers from fields such as economic geography, management theory and labour sociology, turned back to the concept of the business function. Rooted in the earliest theories on the division of labour (Huws et al., 2009), the business function typology started out as a corporate tool in business economics with the best-selling 'Competitive advantage: creating and sustaining superior performance' by Michael Porter (1985). Business functions are defined by Porter as the technologically and economically distinct activities a company performs to do business. Marketing & sales, production and research and development are examples of such business functions. The functions link together in a value chain which describes the full process of producing and delivering goods and services. Following the management concept of Business Process Reengineering, a firm will look at the value chain in order to choose the optimal strategy to maximize profits. As a result, firms reconsider the governance of the underperforming business functions. This process leads to an intensification of the (interorganisational) division of labour because it generates or facilitates the decision to outsource. These management decisions eventually translate into structural economic change. Meanwhile, the business function has become a key concept in the empirical development of global value chain research, e.g. giving rise to the Global Value Chain initiative[1], an impetus for supranational research on value chains. The main point is to describe the interorganisational networks that emerge around the production and distribution of goods, linking states, organisations and consumers. The nodes in this network consist of input factors (raw materials or intermediate products), processes, distribution or consumption. This input-output structure was originally described as the commodity chain (Gereffi & Korzeniewicz, 1994) or supply chain but gradually more emphasis was put on the economic value that was added in the sequence of the linked activities (or business functions), thus leading to the currently widely used term 'global value chain'[2] (Huws et al., 2009, 25).

Not all business functions are equal: Porter makes the distinction between primary functions and support functions, which may serve any of the primary activities (cf. Table 1). Over time, scholars redefined and reclassified the different business functions. For instance, Gospel & Mako (2010:5) argue that primary functions add economic value to the product or service as 'components', while support functions are business processes which are normally viewed as part of the administrative overhead. On this basis they distinguish the vertical disintegration of the value chain, the outsourcing of primary functions, from the unbundling of corporate functions, which refers to the outsourcing of support functions, such as HRM. Further, the concept of the business function received renewed academic

---

[1] http://www.globalvaluechains.org

[2] In one of the concluding books of the EU-funded WORKS project, a historical account of the various underlying theories behind the concept of the global value chain, which date back to 18th century economics, is summarised by Huws et al. (2009).

attention in different studies on globalisation. One reason for this revival is that it was suggested as a solution to solve measurement problems in the (statistical) mapping of the employment impact related to offshoring and outsourcing of activities and the restructuring of global value chains (Sturgeon & Gereffi, 2009). The starting point is that traditional industry classifications using units of observations such as the enterprise or sector are increasingly inadequate for the analysis of the structure and development of global value chains[3]. The restructuring of value chains through outsourcing and offshoring typically involves only specific business functions which are moved between firms, rather than the relocation of entire companies (Ramioul & Huws, 2009).

Table 1:   Business function classifications

Author	Functions	
Porter (1985)	*Primary functions* — Inbound logistics — Operations — Outbound logistics — Marketing and Sales — Service	*Support functions* — Firm infrastructure — Human resource management — Technology development — Procurement
WORKS (Geurts et al., 2007; Huws et al., 2009)	— R&D — Operations (production) — Material and product logistics — Marketing and Sales — Customer Service	— Firm infrastructure — Human resource management — Technology development — Procurement — ICT
Bureau of Labour Statistics (Brown, 2008)	*Core processes* — Procurement, logistics, and distribution — Operations — Marketing, sales, and customer accounts — Customer and aftersales services — Product or service development	*Support processes* — General management and firm infrastructure — Human resource management — Technology and process development
EUROSTAT (Statistics Denmark, 2008)	*Core function* — Production of goods and services for the market	*Support functions* — Distribution and Logistics — Marketing, Sales and After Sales Services — Administrative and Management functions — Engineering and related Technical Services — Research and Development — Others including ICT services
KEROSINE (Dekocker & Wynants, 2009)	*Core function* — Production of goods and services for the market	*Support functions* — Distribution, logistics and transport — Marketing and Sales — Customer Services — Financial and legal administration — HRM — Engineering — ICT — Research and Development — Facility Management

---

[3] See Huws et. al., 2009: 19ff for a summary on the measurement problems of industrial classifications for the study of value chain restructuring

Using this perspective, the business function was picked up as analytical concept in a range of consecutive EU-funded research projects to investigate corporate restructuring from the perspective of work and employment. The EMERGENCE project[4] used business functions empirically in a company survey in order to map their outsourcing and relocation. Using 'e-work' as the overall research umbrella, this project was limited to business functions involving information processing and telemediated by ICTs (i.e. being delivered over a telecommunications link) such as software development or customer relation services (Huws, 1985). The EU-funded WORKS project[5] further refined the empirical value of the business function concept. The project's main objective was to investigate changes in work related to global value chain restructuring. In its case studies, a variety of business functions (production, research & development, logistics, IT, etc.) were selected in order to use the business function typology as a 'window' to look at global value chain restructuring in different industries and in a comparative European perspective (Flecker et al. , 2008). In the quantitative research of the WORKS project, employment in business functions was analysed using proxies based on sectoral and occupational employment data (Geurts et al., 2007). This technique allowed an analysis of employment in business functions from two perspectives. First, what are the changes in the business function composition structure within a sector (e.g. offshoring of production functions) and can we observe shifts in core business (e.g. from manufacturing to R&D or to retail)? Second, in what way are specific business functions distributed over sectors? Are they organised in one sector or dispersed over the entire economy, and what movements between sectors can be observed (e.g. concentration of transport & logistics functions or IT functions in specialised sectors instead of the sector they are serving)?

In parallel with these EU projects, the US Bureau of Labor Statistics' Mass Layoff Statistics program developed a list of business processes and business functions in order to collect data on massive layoffs in the US (Brown, 2008). Brown uses the term 'business processes' instead of 'business functions', which describe, in her account, activities within business processes. Further, 14 EU National Statistics Institutes used the business function approach in a Eurostat pilot survey on establishments to map International Sourcing (Statistics Denmark, 2008) and some national establishment surveys (e.g. KEROSINE) did the same (Dekocker & Wynants, 2009; Geurts, 2009). In the US and Canada, several initiatives have been launched to include the business functions in organisation surveys, such as the Survey of Changing Business Practices in the Global Economy (Statistics Canada), National Organizational Survey (US) and International Offshoring research Network (US).

Table 1 shows different authors' selection of business functions and group classifications. The typologies are developed based on hypotheses within the lines set out by data restrictions. As a consequence, there is some variation in the bundling of activities into business functions, for instance, in whether to combine customer services and marketing & sales, or to distinguish financial & legal administration from overall administrative

---

[4] http://www.emergence.nu.

[5] http://www.worksproject.be.

functions. In the WORKS project the classification was adapted in view of a broader analysis at the European level, making no difference between inbound or outbound logistics but instead including the category material and product logistics.

Furthermore, while most authors assign business functions to either a group of core activities or a group of secondary (or support) activities, there is no consensus on the divisions used. Part of the problem is that a business function can be acting in support to core functions in one company, while being part of the core in another. In that particular sector some occupations may even be core and support at the same time, depending on who the employee is serving: e.g. accountants in an accountancy firm. We propose a pragmatic approach to put theory into practice, defining business functions depending on the sector, based on the most obvious scenario. For instance, HRM and IT departments are support activities in many companies, but they are primarily core functions in the sector of labour recruitment or IT. In other words, any activity can theoretically be, or become, a core function when companies emerge which provide that function as a service. This is thus related to the progressing specialisation of firms and sectors and the growing inter-firm division of labour and lengthening of value chains. A second reason for the discordance amongst typologies are the criteria used to define a function as core or support. Although there exists a wide economic literature on business processes and core competencies, this is not always made explicit in the empirical research mentioned earlier. Generally, the core function is defined as the organisation's main characteristic activity, which gives the company a competitive advantage (Kotler et al., 2004, 61). Looking only at added value may be misleading. For example, in clothing, branding and marketing may be more important in terms of added value (Kaplinsky & Morris, 2001, 23), but the value chain will not be broken if this function is outsourced to another sector. On the other hand, it is not possible to take away from the sector core activities such as design and production without altering the very meaning of the clothing industry. This is in fact what happens in the case of global value chain restructuring. Therefore, ideally, the definition of the core function is linked to the sector or industry to which the firm belongs.

Because corporate restructuring trends may hold important explanations for sector job creation and destruction, the business function approach was picked up as a key perspective for the WALQING project[6]. A central objective of this project is to identify new and growing jobs in the EU and to investigate the quality of work and life of the employees in these new jobs. WALQING aims to capture employment changes not only across sectors but also within sectors and to measure job creation at a lower level than the usual sector aggregates. The business function hence appears as a useful intermediate level of measurement. The paper at hand, prepared within the frame of WALQING, builds on the recent insights on global value chain restructuring and on the legacy of WORKS by further elaborating on the technique on identifying occupations within sectors and clustering them as proxies for business functions. In particular, we will show how to use business functions in order to obtain more insight from EU-LFS data. The framework can be a

---

[6] WALQING is an European research project funded by the EU's 7th Framework Programme (http://www.walqing.eu).

valuable instrument for observing trends in the business function composition of sectors (in terms of employment), but also to assess job characteristics such as quality of work and to compare these over time or between sectors, countries or regions. We therefore need to take two steps: first, employment numbers in business functions have to be calculated; second, the impact of quality differences between business functions can be discussed. Analyses and policy attention often focus on the first step (e.g. job growth), because few tools are available to link both steps. In this paper, we elaborate on the first step, in a following WALQING paper the next step will be addressed.

3 The construction of business functions to measure quantitative and qualitative employment change

3.1 Measuring jobs in business functions

The usual practice when using the EU-LFS to study evolutions in the quantity and the quality of jobs in Europe is to combine information on occupations and sectors. This method has been used in the research of the European Foundation of the Improvement of Living and Working Conditions (Fernández-Macías & Hurley, 2008) and in the adjacent study of Fernández-Macías (2010) who had to conceive an operationalisation of a 'job' for their quantitative assessment of the 'More and better jobs' objective of the Lisbon strategy. Traditionally, combining sectors and occupations leads to a job matrix and is called a 'jobs approach'. However, the terminology might lead to some confusion, since a job can be defined as a position on the labour market, to which an occupation, a sector, a company, an employee, etc. can be linked. Jobs are thus the unit by which the count of the employment in an occupation is expressed. Following the jobs approach, working with intersections of (the classifications for) occupations and sectors, brings us closer to the real meaning of an occupation, defined as a bundle of tasks for which a set of skills and actions is needed in order to be accomplished. For example, in a company where employees cut rope and stack bricks, there are only two occupations (cutting rope and stacking bricks), but there are *at least* two jobs. As such, combining occupations and sectors enables us to reflect the outcome of processes of division of labour both within and across companies. On the one hand, sectors can be regarded as the outcome of the historical progression of the (horizontal) division of labour between firms, based on corporate strategies of outsourcing and bureaucratisation (make or buy) and leading to a growing specialisation of firms (hence to the emergence of sectors in advanced economies). This is reflected in the NACE classification scheme. On the other hand, there are the (equally historical and ongoing) processes of horizontal and vertical division of labour within firms and sectors which lead to the emergence of a wide range of occupations based on skills differentiation (from specialists and crafts to elementary occupations both in manual and service work) and to vertical structures based on hierarchy and authority. These differentiations are reflected in the occupational ISCO classification scheme.

The work of Fernández-Macías (2010) using the jobs matrix approach is very useful and inspiring for measuring changes in the quantity and quality of jobs. One issue here is that the structure of the matrix is changing throughout the thesis, depending on the level of detail of the constructing variables, in particular ISCO. Therefore, in practice, the study is mostly limited to the lowest level provided in the different data sources that were linked to the EU-LFS data. Also, it is impossible to report on the cells within this immense matrix. Therefore, we take full advantage of one source, the EU-LFS, but cluster occupations within sectors by business functions, resulting in a much smaller but coherent jobs matrix, having used all available data.

In addition to the argument that the evolution of sector employment may be related to corporate restructurings involving the shift of business functions, the use of business functions may have some advantages to reconstructing and estimating the outcome of the combined processes of the horizontal and vertical division of labour. As will be illustrated with four sectors in the next paragraph, the construction of business functions is based on the grouping of occupations within sectors. Such grouping enables us to overcome some of the limitations of the EU-LFS database as well as some of the problems with the classification schemes used.

Clustering occupations may in particular contribute to overcoming the specific characteristics and limitations of ISCO classes, which are the result of long-standing and gradual processes of refinement and international (political) decision-making to achieve a harmonised classification scheme. This historical process has resulted, for instance, in an uneven differentiation within blue-collar work (highly diversified) versus service work (much less differentiated). As a side effect, we also know less about female work, since it is more prominent at the service side. Adding to the fuzzy picture, one has to consider that similar work can be done by several occupations. It is hard to see the differences in the job content of 'numerical clerks', 'office clerks' or 'other office clerks' in a large survey database, while it is legitimate to say that they all do administrative work. Similarly, instead of basing the analysis on, for instance, the 'wood treaters, cabinet-makers and related trade workers' in Construction, these occupations can be clustered with a range of other craftsmen that are involved in the core activities of construction firms. Another, adjacent problem to overcome is the increasingly blurred boundaries between occupations and the fact that some activities effectively increasingly rely on a wider range of occupations, especially in some 'new' sectors (Huws, 2005). From the data it appears for instance that in some sectors such as call centres, wholesale, real estate, sewage, recycling, the heterogeneity of occupations is quite large.

As an aggregation technique, the clustering of occupations into business functions may help to overcome these problems and bring the analysis closer to the reality of business functions which can effectively be identified in sectors and firms. The specificities of this aggregation will be further explained in the next paragraph. A last advantage is that the grouping of occupations helps to overcome problems of small cell sizes within EU-LFS. Aggregating data allows the random fall out of particular units contributing to the aggregate.

3.2 The construction of business functions

As elaborated, distinguishing business functions in an employment survey database in the first place allows us to identify current trends in changes in organisational structures. When outsourcing or insourcing are considered, research has shown that, mostly, it is not about entire firms or individual jobs but about business functions (Huws, 2006, 13). Similarly, business functions allow us to identify how the division of labour might be changing within firms and sectors. Such changes include growing bureaucratisation, growing importance of technical experts, increasing or decreasing knowledge intensity of production processes, growing market orientation and so on. Second, occupational groups as proxies for business functions allow an analysis and comparison of job quality and workforce composition in the different business functions within specific sectors. We can, for instance, identify if employees in support functions are more likely to have temporary contracts or whether there is an over- or underrepresentation of women in administration. Third, it is also possible to compare the quality of work of specific business functions across sectors, for instance, to compare the quality of work of employees involved in transport and logistics activities in wholesale, retail, manufacturing, public postal services and transport firms, and across regions and countries, for instance to compare the quality of work of construction workers throughout the EU. This may shed more light on the effects of changes in the intersectoral and international division of labour.

The key distinction and first dimension in the construction of business functions is whether the function makes up the core of the sector or not, which has been discussed earlier. Some previous business function typologies did not use this as a separate dimension, instead labelling only operational or core production as core functions, primarily referring to blue-collar production work (Geurts et al., 2007). As the meaning of an occupation may be different between sectors, so are the business functions they are part of. Non-core functions are in turn subdivided in two categories: administration and (other) support functions. Separating administration provides insight in the different levels of bureaucratisation between sectors and countries. The support functions give an indication of the progress of the division of labour in a particular sector.

The second dimension is the degree of specialisation of the business function. This is related to the vertical and horizontal division of labour within firms and sectors and is based on a differentiation of skill and authority levels. The ISCO classification is built on these two dimensions. This enables us to distinguish on the one hand between operational or professional occupations, which often represents the distinction between blue and white-collar work. On the other hand, operational and professional occupations can be further specified depending on the nature of the work. Professionals are either managers (ISCO category 1, generally found in administration) or experts (ISCO category 2 and 3). Precisely because experts come in many flavours, determined by the sector and company, there are few categories to be made, other than the exact occupation, which would in turn hinder cross-sector comparisons. Finally, the operational functions can be further specified, inspired by the typical business functions as identified in the different typologies: sales, transport and logistics, technics, services and clerks. Sales are all

occupations where goods or services are sold: cashiers, tellers, sales personnel, etc. Business representatives, on the other hand, would be labelled experts because of higher qualifications. Transport & logistics refers to drivers, pilots, lifting truck drivers, etc. Transport clerks are a trickier type as some of these employees are mobile (on the road) while others have merely administrative office jobs. They nevertheless are joined in one business function for the sake of simplicity. Technical work or 'technics' is manual production work in the field of constructing, and repairing infrastructure or goods. Services, in contrast, are mostly oriented towards people (such as nursing or catering), or aimed at maintaining and protecting infrastructure (cleaning, security). Clerks are the operational workers in administration, but in the case of 'library, mail and related clerks' we consider them part of the core of a sector such as travel agencies.

Figure 1:   Two level business function classification
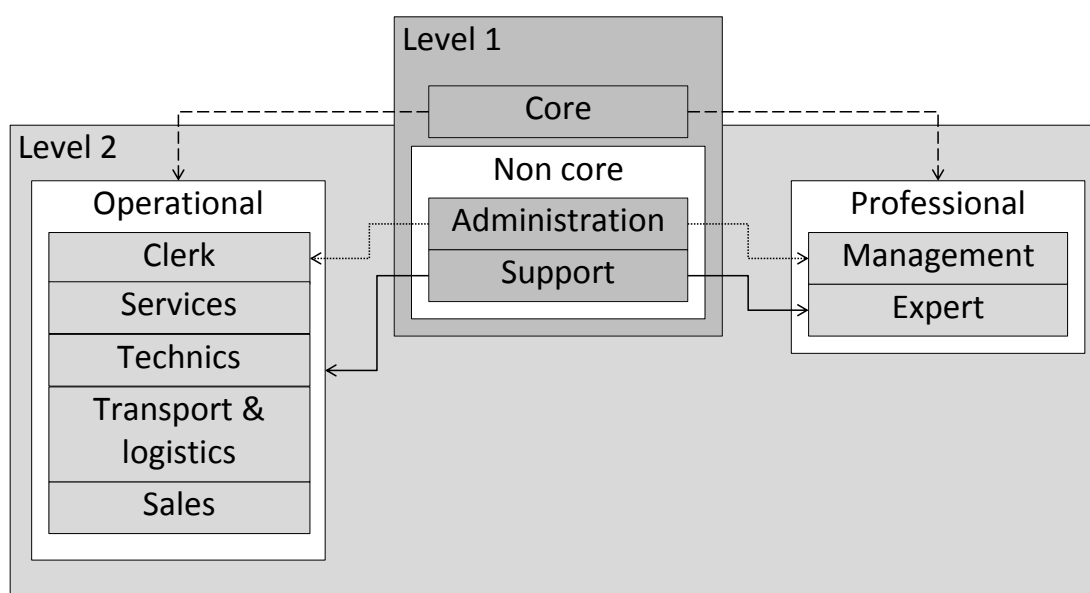
Note: Level 1 categories in dark grey; level 2 categories in light grey. Grouping of categories by the dimensions distinguished at each level in a white box. Arrows point to the box with possible level 2 categories.

All possible combinations of the typology's two levels are outlined in Figure 1. Again, categories should be interpreted flexibly according to the sector they belong to. Although managers will most often be placed in administration, when temporarily hired from a consultancy company, they would be core in, for example, the sector of (other) business activities (NACE 74). In manufacturing sectors, sales will be considered as a support function, but in retail it is, of course, core; catering is core in hotels & restaurants but support in all other sectors and so on. Assigning occupations to business functions eventually depends on the sector. This approach makes different sectors comparable by using the same typology. Builders and steel workers may have different occupational titles but it may be precisely these operational workers that switch between the sectors of construction and manufacturing of metal products. The typology will also prove useful to gain insight into the dynamics of outsourcing. In the next paragraph we propose a clustering of occupations based on this new framework.

3.3 Selection of sectors

Business functions are defined as the technologically and economically distinct activities a company performs to do business. Considering this from the perspective of statistics and survey data, it implies that business functions are an intermediate level of analysis, in between sectors and jobs. To construct business functions, one can start from the sector level and carry out a further dissection into a preliminary defined set of business functions. This was the approach of, amongst others, Sturgeon et al. (2008), the International Sourcing Survey (Statistics Denmark, 2008), the Belgian KEROSINE Survey (Dekocker & Wynants, 2009; Geurts, 2009) and the qualitative research of WORKS (Flecker et al., 2008). Another approach is to construct business functions by clustering employers or employee responses. This is the method used by Brown in the Mass Lay Off Statistics (Brown, 2008), in the quantitative analysis of WORKS (Geurts et al., 2007) and it is also used in this paper. This approach has the advantage that it is not necessary to collect new data: existing and even partial data on occupations allow for the technique to be applied.

In order to construct the business functions, the sector information is necessary too because the same occupation may have a different functional meaning in a different sector. Therefore a selection was made from the 60 sectors included in the NACE 1.1 classification. First and foremost, and in line with the main objective of the WALQING project which is to identify new and growing jobs, structurally growing sectors were selected using the BART Index that was developed in WALQING (Vandekerckhove, Capéau, & Ramioul, 2010). Next, this list of sectors was matched with the Quality of Work index used in other work of WALQING by Holman (Holman & McClelland, 2011). Of the structurally growing sectors, those with precarious working conditions were selected, going down from the most growing sector, using a threshold value of 62% on the job quality scale that could not be surpassed as a criterion. The five sectors selected this way are:

— Construction
— Health & social work
— Hotels & restaurants
— Sewage & refuse disposal
— Business activities

In the remainder of this paper, we will focus on the first four sectors. The sector of business activities will be skipped because of the large heterogeneity of its subsectors. From this sector only the cleaning subsector is retained for further analysis in the research project. It was decided to adopt a cross-sectoral approach for this particular activity, comparing cleaning in the cleaning sector with cleaning in other sectors. A business function identification for eight more sectors is available in the Appendix.

3.4 Selection of occupations

As a first step, some data cleaning is necessary to eliminate very rare and unfamiliar occupations from a sector (e.g. street vendors in construction). Occupations are ordered by their share in sector employment and a threshold for each sector is defined at the occupation where a cumulated coverage of 90% in every country was reached in 2007. As a second step, the occupations up to the threshold (at least 90% of the working population) are assigned to a business function. Because of the fact that occupations above the threshold in one country may be included due to their marked presence in other countries, the coverage in the end is almost complete (Table 2).

Table 2: Business function typology coverage of employment in selected sectors (EU-LFS, 2000; 2007)

	2000 Coded	Total	2007 Coded	Total
Construction	98%	14,128,574	98%	17,865,225
Health & social work	97%	16,639,347	98%	21,167,580
Hotels & restaurants	98%	7,126,865	98%	9,059,294
Refuse disposal	98%	589,031	99%	948,563

An important asset of the business function classification is that it enables researchers to maintain the broad scope on the economy when studying employment trends in longitudinal and comparative research. The problems that come to the fore, however, may be vast. First, some countries may not be included in the survey or are not using fully harmonised questionnaires. Second, occupational classification has changed over time both in its framework as in its use in the field. Finally, there is a risk of intercoder unreliability, as was illustrated with an experiment with occupations of the so-called e-Economy in the EU project STILE (Huws, 2005). As elaborated above, using business functions solves some of the problems in the EU-LFS in this regard. Business functions, because they are aggregates, are less prone to the simple danger of coding. Table 3 shows the share of jobs coded at one- and two-digit level of the ISCO classifications in the total national employment for both years considered. Countries which have full coverage at three-digit level are not shown. In most cases, there are either no or few problems. The worst case is France, having a significant limitation of detail in 2000 (6.18%), lasting until 2007 (4.84%). Typical examples of teething troubles are found in Malta and Romania, having no 3-digit coding in 2000. A strange case is the Netherlands, where a decreasing use of 3-digit classification is found. We can solve these issues to a certain extent. To begin with, for 2007 these categories were already coded if their share was large enough. The solution for 2000, then, was to apply the modal business function for occupations at 1 or 2-digit level within a sector in 2007 to insufficiently documented occupations in 2000. In doing so, we avoid artificially outlying results when calculating trend statistics.

Table 3:   Ratio of one- and two-digit ISCO classifications in EU-LFS data
            (share of national employment, EU-27+Norway)

	2000			2007		
	1-digit	2-digit	Total	1-digit	2-digit	Total
Bulgaria	0.00%	0.00%	0.00%	0.14%	0.00%	0.14%
Czech Republic	0.00%	0.05%	0.05%	0.00%	0.00%	0.00%
Germany	0.00%	1.37%	1.37%	0.00%	1.26%	1.26%
Denmark	0.00%	0.00%	0.00%	0.05%	0.00%	0.05%
Spain	0.00%	0.07%	0.07%	0.00%	0.24%	0.24%
France	1.68%	4.51%	6.18%	1.18%	3.66%	4.84%
Lithuania	0.00%	0.69%	0.69%	0.00%	0.00%	0.00%
Latvia	0.00%	0.00%	0.00%	0.00%	1.46%	1.46%
Malta	0.00%	100.00%	100.00%	0.00%	0.00%	0.00%
The Netherlands	0.03%	0.99%	1.03%	0.09%	2.61%	2.70%
Norway	0.00%	0.08%	0.08%	0.00%	0.00%	0.00%
Poland	n.a.	n.a.	0.00%	n.a.	0.00%	0.00%
Portugal	0.00%	0.00%	0.00%	0.00%	0.10%	0.10%
Romania	100.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Slovakia	0.00%	0.00%	0.00%	0.20%	0.48%	0.67%

Note: Left out because of no fails: Austria, Belgium, Cyprus, Estonia, Italy, Finland, Greece, Hungary,
         Ireland, Italy, Luxembourg, Sweden, Slovenia, UK.

3.5 Business functions by sector

In this section we clarify the construction of the business functions based on the overall
scheme, using the two dimensions: the activity (core, administration and support) and the
qualification level (professional versus operational and their subdivisions). This is done for
the four selected sectors. Each time, we begin with a description of the sector based on
the NACE classification. Then, in a next step, the different occupations that are observed
in the sector in the EU LFS (and the ISCO classes that refer to them) are clustered into
business functions.

3.5.1 Construction

The NACE division construction includes general construction and special trade con-
struction for buildings and civil engineering, building installation and building completion. It
includes new constructions, repair, additions and alterations, the erection of pre-fabricated
buildings or structures on the site and also constructions of a temporary nature.

'General construction' is the construction of entire dwellings, office buildings, stores and
other public and utility buildings, farm buildings, etc., or the construction of heavy
constructions such as motorways, roads, streets, bridges, tunnels, railways, airfields,
harbours and other water projects, irrigation systems, sewerage systems, industrial

facilities, pipelines and electric lines, sports facilities, etc. 'Special trade construction' includes the construction of parts of buildings and civil engineering works or preparation for this purpose. It is usually specialised in one aspect common to different structures, requiring specialised skills or equipment. 'Building installation' activities include the installation of all kinds of utilities that make the construction function as such. These activities are usually performed at the construction site, although parts of the job may be carried out in a workshop. Included are activities such as plumbing, installation of heating and air-conditioning systems, aerials, alarm systems and other electrical work, sprinkler systems, elevators and escalators, etc. 'Building completion' activities encompass activities that contribute to the completion or finishing of a construction such as glazing, plastering, painting and decorating, floor and wall tiling or covering with other materials like parquet, carpets, wallpaper, etc., floor sanding, finish carpentry, acoustical work, cleaning of the exterior, etc.

Table 4: Business functions in construction

Business function	Occupation
Administration, clerks	343 Administrative associate professionals 410 Office clerks 411 Secretaries and keyboard-operating clerks 412 Numerical clerks 419 Other office clerks
Administration, management	121 Directors and chief executives 122 Production and operations managers 123 Other specialist managers 130 Managers of small enterprises 131 Managers of small enterprises 241 Business professionals 244 Social science and related professionals
Core, experts	214 Architects, engineers and related professionals 311 Physical and engineering science technicians
Core, technical	611 Market gardeners and crop growers 712 Building frame and related trades workers 713 Building finishers and related trades workers 714 Painters, building structure cleaners and related trades workers 721 Metal moulders, welders, sheet-metal workers, structural-metal preparers, and related trades workers 722 Blacksmiths, tool-makers and related trades workers 723 Machinery mechanics and fitters 724 Electrical and electronic equipment mechanics and fitters 742 Wood treaters, cabinet-makers and related trades workers 828 Assemblers 833 Agricultural and other mobile plant operators 931 Mining and construction labourers 932 Manufacturing labourers
Support, sales	341 Finance and sales associate professionals;
Support, service operational	913 Domestic and related helpers, cleaners and launderers 914 Building caretakers, window and related cleaners 915 Messengers, porters, doorkeepers and related workers
Support, transport & logistics	413 Material-recording and transport clerks 832 Motor vehicle drivers 933 Transport labourers and freight handlers

Note: ISCO-codes ending with 0 point to a 2-digit coding.

3.5.2 Hotels & restaurants

This sector comprises the provision to customers of lodging and/or prepared meals, snacks, and beverages for immediate consumption. The sector includes both accommodation and food services because the two activities are often combined at the same unit.

Lodging units provide lodging or short-term accommodations for travellers, vacationers and others. Restaurant activities provide complete meals fit for immediate consumption, whether traditional restaurants, self-service or take-away restaurants as well as permanent or temporary fish and chips stands and the like with or without seating. Decisive is the fact that meals fit for immediate consumption are offered, not the type of facility providing them.

Table 5: Business functions in hotels & restaurants

Business function	Occupation
Administration, clerks	343 Administrative associate professionals 412 Numerical clerks 419 Other office clerks
Administration, management	121 Directors and chief executives 122 Production and operations managers 123 Other specialist managers 131 Managers of small enterprises 241 Business professionals 244 Social science and related professionals 341 Finance and sales associate professionals
Core, sales	422 Client information clerks 522 Shop, stall and market salespersons and demonstrators
Core, service operational	347 Artistic, entertainment and sports associate professionals 512 Housekeeping and restaurant services workers 513 Personal care and related workers 514 Other personal services workers 741 Food processing and related trades workers 911 Street vendors and related workers 913 Domestic and related helpers, cleaners and launderers 914 Building caretakers, window and related cleaners 915 Messengers, porters, doorkeepers and related workers
Core, experts	342 Business services agents and trade brokers 346 Social work associate professionals
Support, sales	421 Cashiers, tellers and related clerks, service operational 516 Protective services workers,
Support, technical	712 Building frame and related trades workers 713 Building finishers and related trades workers 723 Machinery mechanics and fitters 724 Electrical and electronic equipment mechanics and fitters 931 Mining and construction labourers
Support, transport & logistics	413 Material-recording and transport clerks 832 Motor vehicle drivers

3.5.3 Health & social work

To a large extent, 'health' and 'social work' are different sectors. However, they are taken together because of complementary activities (e.g. elderly care, rehabilitation, etc.). The NACE subsectors are threefold. First, there is 'veterinary activities' for pets and farm animals carried out by a qualified veterinarian. Second, there is a range of 'human health activities', subdivided into hospitals, medical practice and dental care. Hospitals include both medical and surgical technical care activities and accommodation such as boarding, meals, etc. Medical practice is medical consultation and treatment, even in hospitals when the specialist works as a private consultant. Dental care includes dental practice and orthodontic activities, which can take place in hospitals for out-patients. Other human health activities such as recognised paramedical practice are equally part of the sector. Finally, the 'social work activities' are social work activities with or without accommodation. 'With accommodation' includes round-the-clock provision of social assistance for children, the aged or people with disabilities. While self-care is not possible, medical treatment or education are not important elements here. Also in this group are rehabilitation homes and homes for the homeless or refuge homes for mothers. Social care 'without accommodation' includes a long list of social activities and services, such as counselling, welfare organisation, community activities, vocational rehabilitation for handicapped or unemployed persons, day activities for children, handicapped people and other socially weak groups and charitable activities.

A complicating factor of this sector is that it includes both private and publically funded organisations. This may explain why some occupations are linked to civil servant statutes.

Table 6: Business functions in health & social work

Business function	Occupation
Administration, clerks	343 Administrative associate professionals 344 Customs, tax and related government associate professionals 410 Office clerks 411 Secretaries and keyboard-operating clerks 412 Numerical clerks 414 Library, mail and related clerks 419 Other office clerks 422 Client information clerks
Administration, management	121 Directors and chief executives 122 Production and operations managers 123 Other specialist managers 131 Managers of small enterprises 241 Business professionals
Core, service operational	332 Pre-primary education teaching associate professionals 512 Housekeeping and restaurant services workers 513 Personal care and related workers 514 Other personal services workers 913 Domestic and related helpers, cleaners and launderers
Core, experts	211 Physicists, chemists and related professionals 221 Life science professionals 222 Health professionals (except nursing) 223 Nursing and midwifery professionals 233 Primary and pre-primary education teaching professionals 235 Other teaching professionals 244 Social science and related professionals 247 Public service administrative professionals 311 Physical and engineering science technicians 313 Optical and electronic equipment operators 321 Life science technicians and related associate professional 322 Health associate professionals (except nursing) 323 Nursing and midwifery associate professionals 330 Teaching associate professionals 331 Primary education teaching associate professionals 333 Special education teaching associate professionals 334 Other teaching associate professionals 346 Social work associate professionals
Support, service operational	914 Building caretakers, window and related cleaners 915 Messengers, porters, doorkeepers and related workers
Support, technical	710 Extraction and building trades workers 712 Building frame and related trades workers 713 Building finishers and related trades workers 723 Machinery mechanics and fitters 743 Textile, garment and related trades workers 826 Textile-, fur- and leather-products machine operators 931 Mining and construction labourers 932 Manufacturing labourers
Support, transport & logistics	413 Material-recording and transport clerks 832 Motor vehicle drivers

3.5.4 Sewage & refuse disposal, sanitation and similar activities

This NACE division includes the collection and treatment of household and industrial waste not for further use in an industrial manufacturing process but with the aim of disposal and resulting in a product of little or no value. Also included are other activities such as street cleaning and snow removal.

Table 7:   Business functions in sewage & refuse disposal

Business function	Occupation
Administration, clerks	343 Administrative associate professionals 410 Office clerks 411 Secretaries and keyboard-operating clerks 412 Numerical clerks 419 Other office clerks 422 Client information clerks
Administration, management	121 Directors and chief executives 122 Production and operations managers 123 Other specialist managers 130 Managers of small enterprises 131 Managers of small enterprises 241 Business professionals 247 Public service administrative professionals
Core, experts	214 Architects, engineers and related professionals 311 Physical and engineering science technicians
Core, technical	611 Market gardeners and crop growers 712 Building frame and related trades workers 713 Building finishers and related trades workers 714 Painters, building structure cleaners and related trades workers 721 Metal moulders, welders, sheet-metal workers, structural-metal preparers, and related trades workers 722 Blacksmiths, tool-makers and related trades workers 724 Electrical and electronic equipment mechanics and fitters 815 Chemical-processing-plant operators 816 Power-production and related plant operators 828 Assemblers 914 Building caretakers, window and related cleaners 916 Garbage collectors and related labourers 921 Agricultural, fishery and related labourers 931 Mining and construction labourers 932 Manufacturing labourers
Core, transport & logistics	832 Motor vehicle drivers 833 Agricultural and other mobile plant operators 933 Transport labourers and freight handlers
Support, sales	341 Finance and sales associate professionals 342 Business services agents and trade brokers
Support, services	513 Personal care and related workers 514 Other personal services workers 516 Protective services workers 913 Domestic and related helpers, cleaners and launderers 915 Messengers, porters, doorkeepers and related workers
Support, specialist	315 Safety and quality inspectors
Support, technical	710 Extraction and building trades workers 712 Building frame and related trades workers 713 Building finishers and related trades workers 723 Machinery mechanics and fitters 743 Textile, garment and related trades workers 826 Textile-, fur- and leather-products machine operators 931 Mining and construction labourers 932 Manufacturing labourers
Support, technical	723 Machinery mechanics and fitters
Support, transport & logistics	413 Material-recording and transport clerks

3.6 Loss of information

The business function approach is designed to aggregate information. This implies a certain degree of information loss, depending on the variance within the aggregated group on a selected variable. We can make an attempt to map this effect using a three-level hierarchical model with intercepts only. The first level is either the occupation (middle column in Table 8) or the business function (right hand column in Table 8). These are *exclusively* grouped by sector at the second level (11 sectors for which business function classification is done). Finally, these sectors are clustered by country, which is the third level. The residual variance, after taking into account variance (to be) explained at the sector and the country level, is given in the cells. The exact amount of information loss depends on the quality of work indicator, but on average, the difference is acceptable (8 percentage points). For variables relating to working time agreements, the occupations within business functions are clearly homogenous. For other variables, figures are more scattered. Part-time work and the occurrence of multiple jobs seem not to be very different amongst occupations. Looking for another job, temporary contracts and the wish to work more hours have more occupation specific scores.

Table 8:   Residual variation for occupations and business functions

Quality of Work	Occupations	Business Functions
Temporary contract	81%	72%
Part-time work	63%	57%
Shift work	85%	80%
Evening work	83%	80%
Saturday work	73%	64%
Sunday work	75%	65%
Home work	80%	77%
Night work	90%	85%
Has second job	93%	87%
Wish to work more hours	83%	73%
Looking for another job	86%	68%
Average	81%	73%

Note: Level 1 residual variation with random effects for country (level 3) and sector (level 2).

3.7 Business functions or ISCO aggregates?

The business function approach as elaborated requires occupation and sector variables with a fairly high level of detail. In many surveys, ISCO will be available at 2-digit level at most. A question is if it possible to identify business functions nevertheless. In addition, would it not be a quicker solution to simply aggregate at a lower digit level? The business function theoretically counts 15 categories, although in practice only 13 are observed and it is possible to limit the scope to one of both levels (e.g. core, support, administration or

professional versus non-professional functions). This is a clear advantage over the 112 ISCO categories at 3-digit level when it comes down to reporting. The business function approach comes in by simplifying the data through a clustering of occupations. As said, for many purposes, we are not so much interested in the differences between numerical clerks and keyboard-operating clerks, or between chemical-products machine operators and rubber- and plastic-products machine operators. Differences of this kind may even distort comparative and longitudinal analyses. Therefore, it is thought to be advisable to aggregate to the highest order without a loss of relevant information. The business function approach is one such technique, as explained. Using lower level ISCO categories may be another way of overcoming the issues of too much detail. The difference with the 2-digit ISCO classification (27 categories instead of 112 at the 3-digit level) is less problematic at first sight, and the 9 categories at 1-digit level are even fewer than the number of business functions.

It would be interesting to find out to what degree these lower digit classifications can still cover the variation of the business function typology. Therefore, we compute the modal business function at 3-digit level for combinations of country, sector and occupation at 1- and 2-digit level. At this level of detail, some particular business function are not retrieved any more: of all combinations of country, sector and business function originally found, only about 73% remain when determining the business functions with 1- and 2-digit ISCO (Table 9).

Table 9:   Overlap of business functions and ISCO categories in 12 sectors

	1-digit equivalence	2-digit equivalence	Total
Combinations	72.96%	72.65%	6,531
Employment	90.23%	90.16%	69,108,797

Looking at Table 23 in the appendix, summarised in Table 10, we see the causes of the difference in variety: at the highest degree of aggregation, it is nearly impossible to make the core/non-core distinction. The fifth 1-digit group would be mixing up service and sales functions, and the ninth 1-digit group includes service, sales and transport. Essentially, one ends up with a view of the structure of the labour market from the core items of the occupational classification: the level and specialisation of skills. As a consequence, there is no equivalence between the business function classification and the ISCO classification. Using the ISCO classification implies one has to sacrifice the functional dimension of an occupation.

Table 10: Business function interpretation of 1-digit ISCO categories

ISCO	Interpretation
1	All occupations are managerial
2	There is confusion between managers and experts within sectors
3	There is ample variety, having clercks, experts, services, technical workers and sales personnel all within this group
4	Most occupations are clerical, but there are also transport & logistics and sales functions
5	In this category we find sales and services next to each other (e.g. hotels & restaurants)
6	All occupations are technical workers
7	Almost all occupations are technical workers, there might be confusion between core and support functions
8	Technical workers and transport and logistics cannot be distinguished
9	Sales, services, transport & logistics and technical work all belong to this category and core and support can be mixed up

From the point of view of employment, however, the business functions that are lost do not hold the bulk of employment. This is a direct result of choosing the modal business function for the original combinations at 3-digit ISCO level. About 90% of employment belongs to the modal group within the aggregate. Most importantly, there is no difference between 1- or 2-digit ISCO aggregation. When accepting a little loss of information, the 1-digit ISCO classification is equally defendable as a solution to summarize occupational distributions, as is done by Fernández-Macías (2010) and many others.

4   Using the business function typology

4.1 Methodology

The EU-LFS data used in this paper was delivered by Eurostat through custom table requests. There is a possibility to obtain microdata, but for reasons of privacy, limitations are put on the level of detail of NACE and ISCO classifications, making the business function analysis impossible, as demonstrated in Section 3.6.

The selection of sectors, discussed in Section 3.3, and the period considered (2000-2007), are further documented in WALQING working paper 2010.1 (Vandekerckhove et al., 2010). The selection of countries tried to cover most of the European Union (EU-27), leaving out Romania, Bulgaria and Malta for reasons of comparability of the results with other data sources in the quantitative work of the project, notably the European Working Conditions Survey (EWCS), the European Quality of Life Survey (EQLS) and the European Union Statistics on Income and Living Conditions (EU-SILC). Due to the fact that Polish data was coded at 1-digit NACE level in 2000, we had to exclude this country in the analysis as well.

To show results in a presentable way, countries were clustered following the practice of the European Foundation for the Improvement of Living and Working Conditions (Eurofound). While there is some resemblance with well-known country classifications for comparative research such as the welfare state typology of Esping-Andersen (Esping-Andersen, 1990) or the Varieties of Capitalism approach (Hall & Soskice, 2001), we focus on the description of the spread within Europe rather than on an explanation from these theoretical frameworks.

Table 11:   Clustering of countries in the EU-27 and Norway

Cluster	Countries
Continental cluster	Austria Belgium Germany France Luxemburg
Anglo-Saxon cluster	Ireland UK
Eastern cluster	(Bulgaria) Czech Republic Estonia Hungary Lithuania Latvia (Poland) (Romania) Slovenia Slovakia
Southern cluster	Cyprus Greece Italy (Malta) Portugal Spain
Nordic cluster	Denmark Finland Netherlands Sweden Norway

Note: Countries between brackets are not further analysed in this paper.

4.2 Growth of business functions

4.2.1 European perspective

The typology now allows us to investigate some recent employment trends. As explained in Section 3.2, a key argument for the use of business functions was its potential to identify trends in business function composition of sectors and compare this across sectors (and countries). Secondly, business functions allow us to analyse and compare the quality of work and workforce composition in the different business functions within specific sectors. Thirdly, it is also possible to compare the quality of work and workforce composition of specific business functions across sectors and countries.

We focus on four growing sectors with observed problematic quality of work, in order of growth: construction, hotels & restaurants, health & social work and refuse disposal. Table 12 shows the relative increase of each sector between brackets. The column 'share within sector' is the share of the business functions in the rows within each sector in 2007. The column 'growth of share' point to the relative evolution of the share from 2000 to 2007. When multiplying the relative evolution of the share of a business function with the growth of the sector, we obtain the 'real growth', or simply the growth of the business function itself.

Let us first look at the growth rates in terms of business functions. Within construction, a sector that grew between 2000 and 2007 by 19% on average, we see that sales positions rank first, with an average growth of 16%. However, the average share of sales in 2007 is still below 1%. Next there is administration, growing at a moderate pace (8% for managers, 12% for clerks) to a summed share of 13% in 2007. The share of core functions, which make up the bulk of employment in the sector (81%), is generally unchanged. Not controlling for the sector's evolution, this implies that the 'real' growth of the core functions is close to the sector's growth: 20% for core technics and 27% for core experts.

A similar picture can be discerned in hotels & restaurants, having a sector growth rate of 7%. Minor business functions, notably all support functions, grow positively and the growth rates of core functions are sometimes remarkably strong (core experts, 148%). Their respective shares however are very low. But while a reasonably large business function such as management, becomes even more prominent (growing by 50% in relative terms), the biggest one, core services, having a share of 72%, is shrinking in relative terms (-4%). Still, there is about 3% more employment (real growth) in this function in 2007 than in 2000. In terms of a quality of work hypothesis, the fact that the growth of the share is negative can indicate a higher workload.

In health & social work, itself growing by 10% on average, support experts (97%) and managers (58%) grow strongest. In administration, we also see a growth of the proportion of clerks (by 7%). Core services grow by 12% while core experts face a small decline of their share (-4%).

Finally, the small sector of refuse disposal comes to the fore between 2000 and 2007 (relative growth of 27% at the sector level). Again, support experts (74%) and managers (54%) are most prominent. However, the biggest functions (core technics and core transport & logistics) shrink relative to the other functions, which may indicate a sector that is becoming more mature in this period.

Table 12: Growth of sectors and business functions (EU-LFS 2007)

Business function	Growth of share	Real growth†	Share within sector
Construction (19%)			
Support – Sales	16.07%	37.88%	0.92%
Administration – Clerks	11.65%	32.62%	4.72%
Administration – Management	8.09%	28.40%	7.90%
Core – Expert	4.03%	23.57%	6.61%
Support – Transport & Logistics	2.63%	21.91%	3.00%
Support – Services	0.34%	19.19%	0.74%
Core – Technics	-1.25%	17.30%	74.16%
Hotels & Restaurants (7%)			
Core – Expert	148.28%	165.19%	0.26%
Support – Transport & Logistics	72.52%	84.27%	0.88%
Administration – Management	49.80%	60.01%	17.02%
Support – Technics	19.79%	27.95%	0.71%
Core – Sales	18.36%	26.43%	5.20%
Support – Sales	17.65%	25.66%	0.87%
Administration – Clerks	12.29%	19.94%	1.84%
Support – Services	10.55%	18.08%	0.32%
Core – Services	-3.96%	2.58%	71.63%
Health & Social Work (10%)			
Support – Expert	96.78%	116.45%	0.24%
Administration – Management	57.72%	73.48%	3.19%
Core – Services	12.22%	23.44%	33.57%
Administration – Clerks	6.86%	17.54%	7.39%
Support – Transport & Logistics	-1.67%	8.16%	1.27%
Core – Expert	-4.17%	5.40%	50.15%
Support – Services	-4.49%	5.06%	0.93%
Support – Technics	-16.45%	-8.10%	1.18%
Refuse Disposal (27%)			
Support – Expert	73.63%	119.92%	1.53%
Administration – Management	53.60%	94.56%	4.77%
Core – Transport & Logistics	-2.30%	23.75%	25.54%
Core – Technics	-3.69%	21.99%	48.71%
Core – Expert	-6.63%	18.26%	5.21%
Administration – Clerks	-6.84%	18.00%	6.94%
Support – Services	-41.81%	-26.30%	6.45%
Support – Technics	-80.20%	-74.92%	1.83%
Support - Transport & Logistics	-100.00%	-100.00%	0.82%
Support – Sales			0.82%

† Real growth = relative growth of sector x growth of share within sector

A tentative conclusion is that in these four quite different sectors, a trend of growing importance of management and (expert) support functions can be discerned. We will elaborate on this in the next paragraphs, after disentangling the cross-national differences in business function growth.

4.2.2 Comparative analysis

In construction, we found an average growth of 19% in employment. Looking first at the regional differences in Table 13, we see that Eastern Europe is significantly above the regions' average, with the Anglo-Saxon cluster coming second. Southern and Northern Europe rank about equally, and there is even some decline in the Continental cluster. Turning to the structural changes these figures imply, we see core functions and administration in Eastern Europe practically unchanged. This means the sector expands without visibly altering except in some (smaller) support functions (services, transport & logistics) that do decline. On the other hand, looking at all countries, we notice as a pronounced trend a growing administration in Continental and Southern Europe. Concerning core activities: technical functions stay about at the same level, with the exception of the decline in Continental Europe while expert functions grow in Anglo-Saxon countries and Continental Europe.

The sector of health & social work, growing by 10% on average, saw some changes towards support experts and management. In the regional approach, this time, the Anglo-Saxon countries have the strongest growth, closely followed by Southern and Continental Europe. Generally, but not in the Continental cluster, the proportion of managers is growing. A sharp rise in clerks is found in the Eastern countries. Core services take up a larger share, but less so in Continental and Southern Europe. Support expert functions grow tremendously in the Anglo-Saxon, Continental Europe and Nordic cluster. Other support functions show mixed trends.

Hotels & restaurants grew on average by 7%. Main shifts included growing management, growing core functions such as sales and experts and generally a larger share given to support functions. From a regional perspective, Eastern Europe has the highest relative increase in employment in hotels & restaurants. Management grows strongest, while core sales functions become more important and core services less. In a comparative view, the growth of administrative functions is not equivocal. E.g. a reduction in the share of clerks is found in the Nordic cluster while other regions have growing figures. Core services do not show a uniform evolution, unlike the rise in core experts which, however, are only found in the Continental and Nordic clusters. Again there is no general trend in support functions.

Refuse disposal had the highest growth of the selected sectors (27%). The sector grew markedly in most regions indeed, but not in the Eastern cluster. In the Anglo-Saxon and Nordic cluster, the growth is strongest (up to 60%). There are just four business functions found in every region: both administrative functions as well as core technics and core transport & logistics. The trends, however, are very blurred and may be biased by the small size of the sector.

Table 13: Growth of business functions by regional cluster (2000-2007)

Business Function	Anglo-Saxon	Continental	Eastern	Nordic	Southern
Construction	**25.20%**	**-1.31%**	**42.52%**	**9.64%**	**12.23%**
Administration – Clerks	-12.36%	19.04%	1.56%	-6.32%	41.91%
Administration – Management	6.14%	21.78%	3.15%	3.26%	6.65%
Core —— Expert	12.65%	28.61%	-1.99%	-10.21%	-2.55%
Core – Technics	-1.44%	-5.95%	1.58%	-0.84%	-0.87%
Support – Sales	16.83%	23.53%	7.21%	-0.53%	63.36%
Support – Services	18.56%	33.43%	-32.16%	-6.20%	-16.89%
Support – Transport & logistics	10.98%	-14.89%	-35.42%	61.89%	10.81%
Health & social work	**18.04%**	**14.07%**	**2.15%**	**4.33%**	**19.36%**
Administration – Clerks	-4.14%	3.58%	32.13%	-8.04%	-5.96%
Administration – Management	38.19%	-9.95%	27.34%	31.31%	369.76%
Core – Expert	-13.04%	-2.93%	-8.15%	0.15%	-0.63%
Core – Services	16.33%	1.83%	24.59%	16.61%	-0.73%
Support – Expert	580.15%	94.90%	-37.82%	51.32%	-30.26%
Support – Services	44.04%	-18.52%	-22.83%	21.40%	-17.69%
Support – Technics	11.67%	-16.24%	-4.39%	-42.50%	-13.23%
Support – Transport & logistics	11.31%	-6.33%	-21.14%	32.25%	4.00%
Hotels & restaurants	**0.05%**	**-0.91%**	**18.44%**	**4.22%**	**3.54%**
Administration – Clerks	17.49%	7.57%	6.32%	-24.98%	41.12%
Administration – Management	-2.14%	-0.24%	21.03%	-2.57%	207.53%
Core – Expert		167.60%		90.33%	
Core – Sales	20.94%	-1.59%	20.52%	9.48%	45.98%
Core – Services	-2.63%	2.03%	-7.45%	0.84%	-10.39%
Support – Sales	-6.13%	53.25%	-27.00%	9.42%	30.42%
Support – Services	160.69%			-21.63%	-28.77%
Support – Technics	94.07%	-46.36%	22.93%	94.03%	12.14%
Support – Transport & logistics	158.22%	-28.87%	182.66%	5.44%	58.83%
Refuse disposal	**61.01%**	**23.57%**	**-7.48%**	**59.76%**	**30.73%**
Administration – Clerks	18.62%	-0.21%	20.88%	-35.28%	-56.89%
Administration – Management	-21.94%	209.70%	4.99%	-100.00%	-12.81%
Core – Expert	-100.00%	39.71%	-6.41%		
Core – Technics	16.76%	-24.90%	13.12%	-12.03%	-6.74%
Core – Transport & logistics	-15.47%	6.80%	-19.42%	-16.98%	23.94%
Support – Expert	131.15%				16.11%
Support – Sales					
Support – Services	-51.82%	-69.28%	-35.35%		-28.78%
Support – Technics			-67.35%	-73.25%	-100.00%
Support – Transport & logistics		-100.00%			

4.3 Specialisation and bureaucratisation

4.3.1 European perspective

Taking the dynamics of Business Process Reengineering at face value, we would have expected increasing degrees of specialisation with disproportionate growth in the core functions of each sector. Since 2000 however, we mainly see a growth of non-core functions. First, in every sector, administration is growing, indicating bureaucratisation. Second, support functions grew in three out of the four sectors considered. As a consequence, cores lost a fraction of between 1% and 2% in the period studied. These trends may run counter to common understanding, but at the same time, core functions do still make up the largest part of every sector, amounting to about 80%.

Table 14:   Average share of first level business function categories (EU-LFS 2000-2007, growth figures between brackets)

Sector	Admin		Core		Support	
Construction	12.63%	(+0.86%)	80.77%	(-0.90%)	4.66%	(-0.26%)
Hotels & restaurants	18.87%	(+1.70%)	76.84%	(-2.41%)	2.61%	(+0.79%)
Health & social work	10.59%	(+0.61%)	83.71%	(-1.06%)	3.52%	(-0.10%)
Sewage & refuse disposal	11.63%	(+4.56%)	78.42%	(-0.38%)	9.89%	(+2.00%)
Group average	13.43%	(+1.93%)	79.94%	(-1.19%)	5.17%	(+0.61%)

4.3.2 Comparative analysis

We have seen that in the whole of Europe, cores shrink. The only brake on this trend is the fact that, generally, the share of experts in the core increases – but not as much as the decline of other core functions. Crossing regions and sectors, there are 5 occasions where cores do grow. First, in the Continental and the Nordic cluster, hotels & restaurants have growing cores, although in the Continental cluster, the share is smaller than in other regions. Next, in sewage & refuse disposal, Continental and Eastern Europe show some specialisation. Finally, in Eastern Europe, the share of core functions is growing in construction.

Table 15:   Average share of core functions by region (2000-2007, growth figures between brackets)

Sector	Anglo-Saxon		Continental		Eastern Europe		Northern Europe		Southern Europe	
Construction	81.40%	(-0.60%)	77.81%	(-2.57%)	79.04%	(+1.35%)	79.98%	(-1.62%)	86.71%	(-1.77%)
Hotels & restaurants	72.99%	(-0.56%)	71.86%	(+2.66%)	81.07%	(-6.29%)	81.95%	(+0.66%)	73.36%	(-6.59%)
Health & social work	78.89%	(-0.92%)	82.90%	(-1.22%)	84.01%	(-1.51%)	87.25%	(-0.68%)	82.50%	(-0.68%)
Sewage & refuse disposal	72.42%	(-2.23%)	70.83%	(+1.57%)	75.86%	(+8.51%)	81.43%	(-10.85%)	88.32%	(-3.73%)
Group average	76.42%	(-1.08%)	75.85%	(+0.11%)	80.00%	(+0.51%)	82.65%	(-3.12%)	82.72%	(-3.19%)

4.4 Professionalisation

4.4.1 European perspective

Dealing with labour market evolutions, a common assumption is the general upskilling of the economy. In the sectors studied, we find little evidence for this trend, although there is a moderate growth of professional functions in construction and hotels & restaurants and a very pronounced growth of these functions in sewage & refuse disposal. On the other hand, we notice that operational functions do grow in health & social work and in sewage & refuse disposal.

Table 16:   Share of second level business function categories (2000-2007, growth figures between brackets)

Sector	Operational		Professional	
Construction	83.39%	(-0.99%)	14.44%	(+0.70%)
Hotels & restaurants	81.89%	(-1.30%)	16.89%	(+1.36%)
Health & social work	43.14%	(+1.22%)	54.43%	(-1.96%)
Sewage & refuse disposal	88.99%	(+0.74%)	10.17%	(+5.18%)
Group average	74.35%	(-0.08%)	23.98%	(+1.32%)

4.4.2 Comparative analysis

Is Europe running on different speeds, having regional clustering of knowledge intensity? Making the distinction between operational and professional functions, we do not see confirmation of this idea. In construction and sewage & refuse disposal, the share of professional functions is lower in the Southern cluster than in other regions and declining. However, in hotels & restaurants and health & social work, Southern Europe is 'up to speed'. Most consistent are Anglo-Saxon and Continental European countries, which never lag behind and have large shares of professional functions.

Table 17:   Share of professional business functions by region (2000-2007, growth figures between brackets)

	Anglo-Saxon	Continental	Eastern Europe	Northern Europe	Southern Europe
Construction	15.37% (+1.23%)	15.14% (+3.35%)	16.41% (+0.59%)	16.26% (-0.92%)	9.12% (-0.40%)
Hotels & restaurants	20.21% (-1.07%)	23.92% (-1.34%)	11.96% (+3.38%)	13.59% (+0.19%)	20.09% (+5.20%)
Health & social work	48.60% (-3.71%)	52.23% (-0.43%)	62.78% (-3.93%)	42.64% (-2.85%)	55.26% (+0.67%)
Sewage & refuse disposal	11.75% (-1.00%)	19.82% (+13.50%)	8.96% (+3.01%)	11.61% (+9.51%)	4.60% (+1.76%)
Group average	23.98% (-1.14%)	27.78% (+3.77%)	25.03% (+0.76%)	21.02% (+1.48%)	22.27% (+1.81%)

4.5 Vulnerable groups

In this section, we show the distribution of vulnerable groups over business functions. The vulnerable groups selected are women, employees aged 50 and older, employees aged 29 and younger, foreigners and low educated employees.

To understand the figures, take note that for each indicator, we averaged the ratios of all coded occupations within a business function to obtain a percentage at the country level. The figures presented here are averages of the countries' results. There is a different interpretation for the sector average: this is the totality of people in a vulnerable group for each country and sector, divided by the sector size. The result of all countries has then been averaged. Because there is no uniform way to average, the sector average will be different from the group average[7], but it is included because it is interesting in its own right.

4.5.1 Gender

The impact of gender on the labour market is well documented. The differences between men and women are situated on two dimensions: the vertical or hierarchical dimension, and the horizontal or sector dimension (Vandekerckhove & Delmotte, 2010). Indeed, the four selected sectors already include two typically female sectors: health & social work and hotels & restaurants. Construction and refuse disposal, on the other hand, only have about 10% women. On the hierarchical ladder, we suspect a so-called 'glass ceiling': the degree of feminisation in the professional functions is likely to be low.

In Table 18, the share of women ranges from 3.65% (core technics in construction) to 83.72% (core services in health & social work). There is a large variation over functions and sector, as indicated by a substantial standard deviation of 25.74%. We see majorities of women working as clerks in all sectors, but also in management, expert functions and core services in the sector of health & social work. Managers in construction and refuse disposal, on the other hand, are mostly male. In hotels & restaurants, women are overrepresented in sales functions, but not in service functions.

---

[7]   The group average itself is meaningless since it is only possible to discern two professional functions (management and experts).

Table 18:   Percentage of women by business function for four sectors (2007)

Business function	Construction	Health & social work	Hotels & restaurants	Refuse disposal
Administration – Clerks	77.26%	81.81%	65.07%	54.49%
Administration – Management	17.07%	56.07%	39.48%	10.87%
Core – Expert	10.54%	68.67%	39.17%	17.02%
Core – Sales			69.39%	
Core – Services		83.72%	49.10%	
Core – Technics	3.65%			10.85%
Core – Transport & logistics				3.97%
Support – Expert		52.33%		13.44%
Support – Sales	23.07%		75.57%	21.04%
Support – Services	32.57%	30.79%	16.97%	27.77%
Support – Technics		14.56%	4.94%	5.85%
Support – Transport & logistics	7.60%	19.33%	14.74%	19.93%
Sector average	9.04%	72.02%	47.94%	12.34%

4.5.2 Elderly employees

Employees aged over 50 are considered a vulnerable group. They have more experience, but companies are less inclined to hire older, more expensive employees and to provide training. It is difficult to speak in terms of under- or overrepresentation since we are dealing with averages over countries. Instead, we compare the share of aged employees between business functions by sector. The highest proportion of aged employees is found in hotels & restaurants for core experts (33.60%), the lowest amounts to 6.04% and is found in the same sector for support experts. The standard deviation for this vulnerable group over all sectors and functions is smaller than the one for gender, being 6.32%. Still, there are some patterns to be found.

In construction, older employees are found primarily in support functions. The same can be said for health & social work, although there is a stronger presence in administration when comparing with other sectors. In hotels & restaurants, core experts as well as support services and support technics have aged employees. In refuse disposal, support services are less likely to be done by aged workers.

Table 19:   Percentage of aged employees by business function for four
             sectors (2007, 50 years and older)

Business function	Construction	Health & social work	Hotels & restaurants	Refuse disposal
Administration – Clerks	10.72%	14.25%	11.60%	17.48%
Administration – Management	10.79%	13.61%	7.15%	
Core – Expert	10.87%	8.49%	33.60%	
Core – Sales			10.37%	
Core – Services		11.30%	14.73%	
Core – Technics	12.52%			14.43%
Core – Transport & logistics				15.98%
Support – Expert		6.04%		13.15%
Support – Sales	17.92%		6.07%	
Support – Services	19.77%	22.18%	27.21%	9.84%
Support – Technics		19.18%	23.20%	
Support – Transport & logistics	16.30%	21.09%	11.78%	
Sector average	11.74%	9.48%	12.45%	7.94%

4.5.3 Young employees

For exactly the opposite reasons of the ones cited for older employees, lack of experience and the need for training, young employees (29 and younger) are also considered a vulnerable group. They have lower bargaining power and are often found in precarious jobs. In what business functions do they appear?

In construction, the average share of young employees ranges from 6.25% (management in health & social work) to 68.35% (core experts in hotels & restaurants). The standard deviation for the whole table is 13.13%. In general, technical staff and clerks can be considered business functions populated by the young. For health & social work, core experts, core services, support technics and also clerks have about 5% more young employees than other business functions. Next, in hotels & restaurants, the share of young employees is very high (38.38% for the sector), up to a majority in core expert and core sales positions. Service functions, transport & logistics and support sales also have a significant share of young employees. For refuse disposal, the size of the shares is in between figures of construction and health & social work on the one hand and hotels & restaurants on the other hand.

Table 20: Percentage of young employees by business function for four sectors (2007, 29 years and younger)

Business function	Construction	Health & social work	Hotels & restaurants	Refuse disposal
Administration – Clerks	26.92%	14.51%	30.63%	19.76%
Administration – Management	10.76%	6.25%	17.71%	15.36%
Core – Expert	21.70%	17.85%	68.35%	30.35%
Core – Sales			50.10%	
Core – Services		14.73%	43.20%	
Core – Technics	27.42%			20.52%
Core – Transport & logistics				17.43%
Support – Expert		9.85%		13.83%
Support – Sales	24.01%		45.71%	37.29%
Support – Services	26.66%	11.41%	31.82%	20.02%
Support – Technics		16.61%	20.76%	21.25%
Support – Transport & logistics	23.04%	11.13%	39.65%	22.46%
Sector average	25.45%	16.31%	38.38%	16.17%

4.5.4 Foreigners

Foreign employees may as well be migrant workers in vulnerable jobs as high skilled expatriates with good working conditions. We cannot disentangle both groups in the data, but the figures may suggest which effect prevails. The average shares range from 0.59% (support transport & logistics in refuse disposal) to 18.90% (support sales in hotels & restaurants). The average absolute deviation is 4.35% and is mostly due to sector differences. Looking at Table 21, the highest numbers found are in hotels & restaurants, where 14.37% of the workforce of the sector appears to be from foreign descent. Construction comes close, primarily with the core technics function and support services.

Table 21: Percentage of foreign employees by business function for four
sectors (2007)

Business function	Construction	Health & social work	Hotels & restaurants	Refuse disposal
Administration – Clerks	5.78%	4.82%	8.38%	7.29%
Administration – Management	7.89%	6.16%	11.23%	4.71%
Core – Expert	6.45%	6.17%	11.57%	8.51%
Core – Sales			15.80%	
Core – Services		7.24%	15.11%	
Core – Technics	13.54%			9.46%
Core – Transport & logistics				6.43%
Support – Expert		7.04%		1.56%
Support – Sales	7.40%		18.90%	3.67%
Support – Services	15.09%	8.08%	17.52%	5.41%
Support – Technics		7.12%	11.78%	6.74%
Support – Transport & logistics	10.22%	7.49%	13.83%	0.59%
Sector average	12.29%	6.28%	14.37%	9.14%

4.5.5 Low education

Low education and a low degree of specialised functions are expected to coincide. Hotels & restaurants, for example, have a high proportion of low educated employees, as does the sector of refuse disposal. Using the business function typology, however, there seems to be a lot of variation within sectors. The highest proportion of low educated employees is found in refuse disposal for support services (64.85%), the lowest in health & social work for managers (3.34%). The standard deviation over all sectors and business functions is rather high (17.76%), pointing to much variation across sectors and functions. In general, following the expectations, management, clerks and expert functions are characterised by employees with a higher educational attainment. Also, in construction, support sales can be added to this list.

Table 22: Percentage employees with low educational attainment by business function for four sectors (2007, ISCED 0-2)

Business function	Construction	Health & social work	Hotels & restaurants	Refuse disposal
Administration – Clerks	14.08%	14.17%	11.24%	29.10%
Administration – Management	16.36%	3.84%	14.45%	30.01%
Core – Expert	6.28%	3.34%	21.27%	10.71%
Core – Sales			23.70%	
Core – Services		32.08%	38.81%	
Core – Technics	37.10%			55.86%
Core – Transport & logistics				57.60%
Support – Expert		7.56%		44.42%
Support – Sales	11.93%		40.49%	39.49%
Support – Services	58.37%	44.69%	36.98%	64.85%
Support – Technics		54.30%	48.88%	42.07%
Support – Transport & logistics	40.61%	34.33%	42.61%	47.75%
Sector average	32.37%	33.06%	15.03%	46.51%

5   Conclusion

In order to describe and analyse job trends within sectors, such as growth, the presence of vulnerable groups or (evolutions of) quality of work, there is a need for a framework encompassing the business function logic of the structure of a sector. This paper focussed on a business function typology, a concept rooted in early theories on the division of labour within and between firms. Indeed, we find value chains that may span across different firms and sectors, a trend which has become more prominent in an age of globalisation and increased competition. Companies decide to outsource, offshore, in-house or specialise in core activities with the greatest comparative advantage, to maintain and increase profitability.

The business typology developed here builds on previous accounts, but is explicitly presented as a practical solution to turn the concept of business functions into a measurable unit, using in particular the European Union Labour Force Survey, the largest and most detailed data source on European employment. We provided a classification for four growing sectors with a high degree of precarious work: construction, hotels & restaurants, health & social work and sewage & refuse disposal. Another seven sectors are also available for further use. In standardising the framework with which to dissect diverse sectors, we considered a business function as a two-dimensional unit, shaped by its position within the sector or value chain (core or not) and by its nature (professional versus operational). We found that business functions, located on a job matrix formed by occupations and sectors, do retain much of the variation present at the occupational level, while being more refined than easier approaches limiting to lower-digit ISCO categories.

The business function approach then was applied to the four selected sectors to describe job evolutions at the European level and in a comparative way. In general, the largest business functions, and in particular operational core functions, are declining, while other functions are becoming proportionally larger within a sector. Seemingly a move away from specialisation, it is nevertheless the category of experts who are consistently increasing their share of the sector employment. Together with the growth of the amount of managers, we therefore speak of a professionalisation pattern. From a comparative view, it appears that these broad lines are merely averages, since first of all sectors are not growing at the same rate in different regions of Europe. Construction is growing primarily in Eastern Europe and in the Anglo-Saxon countries, health & social work is growing in the Anglo-Saxon countries and the Continental cluster, hotels & restaurants grew most substantially in the Eastern cluster and while sewage & refuse disposal shrank there, in contrast to the trends observed in all other clusters. Second, while the average evolutions are found in most of the clusters, idiosyncrasies arise. We note a decrease of experts in health & social work in Eastern Europe, stable levels of management in hotels & restaurants in all clusters but Eastern Europe, a growing importance of transport & logistics in construction and health & social work in the Nordic cluster and higher sales employment rates in the Anglo-Saxon countries. The business function approach reveals much variation beneath the theoretical surface of the structure of the economy.

Finally, we made a link between business functions and vulnerable groups: women, elderly employees, young employees, foreign employees and employees with low educational attainment. On the one hand, vulnerable groups may be present more, to their advantage or not, in some sectors than others: e.g. women in health & social work, migrant workers in construction, both young and old employees in hotels & restaurants. On the other hand, though, there is also a vertical division of vulnerable groups: the results are fairly obvious, although sometimes interacting with the horizontal or sector dimension: vulnerable groups are found less in professional functions (experts, management).

This contribution forms a second step in a quantitative analysis between employment growth and the quality of work, studied within the framework of the WALQING project. In a first step, we determined job growth at the sector level across Europe, in this paper we dissected within-sector variation using the business function approach and in a next and final analysis, quality of work indicators will be linked to the business function configuration. Although providing a solid structure for analysis, some weaknesses should be signalled. First, for the moment there is no consensus on the definition of business functions and therefore much research still talks in different tongues. Because of the fact that we applied the business function typology to one data source, the EU-LFS, it is not fully comparable with other sources. Second, the business functions approach developed here solves some methodological issues (comparability of sectors, random missings and occupation coding) but it is still dependent on a high level of detail. This may actually be overambitious, even for a major survey such as the EU-LFS. A direct implementation of business function questions may be promising in the light of studying trends such as international sourcing, and is being elaborated at the moment.

6   Bibliography

Brown, S.P. (2008): Business Processes and Business Functions: a new way of looking at employment. *Monthly Labour Review*, 131, 51.

Dekocker, V./Wynants, L. (2009): *Uitbesteding in Vlaanderen in kaart gebracht*. KEROSINE. Leuven-Gent: HIVA, CESO & Vlerick, 101.

Esping-Andersen, G. (1990): *The three worlds of welfare capitalism*. Cambridge: Polity Press.

Fernández-Macías, E. (2010): *Changes in the structure of employment and job quality in Europe 1995-2007* (doctoral thesis). Salamance: Universidad de Salamanca.

Fernández-Macías, E./Hurley, J. (2008): *More and better jobs: Patterns of employment expansion in Europe*. ERM Report. Dublin: European Foundation for the Improvement of Living and Working Conditions (Eurofound).

Flecker, J./Holtgrewe, U./Schönauer, A./Dunkel, W./Meil, P. (2008): *Restructuring across value chains and changes in work and employment*. WORKS. Leuven: HIVA-K.U.Leuven, 154.

Gereffi, G./Humphrey, J./Kaplinsky, R./Sturgeon, T.J. (2001): Introduction: Globalisation, Value Chains and Development. *IDS Bulletin*, *32* (3), 1-8.

Gereffi, G./Korzeniewicz, M. (1994): *Commodity chains and global capitalism*. Westport, Connecticut: Praeger.

Geurts, K. (2009): When work moves off. Effect of outsourcing on firm level employment growth. KEROSINE. Leuven: HIVA-K.U.Leuven, 50.

Geurts, K./Coppin, L./Ramioul, M. (2007): *The transformation of work? Tracing employment in business functions. A sectoral and occupational approach.* Work organisation and restructuring in the knowledge society (WORKS). Leuven: Higher Institute of Labour Studies, 130.

Gospel, H./Sako, M. (2010): The unbundling of corporate functions: the evolution of shared services and outsourcing in human resource management. *Industrial and Corporate Change*.

Hall, P.A./Soskice, D.W. (2001): Varieties of capitalism: The institutional foundations of comparative advantage. Wiley Online Library.

Holman, D./McClelland, C. (2011): Job Quality in Growing and Declining Economic Sectors of the EU. walqing working paper 2011.3, Deliverable 4 of the of the WALQING project, SSH-CT-2009-244597. Manchester, May 2011, www.walqing.eu.

Huws, U. (1985): The global office: information technology and the relocation of white-collar work. *Third world trade and technology conference papers*. Presented at the Third World Information Network, London.

Huws, U. (2005): Coding and classification of sectors and occupations in the eEconomy. *Measuring the Information Society*, STILE. Leuven: HIVA-K.U.Leuven, 125-148.

Huws, U. (2006): *The transformation of work in a global knowledge economy: towards a conceptual framework*. Work organisation and restructuring in the knowledge society (WORKS). Leuven: Higher Institute of Labour Studies, 249.

Huws, U./Dahlmann, S./Flecker, J./Holtgrewe, U./Schönauer, A./Ramioul, M./Geurts, K. (2009): *Value chain restructuring in Europe in a global economy* (No. 12.1). Work organisation and restructuring in the knowledge society (WORKS). Leuven: Higher Institute of Labour Studie, 113.

Kaplinsky, R./Morris, M. (2001): *A handbook for value chain research*. IDRC.

Kotler, P./Robben, H./Geuens, M. (2004): *Marketing management. De essentie*. Pearson Prentice-Hall.

Porter, M. E. (1985): Competitive advantage: creating and sustaining superior performance. New York: Free Press.

Ramioul, M./Huws, U. (2009): The snowball effect: global sourcing as an accelerator of economic globalization. *Journal of Architectural and Planning Research*, *26*(4), 327-342.

Statistics Denmark. (2008): International Sourcing. Moving Business Functions Abroad. Copenhagen.

Sturgeon, T. J./Gereffi, G. (2009): Measuring success in the global economy: International trade, industrial upgrading, and business function outsourcing in global value chains. *Transnational Corporations*, *18*(2), 1-36.

Sturgeon, T./Van Biesebroeck, J./Gereffi, G. (2008): Value Chains, Networks, and Clusters: Reframing the Global Automotive Industry. *Journal of Economic Geography*, *8* (3), 297–321.

Vandekerckhove, S./Capéau, B./Ramioul, M. (2010): Structural Growth of Employment in Europe: Balancing Absolute and Relative Trends, walqing working paper 2010.1, Deliverable 3.1 of the of the WALQING project, SSH-CT-2009-244597. Leuven, November 2010, www.walqing.eu.

Vandekerckhove, S./Delmotte, J. (2010): De samenstelling van de loonkloof in België. Een onderzoek op basis van de Vacature Salarisenquête 2008. *Over.Werk*, (3), 99-110.

7   Appendix

Table 23:   business function classification for twelve growing sectors

ISCO / NACE	28	33	37	45	51	55	63	70	72	73	85	90
010							TE					
110						MA						
120		MA							MA			
121	MA	MA		MA	MA	MA	MA	MA	MA	MA	MA	MA
122	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
123	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
130			MA	MA				MA				MA
131	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
200									EX			
211		EX	EX		EX			EX			EX	EX
212									EX			
213		EX			EX		EX		EX	EX		
214	EX	EX		EX	EX		EX	EX	EX	EX		EX
221									EX	EX		
222					EX				EX	EX		
223										EX		
231									EX			
233										EX		
235							EX		EX	EX		
240							EX	EX				
241	MA	MA		MA	EX	MA	EX	EX	MA	EX	MA	MA
243							EX		EX	EX		
244	MA			MA	EX	MA	EX	MA	MA	EX	EX	
245						EX			EX	EX		
247								MA		EX	EX	MA
311	EX	EX	EX	EX	EX		EX	EX	EX	EX	EX	EX
312	EX	EX		EX			EX		EX	EX		
313		TE									EX	
314							EX		TE			
315	EX	EX	EX		EX		EX	EX		EX		EX
321									EX	EX		
322		EX							EX	EX		
323									EX			
330									EX			
331									EX			
332									SE			
333									EX			
334									EX			
341	SA	SA	SA	SA	EX	MA	SA	EX	SA	CL	EX	SA
342	EX	EX			EX	EX	EX	EX	SA			SA
343	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
344							EX		CL	CL		
346						EX		EX		EX		
347		TE				SE	EX		EX			
410	CL	CL	CL	CL	CL		CL	CL	CL	CL	CL	CL
411	CL	CL	CL	CL	CL		CL	CL	CL	CL	CL	CL
412	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
413	TL	TL	TL	TL	TL	TL	TL	TL		TL	TL	TL
414						CL		CL			CL	
419	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
421					CL	SA	SA	CL				
422		CL			CL	SA	SA	CL			CL	CL
511							SE					
512	SE		SE		SE	SE		SE			SE	

ISCO	28	33	37	45	51	55	63	70	72	73	85	90
513		SE				SE					SE	SE
514						SE					SE	SE
516						SE	SE	SE				SE
520					SA							
522	SA	SA	SA		SA	SA	SA	SA	SA			
611				TE	TE			TE		TE		TE
613					TE							
700			TE							TE		
710											TE	
712	TE	TE		TE	TE	TE	TE	TE			TE	TE
713	TE	TE		TE	TE	TE		TE		TE	TE	TE
714	TE	TE		TE			SE	TE		TE		
720	TE											
721	TE	TE	TE	TE	TE		TE					TE
722	TE	TE		TE	TE		TE					TE
723	TE	TE		TE	TE	TE	TE	TE			TE	TE
724	TE	TE		TE	TE	TE	TE	TE	TE			TE
731	TE	TE	TE									
732		TE										
733		TE										
734		TE										
740		TE	TE		TE							
741					TE	SE						
742	TE				TE	TE						
743		TE									TE	
744		TE										
800			TE						TE			
812	TE	TE	TE		TE							
813		TE										
814		TE										
815		TE	TE									TE
816		TE						TE	TE			TE
817	TE	TE	TE									
821	TE	TE										
822	TE	TE										
823		TE	TE								TE	
826		TE				TE					TE	
827						TE						
828	TE	TE	TE	TE								TE
829	TE	TE				TE		TE				
831						TL						
832	TL	TL	TL	TL	TL	TL	TL	TL			TL	TL
833	TL	TL	TL	TE	TL		TL					TL
834								TE				
911				SA	SE	SA			SA			
913	SE	SE	SE	SE	SE	SE	SE	SE			SE	SE
914			SE			SE		SE			SE	TE
915	SE		SE	SE	SE	SE	SE	SE			SE	SE
916		TE				SE		SE	TE			TE
921						TE						TE
931	TE			TE	TE	TE	SE	TE			TE	TE
932	TE	TE	TE	TE	TE		TE		TE		TE	TE
933	TL	TL	TL	TL	TL		TL					TL

Note: Core in bold, administration underscored, support unchanged.

Table 24: Table of ISCO classifications (3-digit ISCO 88)

010	Armed forces
111	Legislators and senior government officials
114	Senior officials of special-interest organisations
121	Directors and chief executives
122	Production and operations managers
123	Other specialist managers
131	Managers of small enterprises
211	Physicists, chemists and related professionals
212	Mathematicians, statisticians and related professionals
213	Computing professionals
214	Architects, engineers and related professionals
221	Life science professionals
222	Health professionals (except nursing)
223	Nursing and midwifery professionals
231	College, university and higher education teaching professionals
232	Secondary education teaching professionals
233	Primary and pre-primary education teaching professionals
234	Special education teaching professionals
235	Other teaching professionals
241	Business professionals
242	Legal professionals
243	Archivists, librarians and related information professionals
244	Social science and related professionals
245	Writers and creative or performing artists
246	Religious professionals
247	Public service administrative professionals
311	Physical and engineering science technicians
312	Computer associate professionals
313	Optical and electronic equipment operators
314	Ship and aircraft controllers and technicians
315	Safety and quality inspectors
321	Life science technicians and related associate professional
322	Health associate professionals (except nursing)
323	Nursing and midwifery associate professionals
331	Primary education teaching associate professionals
332	Pre-primary education teaching associate professionals
333	Special education teaching associate professionals
334	Other teaching associate professionals
341	Finance and sales associate professionals
342	Business services agents and trade brokers
343	Administrative associate professionals
344	Customs, tax and related government associate professionals
345	Police inspectors and detectives
346	Social work associate professionals
347	Artistic, entertainment and sports associate professionals
348	Religious associate professionals
411	Secretaries and keyboard-operating clerks
412	Numerical clerks
413	Material-recording and transport clerks
414	Library, mail and related clerks
419	Other office clerks
421	Cashiers, tellers and related clerks
422	Client information clerks
511	Travel attendants and related workers
512	Housekeeping and restaurant services workers
513	Personal care and related workers
514	Other personal services workers
516	Protective services workers
521	Fashion and other models
522	Shop, stall and market salespersons and demonstrators
611	Market gardeners and crop growers
612	Animal producers and related workers
613	Crop and animal producers
614	Forestry and related workers
615	Fishery workers, hunters and trappers
711	Miners, shotfirers, stone cutters and carvers
712	Building frame and related trades workers
713	Building finishers and related trades workers
714	Painters, building structure cleaners and related trades workers
721	Metal moulders, welders, sheet-metal workers, structural-metal preparers, and related trades workers

722	Blacksmiths, tool-makers and related trades workers
723	Machinery mechanics and fitters
724	Electrical and electronic equipment mechanics and fitters
731	Precision workers in metal and related materials
732	Potters, glass-makers and related trades workers
733	Handicraft workers in wood, textile, leather and related materials
734	Craft printing and related trades workers
741	Food processing and related trades workers
742	Wood treaters, cabinet-makers and related trades workers
743	Textile, garment and related trades workers
744	Pelt, leather and shoemaking trades workers
811	Mining and mineral-processing-plant operators
812	Metal-processing plant operators
813	Glass, ceramics and related plant operators
814	Wood-processing- and papermaking-plant operators
815	Chemical-processing-plant operators
816	Power-production and related plant operators
817	Industrial robot operators
821	Metal- and mineral-products machine operators
822	Chemical-products machine operators
823	Rubber- and plastic-products machine operators
824	Wood-products machine operators
825	Printing-, binding- and paper-products machine operators
826	Textile-, fur- and leather-products machine operators
827	Food and related products machine operators
828	Assemblers
829	Other machine operators not elsewhere classified
831	Locomotive engine drivers and related workers
832	Motor vehicle drivers
833	Agricultural and other mobile plant operators
834	Ships' deck crews and related workers
911	Street vendors and related workers
912	Shoe cleaning and other street services elementary occupations
913	Domestic and related helpers, cleaners and launderers
914	Building caretakers, window and related cleaners
915	Messengers, porters, doorkeepers and related workers
916	Garbage collectors and related labourers
921	Agricultural, fishery and related labourers
931	Mining and construction labourers
932	Manufacturing labourers
933	Transport labourers and freight handlers

Table 25:   Table of NACE sectors (2-digit NACE rev. 1.1)

1	Agriculture, hunting and related service activities
2	Forestry, logging and related service activities
5	Fishing, fish farming and related service activities
10	Mining of coal and lignite; extraction of peat
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying
12	Mining of uranium and thorium ores
13	Mining of metal ores
14	Other mining and quarrying
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastic products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office machinery and computers
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing n.e.c.
37	Recycling
40	Electricity, gas, steam and hot water supply
41	Collection, purification and distribution of water
45	Construction
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
55	Hotels and restaurants
60	Land transport; transport via pipelines
61	Water transport
62	Air transport
63	Supporting and auxiliary transport activities; activities of travel agencies
64	Post and telecommunications
65	Financial intermediation, except insurance and pension funding
66	Insurance and pension funding, except compulsory social security
67	Activities auxiliary to financial intermediation
70	Real estate activities
71	Renting of machinery and equipment without operator and of personal and household goods
72	Computer and related activities
73	Research and development
74	Other business activities
75	Public administration and defence; compulsory social security
80	Education
85	Health and social work
90	Sewage and refuse disposal, sanitation and similar activities
91	Activities of membership organizations n.e.c.
92	Recreational, cultural and sporting activities
93	Other service activities
95	Activities of households as employers of domestic staff
96	Undifferentiated goods producing activities of private households for own use
97	Undifferentiated services producing activities of private households for own use
99	Extra-territorial organizations and bodies