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How Value Chains Grow in the IT Sector – R&D, Software Development, and IT Support
Services and How This Affects Work

By

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Value chains in the IT Sector in Europe – Implications for work and employment

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Abstract

This contribution examines companies' and public-sector organisations' external restructuring processes, with consideration of emerging or lengthening value chains and network relationships in the service sector. Focusing on three business functions – software development in the IT industry, R&D in the IT industry and IT services for public-sector organisations – the paper describes the types of inter-organisational relations that emerge and analyses the impact of restructuring on employment conditions and work organisation. The business functions clearly differ according to the form that restructuring takes and with regard to the impact of restructuring on work and employment. Common trends include increased insecurity, growing flexibility demands and higher levels of standardisation and formalisation of work.

1. External restructuring in the service sector

Restructuring in companies is a difficult phenomenon to analyse, because of the speed at which change is happening, the challenge of unravelling the complex web of drivers, the resulting multitude of forms it takes and the diverse effects for a variety of actors. Traditionally the term restructuring has been used to denote organisational change leading to job loss. In this paper restructuring refers to a process involving the dispersion of functions and activities across company boundaries. The resulting effects can lead to redundancies, but there is actually a much broader range of outcomes on employment relations and conditions of work. The concept of value chains is a useful analytical tool for this task because it encompasses the processes of internal restructuring by looking at the way business functions are broken down by activity and task to be distributed across the chain. It also captures external restructuring by looking at the disintegration that occurs through outsourcing and relocation of tasks, functions and units across the entire range of actors involved in the chain: customers, producers and suppliers. One problem with the term value chain is distinguishing it from a variety of other terms used to describe cross boundary economic activities such as supply chain, value system, commodity chains and filière (Gereffi 1994, Kaplinsky 2006). Here “value chains” refer to a growing literature in which chains are seen as dynamic and reconfigured on an ongoing basis (Sturgeon 2001, p.2), power relations are embedded in the analysis (Gereffi 1994; Huws et. al 2009), the lead or dominant firm is part of the chain, and systems are dispersed, but also linked and coordinated (and controlled).

Often value-chain restructuring is associated with issues popularised by management literature on competitive advantage (e.g. Porter, 1980) in which it is argued that to realise gains, tasks have to be identified that can be externalised to be provided more cheaply, without compromising the company's main business. Logically these processes

would entail low levels of skill and be easily subject to being carved up and modularised. Value-chain analysis has maintained that codification and modularisation are preconditions for outsourcing or, in general, for the lengthening of value chains (Gereffi et al., 2003). In manufacturing, this practice was aggressively pursued in the 80s and 90s, leading to a high level of geographical dis-integration. The first literature from the social sciences on global value chains was thus directed at the manufacturing sector. For instance, the concept of 'systemic rationalisation' in German social science (Altmann et al., 1986) looked at inter-firm relationships with regard to developments in the method of value extraction in capitalist processes. Also beginning with an analysis on the nature of inter-firm linkages, Gereffi and Korzeniewicz (1994) pointed to the increasing vertical disintegration of transnational companies into 'global commodity chains' and suggested a distinction between 'producer-driven' and 'buyer-driven' chains. Realising that a disappearance of vertical integration introduced new issues of managing interactions and control between companies, the authors turned to categorising forms of global value-chain governance and distinguished between 'modular', 'relational' and 'captive' value-chain relations (Gereffi et al., 2003, p.5). These types derive from the position in the value chain, the forms of interconnectedness and the way power operates in supply relations. The analysis was limited to understanding the processes of coordination between organisational units.

Since commodity or value-chain analysis has focused exclusively on manufacturing goods, the question arises as to whether the concepts can be applied to service sectors. Gereffi (2006) maintains that the value chains emerging in the information economy are similar to the ones in the manufacturing and marketing of consumer goods. However, actual research on global value chains in the service sector is still relatively limited. . Initially it was considered unlikely that many areas of the service sector would be externalised (Dossani and Kenney, 2006), because of the need for face-to-face contact and the difficulty in carving up 'knowledge-intensive' functions. Nonetheless, there is a growing trend toward the externalisation and outsourcing of service functions, including front-office activities in customer service, more and more domains in business processes, and high-end software development. Currently, the structure of and relationship between manufacturing and the information economy is in flux. Many organisations in manufacturing, financial services and the public sector rely on specialised accounting, R&D, HR and IT service provision, and use suppliers of business-process outsourcing, including call centres. Through this development, suppliers and service-provider companies in many industries have now become major players with a global reach (UNCTAD, 2004).

Critical comments on the value-chain approach point out that relations are usually much more complex than the linear or vertical portrayal suggested by the chain metaphor, which implies a sequential transformation, in various stages, of inputs into outputs. In actual production networks, each stage of a value chain is said to be embedded in much wider sets of non-linear or horizontal relationships (Henderson et al., 2002, Smith et al., 2002). While the term "chain" tends to bring forth images of vertical ties and sequential stages of production processes, horizontal ties are usually captured by the network metaphor. Complex intra- and inter-firm relations can be seen as comprising not only different stages of production but different layers of inter-relationships, and thus we can distinguish between ties in the same layer (horizontal or network relationship) and ties between layers (vertical or chain relations) (cf. Dicken, 2005).

Critics not only call for more complex concepts to capture inter-firm relations, they also argue that value-chain analysis does not cover issues of work and employment comprehensively: 'Little, if any, attention is given to the organization of work and employment at the intra-firm level, clearly limiting an assessment of a place's location within a commodity chain' (Smith et al., 2002, p.47). To fill this void the analysis needs to take into account that external restructuring and the reorganisation of value chains make use of, and have consequences for, segmented labour markets. Production processes, and increasingly also those of service provision, are spread across the primary and secondary labour market in order to make use of low-cost and more flexible labour. An example, highly prominent in academic debates in the 1980s and 90s, is the dual character of the Japanese employment system and the way companies like Toyota integrated several layers of supply firms with differing employment protection and working conditions into the production process (Elgar and Smith, 1994). Another much debated issue was the 'flexible firm' (Atkinson 1984), which combines an internal labour market with peripheral employment and outsourcing arrangements. While the core workforce, according to this model, provides functional flexibility and commitment to the company, the peripheral workforce is used to achieve numerical flexibility.

Yet, labour-market segmentation theorists have more recently argued that inter-organisational contracting may be less dichotomous than portrayed in core-periphery models. Research shows that organisational restructuring is "motivated by interests of tapping into different market segments where wages are at a lower level, even though the work still requires commitments and skills' (Rubery, 2006, p.9). In addition, the outsourcing arrangement should not be seen only as a market transaction and not including an employment relationship. Rather, the distinction becomes blurred with 'extended hierarchies' in inter-firm-networks (Thompson, 1993) and labour processes under control of both the employer and the client organisation (Rubery, 2006; Marchington et al. 2005). Regarding the impact on work organisation, optimistic views claim that organisational fragmentation offers opportunities for new ways of working, less hierarchy and more opportunities for self-development, whereas pessimists stress the risks and the shifting of responsibilities for skill development (Rubery et al. 2005).

The institutional context is credited with being a major factor in determining the way skills are generated and used, to what extent jobs are protected and therefore how much and what can be outsourced, and how flexibility measures and cost pressures are used (Hall and Soskice 2001; Author B; Gallie 2007). Research in industrial relations has repeatedly suggested that external restructuring of companies through outsourcing and the reorganisation of the value chain weakens labour and destabilises industrial relations institutions. The very motive of vertical disintegration can be to circumvent labour regulation (Hendrix et al., 2003). In addition, similar to internationalisation and relocation of work, outsourcing changes the power relations between employers and labour and may thus lead to 'concession bargaining' (Marginson and Sisson, 1996) on core workforces' employment conditions.

Outsourcing generates pressure to reduce labour costs and deregulate working conditions not only in manufacturing (cf. Caprile 2000) but also in the service sector. Research on telecommunications, for example, shows that companies cut costs through farming out work and spinning off subsidiaries and that they use the threat of

outsourcing to win concessions in-house (Doellgast and Greer 2006, p.16). These findings also suggest that, even in industrial relations contexts where there are sector-level agreements, core workforces may still be weakened by the movement of some jobs out of the sector. Moreover, the coverage and participation of workers in unions tends to be lower in the service sector and IT than in traditional manufacturing sectors.

As with dynamic value-chain analysis, power relations between organisations figure prominently in recent debates on labour-market segmentation and industrial relations. What needs to be considered, however, is that power relations vary and change over time. Subcontractor or supplier companies are usually correctly presented as being in a dependent position, which allows their clients to pass on risks and flexibility demands to them. However, outsourcing can also be seen as part of a structural shift in the economy through the emergence of large service-provider and supplier companies (UNCTAD, 2004). In this perspective, the peripheral workforce of one company is the core workforce of another. Thus, even in outsourcing relationships, workers may be integrated into internal labour markets and benefit from employment stability and workers' representation.

In this contribution, we discuss the issue of external restructuring of companies and public organisations in service sectors and the emergence of cross-organisational value chains. The main interest is in identifying patterns and types of value chains and network relations and, above all, in demonstrating the impact of restructuring and ensuing inter-organisational relations on employment conditions and work organisation.

2. Method and research questions

The empirical data this paper is derived from is based on a pan-European project in which more than 50 case studies in 13 European countries were conducted to examine the impact of value-chain restructuring on the quality of work.¹ The case studies were carried out in four different economic sectors (textiles, food, information technology and public sector/public services). The main criterion for case selection was that the company had undergone a restructuring within the last two years in which new inter-firm links or an externalisation of services to a separate unit were involved in the restructuring process. The increasing fluidity of corporate structures that has resulted from continual processes of reconfiguration and fragmentation has led to a search for a unit of analysis that cuts across firm and sector. We utilised the concept of the business function to examine the effects of restructuring across the boundaries of individual companies and sectors. In this contribution we are focusing on the IT sector covering three business functions: software development and R&D in the IT industry and IT services for public-sector or public-service organisations.

IT software development is generally considered to be a 'knowledge intensive' branch and also a highly internationalised function in which the trend toward outsourcing and inter-firm development is quite advanced. Here we have the opportunity to observe a longer window into movements along the value chain. Also the level of

transnationalisation means that new EU member states as well as several Asian locations are important players in software firms' value chains. Five cases in software development in the IT industry from five different countries and institutional contexts are analysed in detail. The companies in the sample were all in the private sector.

In addition to software development, as a core activity in the IT industry we chose IT service provision as a function to give special attention to the dynamic changes currently taking place between the public and the private sector. IT service-provider companies cover a wide range of tasks supplying IT hardware, software and support, and they are increasingly engaged in business-process outsourcing offering back-office functions such as accounting, wage administration, etc. Focusing on IT services we thus have the opportunity to examine the effects on work and employment in a rather complex interrelationship between client and vendor, private and public. Eight case studies in eight different countries were carried out in IT service-provision and business-process outsourcing.

A case study was based on eight to ten extensive interviews with representatives from management, employees directly affected by the restructuring, and, in cases with institutional representation, either union officials or shop stewards (in the selected business functions). These expert interviews with key informants, based on a standardised set of topics, covered a detailed description of the restructuring, the organisation of business function across organisations, a description of the workflow and its changes, changes in employment conditions (working-time arrangements and contract forms), changes in work organisation, skills and knowledge, and finally the role of industrial relations and regulations in the restructuring process. We received a detailed account of the external restructuring of the organisations in the context of longer value chains or wider network relationships. When possible, we conducted interviews at both the core organisation and one of its outsourced units. The interviews were complemented by company documents such as annual reports and other secondary material such as newspaper articles to produce a comprehensive picture of the restructuring that had taken place. Researchers in the respective countries produced case studies in English from their interview material. Synthesised analyses were carried out on the basis of case study reports. (see Flecker et. al 2008)

The main research questions we will cover in the remainder of this contribution are the following: First, what are the motives and processes of restructuring and, in particular, what are the ensuing types of value chains or network relationships? Second, how do restructuring and inter-firm relationships impact on employment in terms of contractual forms, wage levels and working hours? Third, in what way does external restructuring influence the development of work organisation? Is it conducive to or detrimental to the emergence of post-bureaucratic forms of work organisation?

3. Jumping on the value chain – software development

The IT sector and the business function of software development in particular were early targets of value-chain rationalisation outside of the manufacturing sector. The digitalisation of information and its increasingly rapid transfer made outsourcing easier and more attractive. Indeed, the IT-enhanced integration of value chains and work flows has been complemented and enabled by new functions and work roles that were needed

for liaison and coordination between organisations and the digitised information they exchange (Braczyk, 1993). Initially, simple processes or pieces of the product were outsourced or offshored such as data maintenance or coding tasks. India, with its relatively cheap, qualified labour, was a prime location (Salzman and Biswas 2005). Over the years, larger and larger chunks of the software-development process began to be outsourced or offshored. There is evidence that companies felt pressured to ‘jump on the bandwagon’ and participate in the management fad of offshoring even without a real strategic plan for the use of remote sites (Flecker 2003; Lynn and Salzman 2006).

Given this background, it is not surprising that in the WORKS cases in this business function, regardless of size or business segment, the companies have all experienced a lengthening of value chains, or are part of a larger system in which the value chain is growing. This is even the case in small niche producers in what are characterised as low-cost countries such as Bulgaria. All companies have also undergone a dynamic redefinition of their function and role along the chain, which appears to be ongoing. An international division of labour is evident in every case. The value chains, however, are quite traditionally organised: characterised by a vertical, sequential approach.

Captive software value chains

In the software production case studies, we targeted privately owned firms in different European countries that had either developed or adapted software packages and then sold or installed the software to customers. The sample of cases in this business function was in Sweden, Germany, Hungary, Bulgaria and Austria. Two of the cases, in Sweden and Austria, had undergone a merger with US-based firms, shifting their position in the value chain a notch down in the hierarchy. All of the cases, however, were involved in a lengthening of their value chains, adding units with initially lower positions. All the new units at lower points along the chain were ‘captives’. That is, they were subsidiaries of the focal companies and carried out work exclusively for them.

Both the Swedish and German companies in the sample offer IT-based business solutions, which they produce, implement, maintain and support. The Swedish company’s restructuring involved a merger with a US company, and both companies have recently begun offshoring to Asia, initially for cost reasons. While the German company had the resources to hire the best recruits from the Indian labour market, and is currently upgrading its Indian operations, the Swedish company is downsizing and phasing out its Indian operation in favour of a ‘captive’ Philippine site. The reasons given were a “closer cultural link” to the Philippines and an overheated and expensive Indian market. They also offered a wage ratio of 1:5 rather than the 1:3 in India. (Tengblad/Sternälv 2007 in Author B 2008, p. 48)

The Hungarian case is an IT company that carries out software development for business solutions and is part of the value chain of a large and diversified multinational, which is its only customer. The Hungarian company started out as a low-cost ‘body-leasing type’ of organisation. Given the rising costs of labour in Hungary compared with other eastern European countries just entering the EU, the company strategy shifted to offering higher value-added services (such as professional services, contact with clients, project management) to remain attractive to the multinational customer-owner. The management of the multinational “wanted to outsource as many activities as possible but Hungarian managers argued that although they could not compete with

Slovakian prices they can provide services of higher quality...” (Makó et al. 2007 in Holtgrewe/Meil 2008 p. 49) Later, the Hungarian unit started outsourcing work to less expensive Eastern European sites to reduce costs and become more competitive in bidding for projects within the value chain of its multinational headquarters.

The Bulgarian case is an independent, niche producer, which provides software applications for a range of larger customers in Europe and the US, but retains its independence in the concept and development of its products. The restructuring involved the start-up of a Bulgarian satellite firm and a Vietnamese ‘captive’ subsidiary. The Austrian software developer in the sample was an independent company with a wide range of international customers. In 2004, they were taken over by a US corporation with locations in the US, the UK, Germany, Austria, Croatia and Vietnam. Soon after the takeover, the corporation put the small Croatian unit in the product development chain of the Austrian company. The Croatian team is a fully dependent supplier and focuses on the relatively low level tasks of coding and testing software.

Employment outcomes: standard contracts and growing insecurity

In the case studies for the business function of software development in the IT sector, the employees, with few exceptions, have standard employment contracts and, for their countries, high wage levels. The Bulgarian company is, for example, considered a highly attractive employer in the Bulgarian IT-sector labour market. All the employees have permanent, full-time labour contracts. In the Austrian case, the inclusion of the Croatian site in the value chain did not involve transfer or job loss for the Austrian site. The employment and working conditions have also not changed noticeably as a result of the restructuring. The German software development company passes on the relatively low value-added process of implementing its software by licensing agreements to external companies, also located within Germany, whose employees have more precarious working conditions. Leaving the adaptation and implementation of software to local firms and consultants protects the core workforce from excessive demands for flexibility and mobility.

Although by contract, working hours are generally based on a standard working week of between 38 and 40 hours, there is a general trend toward intensification of work. One cause of intensification is being part of international value chains involving communication outside of normal office hours. In the Swedish case, working time is more fixed than in other IT firms, with regular nine-to-five, 40-hour weeks. However, there is a growing expectation and acceptance of flexible working hours and working at home. This mainly involves carrying out the 40 hours outside of the nine-to-five slot to meet the demands of working with US and Philippine partners. In Bulgaria, as with most IT firms, the working-time arrangements are described as ‘flexible’. (Galev 2007 in Holtgrewe/Meil 2008, p. 54) The main categories of workers set their own working time depending on requirements arising from project needs, commitments to other team members and distributed work in countries with large time differences. A reason for intensification is the competition between sites along the chain, particularly for companies involved in the chains of large multinational enterprises, such as the Hungarian, German and to a certain extent the Swedish cases in our sample. In fact, in Hungary the site aggressively uses its less regulated working conditions in comparison to its western European counterparts – such as longer working hours, weekend work and

willingness to take long-distance assignments requiring travel and long absences from home – to remain a desirable contract partner for its multinational owner.

Competition between sites also puts general pressure on the overall job security in particular units. In the German case the company has introduced internal market competition within its company borders by publishing tenders and having departments (called labs) bid for them. Success depends in part on expertise and an evaluation of the project's potential, but of course cost also plays a role. The Swedish case experienced the most dramatic effect of between-site competition. Not having been especially dominant on the market, the Swedish company engaged in a number of cost-cutting measures, including massive lay-offs at the Swedish site. The employees received settlement packages that were more generous than Swedish or EU law requires, with the agreement that the employees would help with knowledge transfer to the new Philippine site. The lay-off process appeared to proceed quite cooperatively, with the participation of the social partners. For those employees remaining, wages are comparable to, but not above, the Swedish average in the sector. In the Hungarian case, also embedded in a large multinational value chain, the company has to continually upgrade its services and find ways to reduce its costs in order to protect its site from downsizing in favour of less expensive Eastern Europe sites.

Overall, in software development the dynamics of outsourcing and relocation is certainly initially driven by differentials in wages and employment conditions. This does not translate into a lasting simple centre-periphery dichotomy, however, with better working conditions and more highly value added knowledge work remaining in the core and low level work and poor employment conditions moving to the periphery. Most of the companies integrate their remote 'captive' sites into the project organisation of their software development, thereby eventually upgrading their role in the value chain. However, the continual push on costs from particularly the large multinationals leads to ever more outsourcing and offshoring efforts both within and outside of home countries.

Work organisation: standardisation and upgrading

Dynamic value-chain research argues that standardisation and modularisation are preconditions for outsourcing and offshoring. In business software there is indeed an initial process of identifying discrete, low-level tasks that are allocated to mainly captive subsidiaries. For the original core units the remaining work content does not change dramatically. However, what does occur in these distributed work environments is a formalisation and bureaucratisation of processes through more rigid requirements for documentation and standardised data and communication exchanges. The German company's restructuring process, for example, has resulted in a more formalised and hierarchical organisational structure. Two departments were created to separate 'conceptual' and 'operational' production of software. Also there is an expectation to focus on particular issues and create specialties within teams in order to bid on internal company tenders more successfully. "In former times the developer has conducted trainees, accomplished consultancy, he did everything...He wrote documentations, this all became much more specialised. Today a developer develops; a product manager

writes the specifications ... In either case the functional tasks became much more smaller.” (interview quote in Krings et al. 2007, p. 18).

In the early stages of offshoring, non-core ‘captives’ typically undertake standardised tasks such as data maintenance, coding and testing for the core companies. This was the position of the Croatian unit in the Austrian software development case, the Vietnamese unit in the Bulgarian case and the original position of the Hungarian case, in the value chain of its multinational owner. The most traditional form of offshoring in our case studies was found in the Swedish-US merger. Yet even there the new Asian site is taking over some of the tasks formerly carried out in Sweden, leading to knowledge (and job) transfer from Sweden to the Philippines.

What the case studies clearly reveal, however, is that the position of these non-core captives is not static. Over time they begin moving up the value chain, as the Indian site of the German case, the Philippine unit of the Swedish case and the Hungarian case’s increasingly higher value-added tasks demonstrate. At the time of the study, the Hungarian unit was already passing on lower level tasks to a site in Romania. The reasons for this movement are diverse: rising costs at what were originally low-cost sites (as in Hungary and to some extent also in India), demands from highly skilled workers in tight labour markets for more interesting work content (Author A), and a gradual integration of ‘captives’ into the work processes of the core unit through project work. At the Austrian case’s Croatian unit, for instance, programmers were being directly included in development teams in Austria. This made a future upgrading of the Croatian location more likely. Although at the Bulgarian case’s Vietnamese ‘captive’, the new site is initially carrying out simpler, lower-end tasks to start; its role is expected to be upgraded over time. “In all cases of distributed work with Vietnam, the engineers there are in charge of tasks with lower priority...the main reason is that most of the Vietnamese engineers have been working in the company for a short time ...and in fact, they are treated like the Bulgarian newcomers with similar experience.” (Galev 2007, p. 13) The non-core units in our cases all had experienced or were experiencing skill upgrading and movement up the value chain.

In a final stocktaking we see that the effects on work organisation of restructuring across value chains have been an intensification of work and a greater demand for temporal flexibility: for instance to arrange time requirements around project or assignment needs and facilitate communication with offshore sites. Formalisation and standardisation have also taken place in all the cases, but not in the sense of a simplification or codification of tasks.

4. The Road to Market – R&D in IT

Semi-autonomous units in the value chain

R&D in IT tends to involve the restructuring of a university research center or a group of university researchers into a start-up or spin-off company specialising in developing state of the art IT software for various uses in industrial contexts or products. The R&D business function in IT has cases from the following countries: Norway, the UK, Germany, Austria, Belgium and France. R&D in IT appears to be specifically embedded

in the institutional environment. It often takes place at the boundaries of publicly-funded and for-profit activities. Most of the cases (Austria, Germany, the UK, Belgium and Norway) are small companies or labs with 15-25 workers. The exception is the French case whose restructuring involves the deregulation of a large telecommunications company that had its own R&D centers and is now looking to compress and centralise their research efforts. In Norway and the UK, a second wave of restructuring took place when the small research centers were bought up by larger multinational or multi-site companies interested in the specific expertise and market niche offered by these small research centers. In the case of Norway this was a US search engine specialist. In the case of the UK, a Japanese multinational interested in the state-of-the-art research on language processing. The German and Austrian research units now occupy an intermediate position on the value chain, offering their R&D products and services to large industrial producers. The Belgian case is still research oriented, being supported by university and EU funds with the goal of making it self-sufficient on the market.

The Austrian and Belgian cases are fully or partly publicly funded organisations with strong university links. In these cases, the organisation is somewhat remote from the 'immediate' market. However, even in formerly publicly-funded or cross-subsidised organisations, market pressures and attention to the market are increasing, and the R&D organisation is looking for ways to find or construct their markets. Thus a major shift in the orientation of all of the companies regardless of restructuring type is a move toward a commercialisation of their R&D activities.

The value chains of these R&D companies or units can be characterized as *semi-autonomous*. The cases here include subsidiary sites of multinationals as well as labs working by contract with customers or selling their products and implementing them into the processes of other companies. Thus although the customer or lead firm give guidelines for what should be developed, there is a two-way street in that the R&D units also work on their own projects which they offer to customers or to their headquarters. They are usually involved in an interactive way with the processes of the companies where their products or systems are being installed. Although they possess expert knowledge on a particular subject and have a specialized niche in which they operate, they are still in a to some extent dependent relationship with their owners or customers

Employment conditions – flat hierarchies, project based performance

There appears to be little change in formal employment conditions regardless of the type of restructuring. Most of the employees have permanent full-time contracts. In fact, in many cases this seems to be driven by the employer side: free-lance and part-time contracts are not encouraged. Most of the employees also seem to have a long-term perspective in their job and in their company. This binding to the company existed despite very few chances for career mobility in these very small companies with very flat hierarchies. The UK was the exception in that employees were oriented to much more mobility between companies as a means of career improvement or for the content of the work. This also reflects the UK labour market orientation.

The companies tend to have few different categories of workers. Several of the companies have hired marketing or sales specialists, usually shortly after they became independent units from the university. There does not appear to be large jumps in pay between groups of researchers: for instance, between senior researcher and project leader.

Work is organised in projects overall. The working conditions are characterised by a certain amount of informality and adhococracy, a somewhat start-up-like atmosphere. Project leader functions usually comprise project management, allocating workers' hours, reporting and administrative tasks. Other roles and positions may emerge above or below the project leader levels such as team leaders in some kind of matrix organisation (such as in Belgium), or leading thematic strands (UK). Project leaders are often not fixed hierarchical positions, but roles that more experienced researchers take project by project.

Working time also appears quite stable with regular working weeks of 38-40 hours. Although the actual working week might vary due to project contingencies, on average the employees seem to take their overtime as free time and to strive for a regular working schedule. The exceptions here seemed to be more the non-profit, still very research oriented environments rather than the more company oriented ones. In the former cases, either academic goals in Austria or "executive" status in Belgium led to overtime that was not compensated either in pay or free-time. Working times have much in common with other professional work situations. They tend to be long and may be extensive, but researchers have considerable discretion.

Although working time was quite regulated for most of the cases – admittedly with peak periods for project needs – women were highly underrepresented in all of the cases. The UK had the highest share of women working in the skilled research tasks, due also to the fact that linguistics was an important subject in the research. The explanation of the low female participation rates was the low representation of women in IT technical fields. Only in Austria was there a policy attempt to rectify this situation by trying to get more women to study computer science and enter this profession. Even given the low representation of women at the companies, respondents did not see any difference in the treatment of women at the companies or in the work that was assigned among the R&D staff.

The R&D IT cases are companies and labs with an intermediary position between research and industry (an exception being the French case). The main reason for their existence is the intention to make innovative, state-of-the-art IT software development more marketable and usable in industrial contexts. An expected work intensification or more precarious employment relation in these labs and companies was not found. Most of the employees have, at least on average, a standard employment relationship as well as standard working week. There was a wide variation between cases in the ability to work at home and have more flexible working arrangements. The pay tends to be lower than for comparable qualification levels in large companies. However, the employees report a trade-off in the interesting content of work as well as the more informal atmosphere in these smaller companies for the higher wage. The positions are often held by entry level researchers seeking to gain experience or by IT researchers in highly specialised fields.

Many of the employees in the organisations looked at here worked at customer sites in consulting or software development and installation tasks. Some of these assignments could last several days or weeks. However, a permanent or semi-permanent transfer of employees was not found in these cases. The employees most affected by impacts of transfers were in the French case involving centralisation of R&D activities and closure of satellite sites. This meant either losing one's job or changing one's job location. In general, however, R&D IT is not part of a global labour market in our cases. Upon takeover of the Norwegian company, there was mention of moving operations to the US. However, the Norwegian company successfully defended their location. The Norwegian case illustrates *"the amount of power a knowledgeable unit may have even in the face of a global actor. This is a case where the local negotiates successfully with the global."* (Torvath 2007) The Austrian case is surprisingly regional, and the German case is also mostly nationally based with a few European and Asian partners and customers.

Working conditions – autonomy and formalization

In most of the companies, developers feel they have a large degree of freedom in what they are working on. Respondents in the Norwegian case study report:

"Priority is somewhat defined by US... they tell us which verticals are most important now, what features are important... but...when we try to find out what we want and compare this to what should be prioritised we manage to find a solution... we have a large degree of freedom in what we do." (Torvath 2007)

According to the managers in this case, however, external priorities affect the Norwegian companies' plans much more than 1-2 years ago, and the pressure is likely to increase.

Forms of control are also very informal in all of the cases. Most employees don't have to record their hours – they tend to keep their own records, and the expectation seems to be that they would tend to work more rather than less of the required hours. Only the Austrian production company formally recorded hours. Furthermore, strict presence in regulated working days was also the exception. The control comes almost completely from the requirements of the project-based organisational structures. Project time is booked and project schedules have to be met. This means, however, that the control structures are almost all indirect for R&D organisations. The appearance of autonomy in terms of the absence of obligatory starting and ending times, and formal records is very high. On the other hand, performance in the projects is part of the evaluation process, in almost all of the cases, for wage negotiation and bonuses.

The level of skills of R&D employees and software production workers brought into the companies is very high in all the cases – usually high level university or post graduate degrees. The learning curves for new workers are also quite steep. Levels of specialisation and concentration within one IT area of expertise are also very high, especially in the German and UK cases. Formal training opportunities are, in contrast, low. The best training opportunities are offered by the UK and Austria cases in R&D, which have completely different regulatory frameworks. Training access could be due to the proximity and close linkages to the university that both cases reveal.

Also due to commercialization, there was an increase in standardization and formalization of tasks, but not in the sense of them becoming "simpler." The goal of

standardization was to promote product stability and to facilitate communication between project members and groups, also along the value chain. Formalization also promoted communication along the process chain in the form of documentation, project management tools, etc. In some cases, it can be said that the product was standardised to make it more sellable, which is a central and more pressing requirement for the organisations in these case studies. Obviously the shift from university focus to company focus represents a large difference in this regard.

Conclusion : commercialization in a weakly regulated

There are some potentially precarious work situations, for instance for the satellite research sites of the French company, the older workers in the German case, and the threat of unsuccessful labs in the Austrian case. Nonetheless, there is very little participation in and use of institutionalised forms of industrial relations even in the cases in which it exists. Austria and Norway were the only cases with formalised forms of representation (with the exception of France, but France as a case is different from the others in several ways): in Austria collective agreements in non-university research centers and the IT sector which regulated wages and seniority rules). The Austrian case had a works council, although it was only loosely connected to the labs and the employees there. Despite formal institutionalised regulation, the Austrian labs had one of the most precarious forms of wage determination and job perspective of all the cases. In Norway, labour law regulated working time and parental leave. Also Norway was the only country in which many of the employees in R&D were actually trade union members. Also in Norway, the formal rules would favour a positive work-life balance for participation of women in the labour force, but very few women were to be found in the profession. In France, the remains of a strong trade union from the public sector company strived to protect jobs in satellite sites. However, the workers themselves seemed uninterested in the work of the unions or the works council, and thus the union's activities did not act as a form of mobilisation for the workers in the R&D group. Finally, as the Belgian case showed, it is relatively easy to bypass laws protecting against work intensification and working time flexibility by classifying knowledge workers as "executive."

Certainly the high bargaining positions of these knowledge workers with regard to working and employment conditions due to their high levels of qualification and expertise in specialised fields makes it easier for them to engage in individualised forms of negotiation with their employers. Furthermore, many of the issues traditionally negotiated at union level have less relevance for these workers. For instance, the wage levels for these researchers are higher than those set in union negotiated collective agreements, and fixed and regulated working times (as in constant 38 hour work weeks and regulated start and end times) are not a high priority. In terms of work-life balance it must be said that a fair amount of flexibility exists in arranging working schedules. Also, for the R&D workers, although they were tied into value chains (those of their multinational owners or those of their customers), there was not much demand for long travel periods or long periods of transferral to different sites.

All in all, the market pressures and commercialisation in the cases are leading to a formalisation of processes and evaluation criteria. In a somewhat abstract and still

distanced way, market mediated processes for determining the value of research results and products are more and more inevitable. This is leading these small companies more and more away from an orientation as small research units towards enterprises defending their location in intermediate positions along the value chain. (Holtgrewe/Meil 2008)

5. Crossing the public-private divide: IT services

The provision of information technology (IT) infrastructures and services, including hardware, software and support, is increasingly being outsourced to specialised service providers. These companies also offer consultancy and, based on IT, the implementation of various back-office functions such as accounting and payroll administration (Willcocks and Lacity, 2006). The rapidly growing market for IT outsourcing is increasingly oligopolistic and international, and the major companies are global players or, as the World Investment Report put it, ‘a new breed of multinationals’ (UNCTAD 2004). The oligopolistic nature of the IT services business can be explained with reference to two main factors (Miozzo and Grimshaw, 2005): a reputation effect due to the inherent uncertainty in skill-intensive business services and economies of scale stemming from the pooling of skills, partly by staff transfer from clients, and cheap access to new technologies. The competitive advantage of transnational IT-service providers stems from the fact that they find it easier to follow their transnational client companies around the world and to offer seamless services. In addition, these international service providers utilise cost differentials between countries and continents by distributing activities internationally within the corporation or by outsourcing parts of the work (Flecker 2008; Ramioul et al., 2005).

In this section, we will summarise evidence from eight case studies on public sector organisations in different European countries. They cover IT outsourcing from the public sector to private providers, IT-based business process outsourcing to private providers and the centralisation and outsourcing of IT within the public sector. The main findings show that the governance of inter-organisational ties can largely be termed ‘relational’, yet the power relations are often contested. These network relationships and the limited differentials in wage levels between public sector organisations and IT companies limit the consequences of outsourcing in terms of employment conditions. In terms of work organisation, the main changes include commercialisation, formalisation, standardisation and the emergence of new work roles.

Relational inter-firm ties

The main motives of restructuring were cutting costs, updating IT infrastructures and gaining access to specialist knowledge. While economic gains rank highly among the aims and expectations, the outsourcing decisions themselves do not seem to be based on detailed cost-benefit analyses; rather, they seem to follow political considerations and general trends in the country (cf. Powell and DiMaggio, 1991). In contrast to software development described above, characterised by linear or vertical relationships in which inputs are sequentially transformed into a final product or service (cf. Dicken, 2005), IT service provision consists more of a horizontal relationship in which infrastructures and

support are provided to manufacturing or service organisations. However, vertical ties or chain relations can be found *within* large IT service providers if activities are modularised and the programming and testing of software, for example, are passed on to subsidiaries or subcontractors in low-cost countries. The frequent practices of taking over personnel from the client or posting workers to the client, reduce the need for codification of knowledge. In addition, the general support-character of IT services limits the possibility of modularising these activities. Therefore, the ensuing ‘relational’ inter-firm or inter-organisational ties in IT services can be described as being characterised by complex interactions, high levels of asset specificity and mutual dependence. (Gereffi et al. 2005)

Yet the series of case studies showed that the power relations are rarely balanced and often highly contested: public organisations try to avoid dependency and to keep open the option of switching service provider. Only in the Belgian case did the public administration make itself highly dependent on the private partners, by concluding an open-ended contract that can only be terminated with 10 years’ notice. In this case, even IT managers in the public organisation are on the payroll of the private IT service-provider company. Similarly, in the Portuguese case the health authority is highly dependent on the private IT company supplying medical equipment and IT systems. In the Netherlands, where local governments had used collective regional computing centres in the past but had turned to more flexible individual outsourcing to private providers, the case study observed a move towards re-collectivisation of IT activities: several municipalities established a joint organisation intended to play the role of an independent adviser and IT-intermediary for local governments, reducing the dependence of municipalities on private IT service providers.

In general, the case studies showed that crucial knowledge tends to move from the public organisation to the service provider, limiting the capacities of the former to control the service provision and to keep open alternative options. In spite of the competition from other powerful players in the industry, IT service providers are therefore in a rather strong position vis-à-vis their clients, a fact that is also relevant for their employment and working conditions.

Employment conditions: formal continuity, shifting practices

Direct job loss was rare in the cases under investigation, so employment-related issues mainly include the takeover of personnel by the IT service-provider companies; the differences in the forms and the regulation of employment between the different organisations involved and, in particular, between the public and the private sector; the gender-specific impact of restructuring and the changes in job security.

In three of the cases, workers were transferred to a new employer as part of the outsourcing process. By and large, terms and conditions remained the same on a permanent basis and not only for one year as stipulated by the EU regulation on the transfer of undertakings. While in the UK case this result was reached after an eight-week strike called by the unions to prevent privatisation, in the Swedish case it was attained in a consensual way. However, now more flexibility is demanded from the employees and the work load has become heavier. In the UK case only few workers

accepted the offer to change to the service provider's contractual conditions on a voluntary basis during the first year. This meant shorter holidays, a one-hour longer working week, no flexitime, higher salaries and a weaker equal opportunities and diversity policy. In both cases there are worries on the part of the trade unions about possible relocations of work and ensuing job losses. In the UK case these were fuelled by a sudden relocation of the helpdesk, and in the Swedish case by the takeover of the service-provider firm by a US company and its integration into the new parent company's global value chains.

Such concerns were absent in the Norwegian case of IT outsourcing and transfer of workers from a group of hospitals to a new central IT service provider within the public health sector, because the employees kept their employment conditions including job tenure. Here, only their wages needed to be harmonised, because of the considerable differences between the wage systems of the various hospitals and health centres. Generally, in this case employment conditions improved in the process: wages and overtime compensation increased, on-call arrangements and flexitime became more worker-friendly. In other cases, such as the German for example, where there was no transfer of workers, the IT service-provider companies posted their employees to the client organisation, sometimes for lengthy periods. This demand for mobility is seen as a burden for the employees affected. As these highly skilled workers often have a rather strong bargaining position, some IT service-provider companies negotiated with their clients to reduce the time their workers need to spend there.

While there are big differences between the cases in relation to female employment, with up to 40 per cent women in IT departments in Scandinavian cases and a much lower ratio elsewhere, the changes caused by outsourcing generally seem to be detrimental to women: more pressure for flexibility in the Swedish case, weaker equal opportunities and diversity policies in the UK case, less part-time work and increasing problems in reconciling employment with care duties in the Dutch case, and some wage discrimination because of differences between men and women in formal education in the Norwegian case.

Overall, the qualitative employment consequences seem limited if one looks at the formal level only. Growing demands for flexibility, increasing job insecurity in several cases and disadvantages for women indicate subtle deteriorations of employment conditions. Interestingly, these are not compensated for by the inclusion of transferred workers into internal labour markets of large international service-provider companies because former public sector workers do not seem willing to seize the advancement opportunities on offer that come with strings attached regarding mobility demands.

Work organisation: bureaucracy through the back door

External restructuring strongly impacts on work organisation, although the function and often the individual tasks remain the same after externalisation. In IT outsourcing, while workers provide the same services to the various departments of the public organisation as before, the work is now usually much more standardised and procedures are much more formalised. In the UK case the relocated helpdesk takes requests and the services are planned and scheduled through the information system. In addition, every task needs

to be costed, which leads to a big increase in paperwork. Another major change in this case relates to the impact of 'service-level agreements' on working practices. Time pressures increase because of penalty clauses, and staff need to keep daily time sheets that are accurate to the minute. In the Dutch case of business-process outsourcing, the IT system now structures the work and organises the workflow, in particular in the back office.

Not only the scheduling and reporting but also the content of work and thus skill requirements are affected. In the UK case, workers, who had perceived their work as creative, for example, designing a website from scratch, are now supposed to use the templates and systems of the IT service-provider. In the Norwegian case, software development was abandoned altogether in favour of buying standard software; this led to some developers leaving the organisation. Here, centralisation makes work roles more specialised in contrast to a more generalist profile needed in the individual hospitals and health centres. More monotonous work was found at the helpdesk, where workers previously used to rotate between first- and second-level support, but now have to stay in one function all the time. In contrast, in the Dutch case of business process outsourcing specialisation actually decreased: while previously tasks were narrowly defined, after the outsourcing a more general coverage of tasks and juridical competencies is required. In a process of knowledge transfer to the private service-provider company, local government officials thus tend to lose their status as experts in a specific, narrowly defined area.

The case studies showed that externalisation makes it necessary to establish new functions and work roles for liaison and coordination tasks. In the Dutch case, for example, the municipality had to establish strategic internal IT units for organising the relations between the municipality and the IT service providers. In the Norwegian case, too, a new liaison and coordination function was set up, because after all IT workers had been transferred to the new central IT unit there were no IT specialists left in the hospitals to bridge the gap between the hospitals' various departments and the service provider. With externalisation, new tasks – which can be termed 'transaction work' – are thus being introduced into the value chain, and some of them are bundled into newly created functions.

To sum up, externalisation and inter-organisational relationships affect work organisation both in service-provider companies and in public organisations. In IT services, the limits to modularisation and the prevailing relational network ties, in principle, imply close interactions across organisations. Yet commercialisation and the application of distinctive processes tend to increase time pressures and to enhance the level of formalisation and standardisation considerably. Together with the partly increasing specialisation and the emergence of new liaison and coordination roles, externalisation seems to work strongly against the spread of the post-bureaucratic organisation (cf. Alvesson and Thompson 2005).

6. Conclusions

In this paper we have presented research findings on the effects of external restructuring of companies and public-sector organisations on employment conditions and work

organisation. Focusing on software development and R&D in the IT industry and on IT services for the public sector, we described restructuring processes and their results in terms of value chains and network relationships, we discussed the impact on employment conditions and we analysed the consequences for work organisation.

The way that value chains develop and grow differs in the three business functions of software production, R&D and IT service provision. In software production the chain grows vertically and internationally, with 'captive' units added to the chain, and gradually integrated into core processes. In R&D niche speciality labs get increasingly integrated into the processes of larger companies and their role in the value chain has elements of both autonomy and dependence. In IT service provision, the inter-organisational ties are rather horizontal and relational. The differences in the forms that value chain or network development takes are reflected in differences in work and employment outcomes.

In software development, the dynamics of outsourcing and relocation is certainly initially driven by differentials in wages and employment conditions. There are also some indications of a tendency to cushion core workers from demands for flexibility and mobility. In some cases management could argue that outsourcing and relocation even secures employment of the core workforce, because the 'mixed wage rates' make the company more competitive. However, the upgrading of subsidiaries and external service providers tends to build up pressures on core firms and their workforces. Competition between sites, as non-core units move up the value chain taking on more and more complex tasks, leads to increased job insecurity. The risk of redundancies appears to vary by market position. But, this position can quickly change in the volatile IT sector through mergers and acquisitions. Changes in work organisation triggered by external restructuring include intensification of work and a greater demand for temporal flexibility as well as some formalisation and standardisation of tasks.

In R&D, spin-offs and formerly publicly-funded or cross-subsidised organisations find that market pressures are increasing, and the R&D organisation is looking for ways to construct their markets. Thus a major shift in the orientation of all of the companies regardless of restructuring type is a move toward a commercialisation of their R&D activities. Work, although more formalized and with few chances for career jumps, is still considered attractive, with challenging tasks and relatively standardized contracts and working times. IT R&D firms, with highly qualified labour doing highly specialised work, is the only business function in IT that seems to have escaped fragmentation of employment relationships.

The outsourcing of IT from the public sector or from public services to IT service-provider companies often leads to highly contested relationships in which the public organisations aim to limit the dependence on the external service provider. There is a tendency, however, for outsourcing of IT to entail a shift of knowledge from the public organisation to the private provider company. Differences in terms and conditions between client organisations and service-provider companies reflect different systems of employment regulation in the public and private sectors rather than showing disparities in social standards. The fragmentation of employment that partly resulted from

restructuring had thus only limited material effects on workers. Regarding work organisation, IT service providers apply standardised company-specific procedures, leading to higher standardisation and less autonomy for IT workers. In addition, the service level agreements between the client organisation and the service provider company clearly shape work practices. The case studies also revealed the emergence of new functions and work roles that are needed for coordinating workflows across organisational boundaries and for monitoring and negotiating outsourcing agreements and service levels.

Overall, the case studies showed that external restructuring and the reorganisation of value chains and network relationships often affect both employment and working conditions. As value chains grow longer and network relations widen, demands on flexibility often increase and bureaucratic structures tend to be strengthened through the back door. Moreover, the cases illustrate that the power relations and the contractual arrangements between organisations have immediate consequences for labour. The position that an organisation holds is not static, however, and a movement along the value chain has consequences for working conditions and work content. Although the differences in institutional context are sometimes evident, especially in the first phases of a restructuring, the role of the business function for the form restructuring takes and the outcomes for work and employment are very strong.

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