Chapter 7 Knowledge work: a demanding but comfortable job

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Summary

A lot has been written about knowledge work and knowledge workers. However, proper definitions and empirical foundations are lacking quite often. In this chapter knowledge work is distinguished from other work in which retrieval, application and transfer of knowledge and information is important. An analysis is made of the job content and the employment relationship of knowledge workers and how these work characteristics influence the incidence of burn-out, intention to quit and the work-life balance. Data of the Netherlands Working Conditions Survey (NWCS) 2007 and 2009 are used. Conclusions are that definitions matter and that knowledge work is a demanding but comfortable job.

7.1 Introduction

The academic debate on knowledge workers and knowledge work suffers from inappropriate definitions and lack of empirical foundations. Different definitions lead to different populations of knowledge workers of which, as a consequence, characteristics of job content and employment relationship cannot be compared, even if empirical data are available. So there is a theoretical need for a proper definition that distinguishes knowledge work from other work in which retrieval, application and transfer of knowledge and/or information is important. Such a definition should derive its plausibility from the empirical result of its application as well. Only then it makes sense to compare knowledge workers and non-knowledge workers, knowledge work and non-knowledge work.

The results of these analyses are also important for the policy debate as it has emerged in the countries of the European Union. ‘Smart growth means strengthening knowledge and innovation as driver of our future growth’ (European Commission, 2010a: 9). ‘In a global knowledge-based economy where the ability to succeed is based on a propensity to create, exchange, appropriate and exploit knowledge, it is essential to establish a sound knowledge base via policies that aim to educate, train, attract and retain a sufficient cadre of highly skilled knowledge workers’ (European Commission, 2010b:33). These are a few main points from the European Strategy 2020. The statements underline the political importance of knowledge work on European level. In the Netherlands, the Foreign Nationals Employment Act was revised in 2009, making it easier to encourage knowledge workers from abroad to come and work in the Netherlands. In 2010, the new government of the UK restricted immigration possibilities, making an exception for some categories of knowledge workers, such as medical specialists and nuclear physicists. The previous
government already had acknowledged that there is a problem with the supply of a skilled STEM workforce: science, engineering, technology and mathematics skills and capacity (Barrett and Wynarczyk, 2009). In December 2011 the German government decided that non-EU knowledge workers of the STEM-categories can apply for a so-called ‘Blue Card’ which makes it possible to avoid all kinds of immigration restrictions. Considering this political context, we may expect the managerial as well as social science debates on knowledge work and knowledge workers to continue.

That debate is about 1) who can be considered to be knowledge workers (Thompson et al., 2001; Fleming et al., 2004; Warhurst and Thompson, 2006; Marks and Scholarios, 2007) and how many knowledge workers are there (Dankbaar and Vissers, 2009; Fauth and McVerry, 2008), 2) what are the characteristics of knowledge workers’ work (job content and employment relationship) (Warhurst and Thompson, 2006; Benson and Brown, 2007), 3) what risks do knowledge workers run regarding health and well-being (Fauth and McVerry, 2008; Albertsen et al. 2010), 4) what is their class position; are these experts becoming a ‘new working class’ coming into conflict with professional managers (Darr and Warhurst, 2008; Marks and Baldry, 2009; Mallet, 1969), 5) how to manage knowledge workers and how to improve their performance (Davenport, 2005; Wang et al., 2008) and 6) how to ensure that there are enough knowledge workers available (UK and Dutch policies as mentioned above). A lot has been written about these topics, but little empirical research has been carried out into these questions. This paper contributes mainly to the debate on the first three questions.

### 7.2 Definition of knowledge work

Of course, first of all a proper definition of knowledge work is required. It is not necessary to discuss all the definitions that have been used once again in this paper. This has been done elsewhere (Thompson et al., 2001; Fleming et al., 2004; Davenport, 2005; Pyöriä et al., 2005; Warhurst and Thompson, 2006; Benson and Brown 2007; Darr and Warhurst, 2008). Rather, some choices are made for the research model to be used in this paper, based on the following three conclusions from the definition debate.

- In order to define knowledge work, it is preferable to look at work characteristics rather than at professions. Not every worker within an assumed knowledge occupation is in fact a real knowledge worker. (Thompson et al., 2001; Warhurst and Thompson, 2006; Fincham, 2006; Benson and Brown, 2007). IT workers in Scottish organisations differ in professional identity, which is related to differences in job content (method control and cognitive demands) and entry qualifications (Marks and Scholarios, 2007).

- A high level of knowledge must be part of the definition. Having to do with information does not necessarily entail knowledge work. Thompson et al. (2001) make a distinction between knowledge work and knowledgeability in work. Knowledge work requires “high degrees of expertise, education or experience” (Davenport, 2005: 10) or “a theoretical body of knowledge” (Warhurst and Thompson, 2006: 787). Education or qualifications as such is not a very good proxy for knowledge work because job
levels and education often do not match very well in contemporary labour markets (Warhurst and Thompson, 2006; Adams and Demaiter, 2008). However, definitions without the factors of qualification or theoretical body of knowledge will always result in too broad a definition. An example of this is the research by Dankbaar and Vissers (2009), in which only job autonomy and external contacts are taken as criteria for the definition of knowledge work.

- In order to ascertain in which professions knowledge work occurs, it is meaningful to carry out research at the level of separate professions. Using large categories like ‘professionals’ gives an insufficient or even mistaken view of the development of knowledge work. Fleming et al. (2004) demonstrate this for the official statistics of professions like in Australia, but the same objection also applies to the survey by the Work Foundation based on data of the European Working Conditions Survey 2005 (EWCS). In that survey, knowledge workers are defined as workers in the top three ISCO-88 categories, including legislators, senior officials and managers, professionals and technicians and associate professionals (Fauth and McVerry, 2008: 31).

To distinguish ‘real’ knowledge workers, Warhurst and Thompson’s definition is taken as starting point in this paper:

‘The central characteristics of knowledge work are that it draws on a body of theoretical (specialized and abstract) knowledge that is utilized, under conditions of comparative autonomy, to innovate products and processes.’ (Warhurst and Thompson, 2006: 787).

We use these characteristics as criteria to determine who the knowledge workers are among the workers. Then we ascertain in which professions these knowledge workers can be found.

### 7.3 Work characteristics

In the literature referred to, many other characteristics of knowledge work are mentioned, in particular concerning job content. Characteristics given in the papers referred to above are: high cognitive demands, job variety, creative work, many external contacts, working with computers and work requiring high involvement.

In research on occupational safety and health, the focus is also on work pressure as a characteristic of job content (Fauth and McVerry, 2008; Albertsen et al., 2010). Knowledge workers are also expected to experience high work pressure due to high quantitative and qualitative job demands combined with stronger managerial control as a result of global competition and the increased obligation to give account.

A specific category of work characteristics concerns the employment relationship. Benson and Brown (2007), for example, carried out a survey in a large Australian semi-governmental, scientific research organisation. The knowledge workers were more often contented with HR-practices, experienced more frequent support from co-workers and supervisors, gave a higher rating to their job security and were more frequently members of a union than the non-knowledge workers in the same organisation. Benson and Brown differentiate three dimensions in knowledge work: ‘variation and dynamic nature of the work’, ‘degree of reciprocal interdependence of work with other tasks being per-
formed in the team’ and ‘degree of autonomy employees have in carrying out their work’ (Benson and Brown, 2007: 125). By doing so, they avoid the objections to the professions approach. What is a problem, however, is that they omit the level of education or qualifications or another measure for ‘theoretical body of knowledge’. Their case study, however, does not suffer from this fact, because the organisation investigated was a large Australian semi-governmental, scientific research organisation with 6957 employees of whom 3335 responded to the questionnaire. Thanks to this choice, they already had enough ‘real’ knowledge workers in the research population beforehand.

### 7.4 Effect characteristics

In the discussion about knowledge work, work pressure is mentioned as the greatest risk, which might even lead to burn-out (Fauth and McVerry, 2008; Albertsen et al., 2010). Albertsen et al. (2010: 83) define knowledge work broadly as ‘working with signs, communication, or exchange of knowledge, thereby making it possible to perform some part of the work via information technology equipment’. The choice of definition makes it not significant to compare the results with the results of our survey. Counter to this risk of burn-out, however, is the expectation based on the ‘job-demand-control theory’ (Karasek and Theorell, 1990) that high job demands combined with high job control result in ‘active jobs’ with few work related health complaints. Another risk mentioned in the literature is a disrupted work-life-balance, which may have an adverse effect on someone’s work and/or private life. Golden (2009) researched in a high tech organisation with a highly educated workforce, how working life and family life influence each other. The author offers recommendations on how to bend the negative effects on work and family towards mutual consolidation. That is why this paper examines whether knowledge workers experience problems in their work-life balance.

Another possibly different effect concerns the intention to quit. In general, it is assumed that because of the nature of their work (Benson and Brown, 2007) and because of their intrinsic character (Wang et al., 2008) knowledge workers show a high intention to quit or a high turnover. However, this hypothesis was not confirmed in Benson and Brown’s survey. On the contrary, knowledge workers showed a lower intention to quit than the other employees. Of course, knowledge worker turnover is important because it ‘affects organisational learning processes and content, which consequently impacts innovation (Guidice et al., 2009: 157)’.

To sum up, the research questions in this paper are:

1. What percentage of the professional population in the Netherlands consists of knowledge workers and in which professions, sectors of industry and organisations (size) do they work?
2. What are the work characteristics (job content, employment relationship) of knowledge workers compared to those of non-knowledge workers?
3. Do the effects of knowledge work (burn-out, work-life balance, intention to quit) differ from those of non-knowledge workers?
7.5 Methods and measures

Use is made of the data from the Netherlands Working Conditions Survey, an annual monitor carried out by the Netherlands Organization for Applied Scientific Research (TNO) and Statistics Netherlands (CBS). Individual employees are sent a questionnaire. The average response is 32 per cent and is representative for the Dutch employees (Van den Bossche et al., 2008; Van Hooff et al., 2008; Koppes et al., 2010). The data of 2007 (N = 22,659) and 2009 (N = 22,247) – being different samples – have been combined in this paper.

The selected definition, by Warhurst and Thompson is operationalised with the following three NWCS-questions: education (college or university degree required), contributing to the improvement of products and services (regularly or always) and contributing to the innovation of products and services (frequently or always) and with the scale job autonomy (usually). Thus, knowledge workers are regarded as having at least a college or university degree, often or always contributing to the improvement and renewal of products and services, and usually experiencing autonomy in their work. Improvement and innovation combined could be termed as ‘innovative work-behaviour’.

Concerning work characteristics and effects, the NWCS already includes the relevant concepts from the discussion dealt with. Only involvement is lacking. Extra characteristics are: emotional demands, contracts and hours worked (see Appendix 1.).

The analysis of the job content includes visual display unit work, work pressure, emotional demands, cognitive demands, job variety and creative work, external contacts.

The analysis of the employment relationship covers type of contract, working hours, overtime hours, hours working at home, supervisor support, colleague support, satisfaction, job insecurity and union membership.

Finally the following effects will be scrutinized: burn-out, intention to quit, neglect of family because of work and neglect of work because of family.

7.6 Results

7.6.1 Percentage of knowledge workers

According to the definition based on the four characteristics of education, autonomy and improvement and renewal of products, 9.3% of the occupational population of the Netherlands are knowledge workers. Table 7.1 shows that merely considering work characteristics and leaving education out of the definition would result in a far higher percentage, more or less comparable to Dankbaar and Vissers (2009). Only considering college or university graduates without including the work characteristics would give a far higher percentage of knowledge workers, more or less comparable with Fauth and McVerry (2008).
Table 7.1 Percentages of Knowledge workers in total work force according to definition (2007 & 2009)

<table>
<thead>
<tr>
<th>MEASUREMENT YEAR</th>
<th>2007</th>
<th>2009</th>
<th>2007-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge workers (only higher education)</td>
<td>30,1%</td>
<td>30,1%</td>
<td>30,1%</td>
</tr>
<tr>
<td>Knowledge workers (innovative work and a high level of autonomy)</td>
<td>17,9%</td>
<td>18,0%</td>
<td>18,0%</td>
</tr>
<tr>
<td>Knowledge workers (higher education and innovative work)</td>
<td>10,9%</td>
<td>11,3%</td>
<td>11,1%</td>
</tr>
<tr>
<td>Knowledge workers (higher education, innovative work and a high level of autonomy)</td>
<td>9,2%</td>
<td>9,4%</td>
<td>9,3%</td>
</tr>
</tbody>
</table>

Number of employees in the sample | 22,659 | 22,247 | 44,906 |


7.6.2 Occupational groups

The percentage of knowledge workers per occupation group differs considerably and remains below 40% (Figure 7.1). Teachers in higher education, managers, architects, draughtsmen, ICT-occupations and statisticians show a relatively high percentage of knowledge workers.

FIGURE 7.1 Top-20 occupational groups with respect to % of knowledge workers.

7.6.3 Sectors and size
The sectors with the highest number of knowledge workers are (in consecutive order from 30% to 17%): higher education, architects and engineers, computer service and information, legal and economic services, primary education, local government and provinces, oil and chemical industry, secondary education (not shown in table 7.1. or figure 7.1). In addition, it was found that organisations with fewer than 100 employees employ 7.3% knowledge workers; organisations with 100-499 employees employ 10.3%, those with 500-999 employees 12.2% and those with more than 1000 employees 15.6%.

7.6.4 Work characteristics
Job content
Knowledge workers spend far more hours per day working at a computer screen than non-knowledge workers do, their work is more often varied-creative and they are far more often confronted with high cognitive demands. For knowledge workers, work pressure is higher than for non-knowledge workers. The emotional demands they meet are also significantly, though not much, higher. Knowledge workers have significantly more external contacts than non-knowledge workers, although the difference is small (Table 7.2).

Employment relationship
Information on employment relationships is also shown in Table 7.2. All the differences in scores as regards employment relationship are significant but small. Knowledge workers less often have a temporary contract (4%) than non-knowledge workers (11%), they have more contract hours, work more hours overtime and more hours at home. They experience slightly more support from colleagues and get more supervisor-support. Knowledge workers are slightly more satisfied with their terms of employment and HR-practices. They are less often insecure about their jobs (22%) than non-knowledge workers are (27%) and they are less often members of a union (22% versus 25% of non-knowledge workers).
Table 7.2 Means of Knowledge & Non-Knowledge workers on Work Characteristics and Effects (2007 & 2009)

<table>
<thead>
<tr>
<th>JOB CONTENT</th>
<th>MEANS</th>
<th>TOTAL SAMPLE</th>
<th>F-VALUE (ANOVA)</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual display unit work (hours per day, recoded,1-4)</td>
<td>1.79 2.57 1.86</td>
<td>42467 1258.1</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Work pressure (never-always, 1-4)</td>
<td>2.38 2.68 2.41</td>
<td>44660 751.1</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Emotional demands (never-always, 1-3)</td>
<td>1.64 1.87 1.67</td>
<td>44669 491.5</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Cognitive demands (never-always, 1-3)</td>
<td>2.02 2.44 2.06</td>
<td>44684 1474.5</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Job variety and creative work (never-always, 1-4)</td>
<td>2.62 3.24 2.68</td>
<td>44726 2450.9</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>External contacts (never-daily, 1-4)</td>
<td>2.55 2.70 2.56</td>
<td>44240 90.0</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMPLOYMENT RELATIONSHIP</th>
<th>MEANS</th>
<th>TOTAL SAMPLE</th>
<th>F-VALUE (ANOVA)</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of contract (permanent vs. non-permanent, 0-1)</td>
<td>0.11 0.04 0.10</td>
<td>44172 169.3</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Number of working hours according to contract per week</td>
<td>30.9 35.5 31.3</td>
<td>44319 682.8</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Number of overtime hours per week, paid &amp; unpaid</td>
<td>5.45 8.77 5.76</td>
<td>42693 340.8</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Number of hours working at home per week</td>
<td>1.39 3.40 1.61</td>
<td>39192 684.1</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Supervisor support (not agree-agree, 1-4)</td>
<td>2.94 3.18 2.96</td>
<td>42356 429.9</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Colleague support (not agree-agree, 1-4)</td>
<td>3.33 3.45 3.34</td>
<td>43237 171.3</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Satisfaction with pay, promotion, learning possibilities (not satisfied-satisfied, 1-3)</td>
<td>2.29 2.59 2.32</td>
<td>39393 589.3</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Job insecurity (no-yes, 0-1)</td>
<td>0.27 0.22 0.27</td>
<td>44342 39.3</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Labour union membership (no-yes, 0-1)</td>
<td>0.25 0.22 0.25</td>
<td>44504 24.5</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>


7.6.5 Effects
Knowledge workers experience slightly less - though significantly - burn-out symptoms (10%) than non-knowledge workers (12%; Table 7.2). Neglect of family because of work occurs more frequently (70% versus 50%), as well as work neglected because of family (42% versus 28%).

7.7 Conclusions and discussion
In this paper it was shown that the number of knowledge workers depends for a great deal on the definition chosen. Recent research also indicates this. Dankbaar and Vissers (2009) use job autonomy and external contacts as criteria and then investigate how many
knowledge workers there are according to the EWCS 2005 data. They arrive at 25.6% knowledge workers in the EU-member states in 2005. With their general definition of professional groups, Fauth and McVerry (2008) arrive at 33% knowledge workers in the UK, based on UK-data in the EWCS 2005. The results of the analysis of the NWCS-data confirm that our definition, combining schooling with work characteristics, gives a more realistic picture of the number of knowledge workers (9.3% in the Netherlands), in concordance with the differentiation between knowledge work and knowledgeability of work. For those reasons we strongly recommend to researchers and statisticians to use this definition.

Defining knowledge work in the light of specific work characteristics especially results in a differentiation of the concept of a knowledge profession. The NWCS-data confirm that it is not meaningful to speak of knowledge professions in the sense that whoever works in one of those professions is a knowledge worker. It is not surprising in which knowledge sectors knowledge workers occur, once it is known in which professions they work. Although the percentage of knowledge workers in SMEs is lower than in large companies, SMEs still contribute substantially to the knowledge based economy because there are far more SMEs than large companies. For governments it is important to promote the development of skills and competences in general. However, to boost innovation special attention should be paid in educational policy and labour market policy to knowledge workers as is also highlighted in chapter 3 of the Flagship Initiative Innovation Union (European Commission, 2010b:33-46). The more precise definition we propose would increase the efficacy of those policies.

As expected, knowledge work is cognitively demanding and the work concerned is varied and creative. According to the above-mentioned theory by Karasek and Theorell (1990), the fact that knowledge workers suffer less from burn-out although they do more frequently experience work pressure can be explained by their having high job autonomy. As regards employment relationships, knowledge workers clearly constitute a different category than non-knowledge workers. There is no large difference per item of the employment relationship, but it is extraordinary that knowledge workers score more positively on all items than non-knowledge workers do. This concurs with the results of the survey by Benson and Brown (2007), except for membership of a union. In the NWCS this is lower than that of non-knowledge workers and corresponds more closely with the research by Marks and Baldry (2009), who found a low rate of union membership among Scottish software workers. There is no indication that knowledge workers are becoming a ‘new working class’. Trade unions could do more to be attractive for this strategically important category of employees.

These positive scores make it understandable that the intention to quit is low. The only tricky point seems to be that work life and family life sometimes interfere with each other. Knowledge workers have interesting work. They are reasonably contented and have relatively few work related health complaints. To maintain high levels of performance and
well-being, the most important recommendation to managers as well as worker’s representatives is to guarantee job autonomy.

Literature


Appendix 1. Job content, employment relationship and effects.

Job content
Six job content characteristics will be included in the analysis.
- Visual display unit work (1 item, hours per day, recoded, 1-4)
- Work pressure (mean of 4 items, never-always, 1-4; $\alpha$: 0.86)
- Emotional demands (mean of 3 items, never-always, 1-3; $\alpha$: 0.83)
- Cognitive demands (mean of 3 items, never-always, 1-3; $\alpha$: 0.81)
- Job variety and creative work (mean of 3 items, never-always, 1-4; $\alpha$: 0.77)
- External contacts (mean of 3 items, never-daily, 1-4; $\alpha$: 0.44)

Employment relationship
Also nine aspects of the employment relationship will be analysed.
- Type of contract (permanent vs. non-permanent, 0-1)
- Number of working hours according to contract (hours per week)
- Number of overtime hours paid & unpaid (hours per week)
- Number of hours working at home (hours per week)
- Supervisor support (mean of 4 items, not agree-agree, 1-4; $\alpha$: 0.88)
- Colleague support (mean of 4 items, not agree-agree, 1-4; $\alpha$: 0.84)
- Satisfaction with pay, promotion, learning possibilities (mean of 3 items, not satisfied-satisfied, 1-3; $\alpha$: 0.75)
- Job insecurity (mean of 2 items: no-yes, 0-1; $\alpha$: 0.72)
- Labour union membership (no-yes, 0-1)

Effects
Finally four work effects will be scrutinised.
- Burn-out (mean of 5 items, low vs. high, 0-1, Utrecht Burn-out Scale; $\alpha$: 0.86)
- Intention to quit (mean of 3 items, no-yes, 0-1; $\alpha$: 0.66)
- Neglect of family because of work (1 item, never vs. sometimes or more often, 0-1)
- Neglect of work because of family (1 item, never vs. sometimes or more often, 0-1)