

Knowledge-Based Work: An International Comparison

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ABSTRACT

In a globalized, innovation-centred economy, knowledge-based forms of work organization are becoming increasingly important. On the basis of a European-wide survey into working conditions, it can be shown that independent, professional, and managerial tasks in particular are characterized by high job autonomy and complex problem-solving. However, to a surprising extent, more simple service and production occupations are also faced with complex problems and demanding tasks. Knowledge-based forms of work are facilitated by close customer contacts, target management, and participative forms of management. The competences, ability to learn, and commitment of employees are more thoroughly exploited in Scandinavian countries than in the United Kingdom, Ireland, and Mediterranean countries. On the basis of another set of data, it can be shown that an extended utilization of the competences and commitment of employees is accompanied by more individualistic and intrinsic working attitudes—especially in the USA, Canada, Switzerland, the Netherlands, and Scandinavian countries. This can be interpreted as an elective affinity between “new” forms of work organization and “new” more intrinsic work orientations.

Key words: knowledge-based forms of work, knowledge society, working conditions, working attitudes.

RÉSUMÉ

Dans notre économie mondialisée et axée sur l'innovation, les formes d'organisation du travail basées sur la connaissance deviennent de plus en plus importantes. Une étude des conditions de travail effectuée à l'échelle de l'Europe indique que les emplois indépendants, professionnels et de gestion en particulier se caractérisent par une grande autonomie au travail et par la résolution de problèmes complexes. Toutefois, curieusement, des emplois plus simples dans les secteurs des services et de la production sont également confrontés à des problèmes complexes et comportent aussi des tâches exigeantes. Les formes de travail basées sur la connaissance sont favorisées par des contacts étroits avec les clients, par une gestion par objectifs immédiats et par des formes participatives de gestion. Les compétences, l'aptitude à apprendre et l'engagement des employés sont exploités plus à fond dans les pays scandinaves qu'au Royaume-Uni, en Irlande et dans les pays méditerranéens. Un autre ensemble de données indique qu'une utilisation élargie des compétences et de l'engagement des employés s'accompagne d'attitudes plus individualistes et intrinsèques devant le travail—spécialement aux États-Unis, au Canada, en Suisse, aux Pays-Bas et dans les pays scandinaves. Cela peut être interprété comme une affinité élective entre les « nouvelles » formes d'organisation du travail et les « nouvelles » orientations plus intrinsèques du travail.

RESUMEN

Las formas de trabajo basadas en el conocimiento son cada vez más importantes en una economía globalizada e innovadora. Sobre la base de un estudio en toda Europa acerca de las condiciones laborales, se puede mostrar que las tareas independientes, profesionales y de gestión en particular se caracterizan por la alta autonomía del puesto de trabajo y la solución de problemas complejos. No obstante, de forma sorprendente, a las ocupaciones de servicios y de producción más simples también se les plantean problemas complejos y tareas exigentes. Los contactos directos con el cliente, la gestión objetiva y las formas participativas de gestión facilitan las formas de trabajo basadas en el conocimiento. Las competencias, la capacidad de aprender y el comprometimiento de los empleados se utilizan más a fondo en los países escandinavos que en el Reino Unido, Irlanda y los países mediterráneos. Sobre la base de otro conjunto de datos, se puede mostrar que una extensa utilización de las competencias y del comprometimiento está acompañada de actitudes laborales más individualistas e intrínsecas, especialmente en Estados Unidos, Canadá, Suiza, Holanda y en los países escandinavos. Esto se puede interpretar como una afinidad electiva entre las “nuevas” formas de organización laboral y las “nuevas” orientaciones laborales más intrínsecas.

The organization of work in current societies is no longer characterized by the mass production of homogeneous goods by wage-dependent workers coordinated in a hierarchical and bureaucratic way. In addition to this traditional pattern of industrialized work, numerous organizational patterns of work are now evolving in reaction to turbulent, internationalized, and competitive environments and the quicker pace of technical and organizational innovation. Apart from the hierarchically coordinated bureaucratic organization and the mechanized factory, the current economic landscape is being shaped by flexible project

groups, cooperative production and innovation networks, semi-autonomous profit centres, teleworking, and startups. Alongside the fulltime employee with an unlimited contract, there emerges a multiplicity of independent and dependent employment relationships with flexible time, task, and remuneration structures, and limited contracts (Osterman, 1999; Sennett, 1998). The coordination of organizations is no longer just based on hierarchical instructions, technical structures, bureaucratic controls, and financial incentives; it is also based on self-coordination and the possibility of autonomously choosing adequate

strategies in order to achieve specific targets. Coordination through programs and precise routines is supplemented and partially replaced by coordination through objectives and customer relationships. These organizational transformations require knowledge-based forms of work. Abstract intellectual capabilities, systemic thinking, an experimental attitude towards the world, and an ability and willingness to communicate and cooperate are required. These requirements, however, are no longer limited to traditional academic professions, as was assumed by early theoreticians of the knowledge society (Drucker, 1994; Bell, 1976).

This points to the need for a more general concept of knowledge-based work—a concept that focuses on the specific characteristics of the tasks performed, rather than a concept that identifies knowledge-based work requiring specific (academic) training or a privileged occupational status. Work is always knowledge-based, but not always to the same extent. Knowledge work therefore must be defined on the basis of the necessity to learn and on the ability and willingness to transform established routines and practices in response to new situations and challenges.

A suitable starting point for such a definition is the distinction between knowledge and norms proposed by the German systems theorist Niklas Luhmann. Luhmann (1994) defines knowledge as expectations that can be revised when there is evidence that frustrates or contradicts them, when they do not correspond to reality.¹ Knowledge, therefore, is a set of expectations characterized by a cognitive style. The social systems characterized by these expectations are prepared to learn by revising and updating the ways they act and observe the world and themselves. Normatively based expectations are not revised even when they are frustrated. In contrast to knowledge, deeply rooted habits, customs, and norms do not change even when they do not correspond to the observed “reality.”

Therefore, in contrast to the rather static knowledge of cavemen, master craftsmen, and traditional professionals, knowledge-based work can be characterized “by the continuous revision of its cognitive bases (1). It is assumed that it can, in principle, always be improved (2), and it is considered not as truth but as a relevant resource (3). Knowledge-based work is also inseparably connected with ‘non-knowledge’ respective ignorance so that knowledge-based work is always connected with specific risks” (Willke, 1998, p. 21). Such patterns of work—and not expenditures for research and development, attained patents, or value added in certain high-tech areas (OECD, 2003)—are at the centre of the knowledge society.

However, it is rather difficult to empirically analyze such a concept of knowledge-based work. Reich (1992) formulates the most convincing suggestion when he defines the symbol analyst through the ability to identify and solve problems: “Symbolic analysts solve, identify, and broker problems by manipulating symbols. They simplify reality into abstract images that can be rearranged, juggled, experimented with, communicated to other specialists, and then, eventually, transformed back into reality. The manipulations are done with analytic tools, sharpened by experience. The tools may be mathematical algorithms, legal arguments ... or any other set of techniques for doing conceptual puzzles” (Reich, 1992, p. 178).

Reich estimates that approximately 20% of all American employees can be classified as symbol analysts. The other employees are routine production workers (approximately 25%) or those who perform simple and repetitive person-to-person services (approximately 30%).

Similar estimates are available for Germany. Based on the dominant activity, the employees can be divided into three categories:

- Production-related activities (equipment and supervision of machines, cultivation, and production),
- Primary services (commerce, repair, personal, and other services),
- Secondary services (office, technical and commercial administration, informatics, research, marketing, public relations, and management).

Knowledge-intensive activities are found mainly in the category of secondary services. In May 2000, these made up 27% of all employees in Germany (Federal Bureau of Statistics, 2001). These are the best-paid and highest-ranked employees.

From an international perspective, however, amazingly little is known about the weight and different forms of knowledge-based activities. In the following section, we will start to fill this gap by discussing a number of indicators in order to shed light on the societal, organizational, and individual facets of more knowledge-based patterns of work. This will be followed by a discussion of production-related and social services, whose expansion can be interpreted as an indication of more strongly knowledge-based work forms in the OECD. On the basis of a representative survey of working conditions in the European Union we will then discuss the characteristics of knowledge-based

1. “Knowledge therefore is the sediment of an immense number of communications, which have used and marked cognitive expectations and whose results can be updated” (Luhmann 1994, p. 139). Knowledge therefore is no internal, mental representation of an objective world because we simply cannot know anything about such an external world. Knowledge designates a specific set of expectations that will be revised if they do not fit our experiences. This readiness to learn is the difference between knowledge and norms. Learning means revising frustrated expectations,

in other words, expectations that have proven not to be effective in achieving the expected results. In the tradition of the pragmatism of William James and John Dewey, Luhmann therefore also stresses the role of learning from (socially constructed) experience: “Imaginative recovery of the bygone is indispensable to successful invasion of the future ... to isolate the past, dwelling upon it for its own sake and giving it the eulogistic name of knowledge, is to substitute the reminiscence of old age for effective intelligence.” (Dewey, 1960, p. 28).

forms of work and organization. Greater access to the competences and commitment of employees is accompanied by changing, more subjective working attitudes (Baethge, 1991; Heidenreich, 1996). In the third section, based on another international survey, we will analyze the working attitudes connected to knowledge-based forms of work. It can be concluded that the shift from normatively based to knowledge-based forms of work is reflected in a different sectoral structure of advanced economies, in new patterns of organization, and in more intrinsic working attitudes.

Knowledge-Based Work in the Service Society

In the traditional industrial society, knowledge-based activities were primarily organized as services. Service activities were considered to be less standardized, difficult to plan, and interaction intensive. Consumer demand is irregular. Services cannot necessarily be produced and kept in stock. Therefore, the service provider must build up surplus capacities in order to meet unforeseen demands. In addition, services are frequently non-material; they often necessitate the presence or even the participation of the customer. Thus, the proportion of employees in the service sector can serve as a general indicator of an increase in knowledge-based work. In the OECD, this proportion varies between 34% (Turkey, 1999) and 74% (USA, 1999). But this is only a very rough estimate; service activities in general cannot be equated with knowledge-based activities. On one hand, employees working in traditional industries

are increasingly confronted with complex, frequently changing tasks. On the other hand, the field of service activities is extraordinarily heterogeneous.

Thus, further distinctions are necessary. Elfring (1988), for example, defines four different types of services:

- Producer services (business and professional services, financial services, insurance services, and real estate services),
- Distributive services (retail trade, wholesale trade, transport services, and communications),
- Personal services (hotels, bars and restaurants, recreational and cultural services, and domestic services), and
- Social services (civil and military governmental services, health services, and educational services).

In a recent survey by the OECD (2000, 2001a), these four sectors are analyzed in closer detail, showing that on average more than one fifth of the workforce is employed in distributive and social services. Production services and personal services account for approximately one seventh and one tenth of all employees, respectively (see Table 1). The weighted proportion of these four service sectors varies systematically between Scandinavian, Anglo-Saxon, Continental European, and Mediterranean countries—a typology that was constructed on the basis of Esping-Andersen's well-known "worlds of welfare capitalism" (1990). The proportion of production services is lowest in

TABLE 1
Share and Development of Service Activities in Selected Groups of OECD Countries
(in % of Total Employment, 1998)

	Producer services	Distributive services	Personal services	Social services	Services (total)
Scandinavian countries (Sweden, Denmark, Norway, Finland)	11.5% (0.6)	20.2% (1.2)	6.2% (0.5)	31.7% (2.0)	69.6% (2.9)
Continental European countries (Austria, Belgium, France, Germany, Netherlands, Luxembourg, Switzerland)	11.8% (1.3)	20.3% (0.9)	7.6% (0.9)	26.4% (2.3)	66.1% (3.4)
Mediterranean countries (Greece, Italy, Spain, Portugal)	8.6% (1.2)	21.6% (1.5)	9.7% (1.7)	19.9% (2.2)	59.7% (3.5)
Anglo-Saxon countries (Australia, Canada, Ireland, USA, New Zealand, UK)	15.6% (0.7)	21.3% (0.9)	11.6% (1.0)	24.6% (1.1)	73.0% (1.7)
Total (<i>n</i> = 21)	13.6% (2.7)	21.1% (1.1)	10.2% (2.2)	24.6% (2.9)	69.4% (5.4)

The percentages in the table are averages weighted with the number of civil employees. The figures in parentheses are the standard deviations. On the basis of the *F*-test, the differences between the four country groups are significant at the 0.001 level.

Source: OECD (2000). *Employment Outlook 2000*, p. 122.

South European countries and highest in Anglo-Saxon countries, an indication that these activities gain importance in the course of economic modernization processes. In Scandinavian and Continental European countries, personal services have a lower impact, while state-financed social services are found to be more important. On one hand, this demonstrates that knowledge-based activities gain importance with rising per-capita income. On the other hand, the relative weight of personal and social services reflects the considerable impact of public activities on the internal structure of the service sector.

Another indicator for knowledge-based service activities is the skill level of the workforce. The expansion of the education system and higher skill levels of employees are important indicators of the change towards a knowledge society. Abstract intellectual capabilities, adaptability, and the mastery of modern information and communication technologies are acquired to a considerable extent in academic contexts. While more than two fifths of the employees in the goods-producing sector are low skilled, only one quarter of the employees in the service sector are low skilled. One quarter of those employed in the service sector have a university diploma (OECD, 2000, p. 96). These employees are distributed extremely unevenly among the four sectors defined by Elfring (1988). While distribution and personal services are characterized by a large proportion of low-skilled employees, with minimal academic qualifications, more than one third of the employees in the social and production services have completed academic training. However, there are also indications of nationally different skill structures (Table 2): the proportion of low-skilled employees in the Mediterranean and Continental European countries in all service sectors is much higher than in the Scandinavian and Anglo-Saxon countries.

However, without further specifications, this proportion cannot be interpreted as an indicator of a stronger reliance on knowledge-based forms of work organization. For one thing, a secondary or tertiary diploma corresponds to quite different competences in the respective countries (OECD, 2001b). For another, knowledge-based work cannot be reduced to the single criterion of a higher level of education. Abilities that employees acquire primarily in their working environments are becoming increasingly important. The ability to negotiate, the ability to communicate and cooperate, the ability to deal with complex problems and tumultuous situations, and, last but not least, technical capabilities and knowledge are primarily acquired in the context of application.

To summarize this first section, the higher qualification level in social and production services indicates that knowledge-based forms of work and organization can be expected predominately in these sectors. The employment share of these two service sectors is around 40% in the Scandinavian, Continental, and Anglo-Saxon countries and roughly 28% in South Europe. It is not realistic to expect more specific information on the type and form of knowledge-

based patterns of work and organization from official statistics on the sectoral structure and the socioprofessional composition of the workforce. Therefore, in the following sections we will analyze two international surveys in order to obtain a more thorough picture of the characteristics of knowledge-based activities.

Working Conditions in the Knowledge Society

More precise information on the specific characteristics of knowledge-based patterns of work requires detailed information about the specific working conditions of the employees. Cross-national comparisons of organizations are the traditional way to obtain this information (Maurice, Sellier, & Silvestre, 1986). These case studies presuppose considerable financial means, intercultural competences, and detailed knowledge of the extremely heterogeneous service sector—although even then it is almost impossible to formulate statements that can be generalized. Surveys based on standardized questionnaires can be an alternative to case studies of organizations. These surveys, however, can only register employees' subjective perceptions. Despite the same answers, there may be fundamental differences in the employees' working situations. Regardless of these limitations, we use one of the first surveys, which analyzed the working conditions of employees throughout Europe, the "European Survey on Working Conditions" (ESWC). This survey was carried out for the third time by the "European Foundation for the Improvement of Working and Living Conditions" (Dublin) in 2000. In this survey, approximately 21,500 employees in the 15 member states of the EU were questioned (approximately 1,500 in each country and 500 in Luxembourg). Among other questions, the employees were asked to classify their jobs according to perceived job autonomy, different forms of organizational coordination, and perceived forms of involvement and participation. Despite the methodical limitations of such a survey, the answers to these questions can be interpreted as reflections of different organizational and social environments.

We will concentrate on three different topics here: 1) job autonomy and responsibility of the respondents; 2) different forms of organizational coordination; and 3) patterns of employee involvement (the answers of various socio-professional groups to these questions is shown in Table 3). The first questions in Table 3 inquire about the degree to which employees are able to decide on their methods, speed, and production goals, as well as to what extent they are confronted with complex, autonomous, and new situations. The level of job autonomy and the need to learn new things is surprisingly high at all hierarchical levels. While production planning, personnel decisions, and working times are normally considered to be management prerogatives, more than half of the employees without hierarchical responsibilities (service and sales workers, craft workers, machine operators and assemblers, elementary occupations)

TABLE 2

Skill Composition of Service Employment (15 OECD Countries, 1998)

		Scandinavian countries (Sweden, Denmark, Finland, Norway)	Continental European countries (Austria, Belgium, France, Switzerland)	Mediterranean countries (Greece, Italy, Portugal, Spain)	Anglo-Saxon countries (USA, Canada, New Zealand)	15 OECD countries
Ratio of low-skill to medium/ high-skill (1998)	Goods-producing sector	39.8% (8.1)	57.0% (11.4)	295.6% (172.7)	23.0% (7.0)	77.7% (126.3)
	Service sector	21.8% (4.5)	37.0% (8.0)	93.9% (49.6)	13.6% (2.9)	31.8% (37.0)
	Producer services	16.1% (6.2)	26.0% (7.4)	40.7% (29.3)	6.5% (2.3)	15.9% (18.7)
	Distributive services	37.9% (8.6)	47.2% (11.1)	153.9% (46.5)	17.5% (7.4)	47.3% (55.2)
	Personal services	36.6% (11.7)	68.0% (13.5)	244.2% (122.7)	34.5% (2.8)	77.1% (94.8)
	Social services	13.2% (2.3)	28.9% (7.7)	46.2% (37.4)	6.4% (1.3)	17.1% (22.5)
Ratio of university to non- university workers (1998)	Goods-producing sector	7.2% (4.4)	11.1% (4.5)	4.6% (1.7)	19.6% (3.9)	15.1% (7.2)
	Service sector	23.1% (15.8)	31.8% (11.9)	22.5% (8.2)	41.4% (4.5)	35.8% (10.9)
	Producer services	36.0% (26.6)	50.9% (18.7)	41.2% (17.8)	67.0% (8.6)	58.6% (17.9)
	Distributive services	7.7% (6.8)	13.0% (7.1)	5.9% (2.4)	19.8% (3.5)	15.8% (7.1)
	Personal services	9.8% (6.5)	10.5% (3.7)	5.1% (1.6)	14.0% (1.2)	11.7% (4.1)
	Social services	36.5% (26.2)	48.9% (18.5)	38.4% (13.7)	73.5% (7.2)	63.3% (19.1)

The percentages in the table are averages weighted with the number of civil employees. The figures in parentheses are the standard deviations.

Source: OECD (2000). *Employment Outlook 2000*, p. 96.

mention that they are confronted with unforeseen problems, which can influence their speed or rate of work, their methods of work and the order of their tasks (see indicators in upper third of Table 3). Not surprisingly, these values are considerably higher for technicians, professionals, and managers.

Secondly, the ESWC survey analyzes the relative impact of different forms of organizational coordination. For plant and machine operators and assembly-workers, *technical control* is still very high; their pace of work is

determined by the automatic speed of a machine or the movement of a product. *Hierarchical control* by superiors, coordination through organizational cooperation structures, and definition of production targets are important factors in determining the pace of work. The large part played by these technical, hierarchical, *bureaucratic and program-based forms of control* shows that firms still rely to a considerable extent on the definition of organizational routines and on the structural programming of activities. However, the forms by which organizations shape the activities of

TABLE 3

The Working Conditions of Different Groups of Employees in the 15 EU Countries (2000)

	Legislators, senior officials, and managers	Professionals	Technicians and associate professionals	Clerks	Service workers and shop and market sales workers	Craft and related trades workers	Plant and machine operators and assemblers	Elementary occupations	Armed forces	Skilled agricultural and fishery workers	Total
Responsibility production planning	63%	34%	28%	16%	19%	30%	16%	10%	58%	34%	27%
Responsibility staffing	68%	25%	23%	15%	16%	19%	10%	6%	36%	33%	22%
Responsibility working times and shifts	65%	27%	25%	14%	19%	21%	11%	11%	45%	24%	24%
Able to change order of tasks	87%	80%	77%	67%	60%	59%	41%	53%	77%	63%	66%
Able to change methods of work	87%	86%	80%	67%	63%	65%	45%	56%	77%	64%	69%
Able to change speed or rate of work	85%	79%	77%	70%	62%	67%	51%	59%	81%	68%	69%
Job involves assessing the quality of their own work*	83%	83%	80%	68%	66%	81%	67%	62%	76%	69%	74%
Job involves complex tasks*	61%	74%	68%	56%	39%	64%	42%	27%	45%	60%	54%
Job involves learning new things*	72%	91%	85%	75%	63%	71%	57%	42%	57%	85%	71%
Job involves solving unforeseen problems*	93%	91%	91%	81%	78%	82%	71%	63%	83%	88%	82%

TABLE 3 (continued)

	Legislators, senior officials, and managers	Professionals	Technicians and associate professionals	Clerks	Service workers and shop and market sales workers	Craft and related trades workers	Plant and machine operators and assemblers	Elementary occupations	Armed forces	Skilled agricultural and fishery workers	Total
Influence on working hours	77%	53%	53%	42%	40%	39%	26%	32%	74%	36%	46%
Own decision on breaks	49%	60%	83%	49%	65%	65%	55%	81%	54%	64%	60%
Pace of work dependent on numerical production targets*	32%	22%	23%	23%	19%	45%	49%	25%	48%	23%	29%
Pace of work dependent on automatic speed of a machine or movement of a product*	13%	6%	11%	14%	11%	30%	46%	24%	27%	9%	18%
Pace of work dependent on work done by colleagues*	37%	37%	43%	44%	42%	51%	53%	41%	24%	52%	43%
Pace of work dependent on direct control by boss*	12%	18%	21%	37%	28%	39%	42%	40%	15%	49%	30%
Job involves meeting precise quality standards	67%	65%	69%	62%	60%	85%	76%	59%	63%	58%	67%

TABLE 3 (continued)

	Legislators, senior officials, and managers	Professionals	Technicians and associate professionals	Clerks	Service workers and shop and market sales workers	Craft and related trades workers	Plant and machine operators and assemblers	Elementary occupations	Armed forces	Skilled agricultural and fishery workers	Total
Able to discuss organization of work when changes take place*	73%	83%	82%	78%	69%	69%	68%	57%	51%	73%	72%
Exchanges of views take place with colleagues*	60%	82%	79%	76%	67%	68%	71%	55%	44%	76%	70%
Exchanges of views take place with superiors*	46%	75%	76%	74%	65%	61%	65%	55%	22%	70%	65%
Exchanges of views take place with staff representatives	31%	42%	39%	37%	28%	31%	42%	29%	11%	43%	34%
Exchanges of views lead to improvements at own personal workplace*	59%	64%	66%	62%	58%	57%	56%	46%	43%	57%	59%
Exchanges of views lead to improvements in office or factory	51%	54%	56%	56%	39%	42%	44%	32%	18%	46%	46%
Exchanges of views lead to improvements in the organization as a whole	57%	54%	54%	48%	44%	45%	44%	35%	32%	45%	47%
Exchanges of views on a regular basis	40%	47%	47%	42%	37%	34%	37%	30%	25%	45%	39%
Exchanges of views take place on a formal basis	36%	43%	43%	36%	31%	30%	35%	28%	18%	49%	35%

Sources: Calculations on the basis of the "European Survey on Working Conditions" (2000) conducted by the European Foundation for the Improvement of Working and Living Conditions (Dublin). The percentages in the table refer to the proportion of the positive answers in relation to all interviewees. No answer is therefore interpreted as negative answer. The data is not weighted by nationality. Since approximately 1,500 employees were interviewed in each EU country (with the exception of the 500 interviewees in Luxembourg), the results of smaller countries are over-represented.

their employees change. Apart from hierarchies, technological forms of control, and production programs and targets, cooperation between colleagues and work teams plays an outstanding role. Over 40% of the interviewees report that their speed of work is dependent on the activity of their colleagues. Higher employee responsibility does not mean that organizations loosen organizational controls. However, their form changes: organizational rules and targets are enforced less by superiors and technical forms of control; the expectations of colleagues and customers become increasingly important.

Thirdly, different questions were asked in the ESWC about the perceived possibilities of participation (see third part of Table 3). Three quarters of all employees are able to discuss organizational changes with their superiors and colleagues. The actual involvement of employees in internal decision-making is approximately twice as high as their formal and systematic inclusion. Discussions about organizational matters have a real impact on organizational structures: A large proportion of the respondents state that

exchanges of views lead to improvements at their own personal workplace (59%), in their office or factory (46%), or even in the organization as a whole (47%).

These dichotomous variables can be calculated for different socioprofessional groups (see Table 4). It turns out that the roles of managers, professionals, the self-employed, and technicians are characterized in particular by more complex tasks and a high degree of job autonomy. These groups are responsible for production processes and methods. They find themselves confronted with complex problems, and cannot forgo continuous learning. However, the importance of problem solving and learning for other occupational groups also demonstrates that knowledge-based forms of work are not limited to managers, the self-employed, and professionals. Other employees without hierarchical responsibility are—according to the answers reported in Table 3—also confronted to a considerable extent with complex tasks. The shift to a knowledge society means that the organizational patterns and attitudes that were traditionally associated with managers, professionals, and the self-employed are now becoming generalized.

TABLE 4
The Three-Dimensional Structure of Working Conditions (15 EU Countries, 2000)
The Rotated Component Matrix of a Factor Analysis

	Factor 1 (Knowledge-based patterns of work)	Factor 2 (Rule orientation)	Factor 3 (Participation)	Communality
Job involves solving unforeseen problems	0.70			0.50
Job involves learning new things	0.68			0.50
Job involves complex tasks	0.68			0.47
Job involves assessing the quality of their own work	0.65			0.43
Pace of work dependent on automatic speed of a machine or movement of a product		0.71		0.51
Pace of work dependent on numerical production targets		0.68		0.49
Pace of work dependent on direct control by boss		0.60		0.39
Pace of work dependent on work done by colleagues		0.59		0.38
Able to discuss organization of work when changes take place			0.86	0.77
Exchanges of views take place with colleagues			0.86	0.75
Exchanges of views take place with superiors			0.84	0.72
Exchanges of views lead to improvements at own personal workplace			0.77	0.61

Method of extraction: Principal component analysis

Method of rotation: Varimax

Thus, complementary to a high degree of job autonomy, skilled employees are informed of and are able to participate in organizational affairs. The tasks of skilled and factory workers, however, are predominantly coordinated by hierarchical, bureaucratic, and technical control structures. The coordination and control of all types of activities is, to a large extent, also based on direct contacts with customers and other external actors. Seventy percent of all employees report that their work rhythm depends directly on customer requests. In the service sector these external contacts are much more important than in industry. This indicates that market demands—along with technical, hierarchical, and horizontal forms of coordination—are being used more and more to control organizational processes. This provides a base for increased responsibility and autonomy of employees, and thus also for knowledge-based patterns of organization.

These results are hardly surprising and serve as strong support for the validity of the chosen indicators. Therefore, they can be used to compare the organizational environments in different countries and economic sectors. For this purpose, twelve of the variables in Table 3 (those marked by an asterisk *) were the subject of a factor analysis that explains the 64% variance between the twelve initial selected variables. Three factors with a value of more than 1 emerged, each of which showed a particularly high correlation with one group of four variables (see Table 4 where only correlation coefficients with a value above 0.3 were listed). These correlations between the factors and the variables suggest an interpretation of the three factors as indicators for knowledge-based patterns of work (Factor 1), for hierarchical and bureaucratic regulations (Factor 2), and for participative forms of organization (Factor 3).

The value of these three factors can be calculated for each of the interviewees. The median value of these artificial variables is 0 and the standard deviation is 1. When the average values of these variables are calculated for the 15 EU countries, distinct differences emerge (see Table 5).

Knowledge-based patterns of work are more strongly developed in Denmark, Finland, the Netherlands, and Sweden. The lowest values in this dimension are registered in Luxembourg, Ireland, Portugal, and Greece. Given the comparatively high skill level of German craft workers (Schettkat & Freeman, 2000), the average value of knowledge-based work forms in Germany seems surprisingly low. However, the strength of vocational training in Germany is more the mastery of established knowledge domains than cooperation across vocational borders, and the innovation of established work routines (Kern & Sabel, 1994). Also, the comparatively low impact of new forms of organization in Germany supports the observation that the weight of knowledge-based work forms in Germany is actually not outstandingly high (OECD, 1999, p. 188).

The most strongly regulated work forms in Europe can be found in Ireland and Great Britain—a result that reflects

TABLE 5
Working Conditions in Europe (2000)
Factor Scores for 15 European Countries

	Factor 1 (Knowledge-based patterns of work)	Factor 2 (Rule orientation)	Factor 3 (Partici- pation)
Denmark	0.39	-0.31	0.35
Finland	0.26	0.08	0.29
Netherlands	0.25	-0.31	0.38
Sweden	0.22	-0.14	0.20
Austria	0.12	-0.14	-0.08
France	0.10	0.08	-0.11
Great Britain	0.01	0.30	0.11
Belgium	-0.01	0.01	0.07
Germany	-0.05	-0.10	0.01
Spain	-0.09	0.10	-0.33
Italy	-0.10	-0.03	-0.12
Luxembourg	-0.23	0.10	0.13
Ireland	-0.25	0.24	0.11
Portugal	-0.37	0.06	-0.63
Greece	-0.39	0.13	-0.29
<i>Total EU 15</i>	0.00	0.00	0.00

Source: Factor scores calculated on the basis of the "European Survey on Working Conditions" (2000) by the European Foundation for the Improvement of Working and Living Conditions.

the considerable impact of low trust relationships and employment relations "at arm's length" observed by Lane (1989, 1994) and other authors in the United Kingdom. The lowest impact of technical and hierarchical regulations, on the other hand, can be found in Denmark and the Netherlands.

The European countries also differ according to the involvement of employees. This is particularly highly developed in the Scandinavian countries, but only very weak in the Mediterranean countries.

Besides these national differences, there is also sectoral differentiation (Table 6). The hierarchically bureaucratic mode of regulation can be found most in the mining and manufacturing industries. The participation and involvement of employees is strongly developed in the goods-producing industry, in the social and public services, and in publicly owned firms. Knowledge-based forms of work organization are the most developed in production and social services. This corresponds to the higher skill level of these sectors. The impact of complex, unforeseen, and new tasks is clearly lower in the personal and distributive services.

TABLE 6

**Knowledge-Based Forms of Work Organization in the European Service Sector
(15 EU Countries, 2000; Factor Scores)**

	Producer services	Distributive services	Social services	Personal services	All service activities
Scandinavian countries	0.38	0.13	0.36	-0.10	0.28
Continental European countries	0.27	-0.10	0.11	-0.26	0.03
Great Britain and Ireland	-0.05	-0.39	0.07	-0.59	-0.16
Mediterranean countries	0.25	-0.28	-0.22	-0.67	-0.25
<i>15 EU-member states</i>	0.23	-0.16	0.10	-0.46	-0.02

Source: Own calculations on the basis of the "European Survey on Working Conditions" (2000) conducted by the European Foundation for the Improvement of Working and Living Conditions.

Within this general framework, there are clear and highly significant differences between the individual countries (see Table 6):

- While the score of knowledge-based forms of organization is negative in the British and Irish *producer services*, it is clearly positive in all other groups of countries.
- *Distributive services* in the Scandinavian countries are clearly characterized by knowledge-based forms of work organization, while the corresponding score in the other countries is clearly negative.
- In the Scandinavian and Continental European countries, the impact of knowledge-based forms of work organization in *social and personal services* is clearly higher than in the Anglo-Saxon and Mediterranean countries.

This points to the existence of different patterns of organization in the service sector. The Scandinavian countries in particular are apparently more successful than the other countries in developing new, more strongly knowledge-based forms of work in the service sector (OECD, 1999, p. 188).

Thus, higher responsibilities, job autonomy, and more demanding tasks are concentrated among the self-employed, skilled professionals, and managers. However, to a surprisingly large extent, simpler service and production tasks can also involve complex problems and challenges. Rank-and-file workers and employees are often responsible for the results, organization, and speed of their activities. Complementary to this increased self-direction of employees, organizational patterns of coordination (technical, hierarchical, and bureaucratic forms of control) are still important. The stronger organizational inclusion and self-direction of

employees is the result of closer contact with customers, clearly defined objectives, and comprehensive information regarding organizational changes. Customer contacts, target management, and participative forms of management prove to be important conditions for knowledge-based forms of work.

However, work is not organized in the same way in all sectors and countries. In general, it seems that the competences, ability to learn, and commitment of employees is more thoroughly exploited in Scandinavia than in the United Kingdom, Ireland, and Mediterranean countries. This reflects different organizational choices and different degrees of employee involvement in dealing with greater uncertainties.

Working Attitudes in the Knowledge Society

With the transformation of hierarchical and bureaucratic forms of work, instrumental orientations or stable professional norms (expectations that do not change even if they are frustrated) are transformed into an attitude that is characterized by a willingness to learn. The traditional values of duty and obedience, and instrumental working attitudes towards the job are shifting towards other, more intrinsic attitudes. The relationship between firms and employees can no longer be reduced to the exchange of wages and labour. Money is no longer sufficient motivation for the employees. Broader use of the capabilities, commitment, initiative, and cooperativeness of employees in the framework of knowledge-based forms of organization goes hand-in-hand with the change in working attitudes. New organizational forms of work and new attitudes towards work are evolving together. Employees are willing to commit themselves more readily because the changes in working

attitudes reflect a general individualization of patterns of life—and also because it may open the way to new jobs and prospects of promotion. The individualization of life is not limited to the family, the educational system, and leisure time; it can also be observed in the professional sphere (Baethge, 1991; Voß & Pongratz, 1998; Sennett, 1998). We therefore expect a close connection between the previously described knowledge-based forms of work and new working attitudes. In particular, highly skilled employees with more demanding jobs are expected to demonstrate attitudes that are compatible with the patterns of work described earlier.

This hypothesis can partially be tested on the basis of the “International Social Survey Programme.” In 1997, working attitudes were analyzed in the context of this annual survey, which was conducted in 25 countries with approximately 35,000 respondents. We concentrate on the 18 OECD countries that took part in this survey, in which eight questions were asked concerning the subjective evaluation of different aspects of the work situation. The corresponding variables were included in a factor analysis, in order to determine the underlying dimensions. Three factors are determined that together account for 61% of the variance of the eight initial variables. The rotated factor matrix and the communalities are displayed in Table 7.

The correlation coefficients in Table 7 give rise to the following interpretation of the three factors:

- The first factor is particularly highly correlated with the first three variables. It refers to the importance of a stable, well-paid job with prospects of promotion.
- The second factor refers to the social usefulness of the job.
- The third factor, which is correlated particularly highly with the last three variables, focuses on the intrinsic gratification of the job. Employees with a particularly high score in this dimension attach high importance to an interesting, independent, responsible job with sufficient autonomy to make independent decisions on working hours.

These three factors point to different aspects of work: we can distinguish interests focused on the instrumental aspects of the employment relation, on the societal dimension, and on the job content.

As in the previous analysis, the values of the three factors can be calculated for each respondent. A positive value means that the corresponding expectation is higher than the average, while a negative value refers to below-average importance of the respective dimension. If the average values of these factor scores are calculated for different groups of the population (see Table 8), the enormous

TABLE 7
Remunerative Interests, Social Usefulness, and Work Content
A Factor Analysis of Working Attitudes (18 OECD Countries, 1997)

Rotated component matrix	Factor 1 (Remuneration)	Factor 2 (Social usefulness)	Factor 3 (Content-related interests)	Communality
Importance: High income	0.78	-0.05	0.07	0.61
Importance: Good advancement	0.70	0.06	0.30	0.59
Importance: Job security	0.70	0.22	-0.11	0.55
Importance: Useful to society	0.10	0.88	0.11	0.80
Importance: To help other people	0.07	0.88	0.18	0.81
Importance: Work independently	0.06	0.14	0.77	0.61
Importance: Decide their times of work	-0.03	0.03	0.65	0.43
Importance: Interesting job	0.22	0.16	0.65	0.49

Source: Results of a factor analysis on the basis of the “International Social Survey Programme”, No. of respondents = 22,971, ZA no. 3090 (central archive for sociological surveys in Germany). Countries: East and West Germany, United Kingdom, United States of America, Hungary, Italy, Netherlands, Norway, Sweden, Czech Republic, Poland, New Zealand, Canada, Japan, Spain, France, Portugal, Denmark, Switzerland. Further information can be obtained at www.gesis.org.

importance of higher education is immediately evident. In all countries of the OECD (with the exception of Japan), interest in an independent activity increases with the level of education (see the role of education as the crucial factor of sociocultural modernization, in Meyer, Boli, Thomas, & Ramirez, 1997). Intrinsic motivation increases with rising skill level (Factor 3). Simultaneously, interest in income, advancement, and job security declines (Factor 1). The influence of skill level is considerably stronger than national differences.

In addition, Table 8 shows that the importance of independent, autonomous, and interesting jobs is relatively high for employees in private firms, for managers, for the self-employed, and for other employees. Interest in job content is relatively small for low-skilled employees, those providing for family members, the unemployed, pensioners, housewives, the permanently disabled, and those in public administration as well as in non-profit-making organizations.

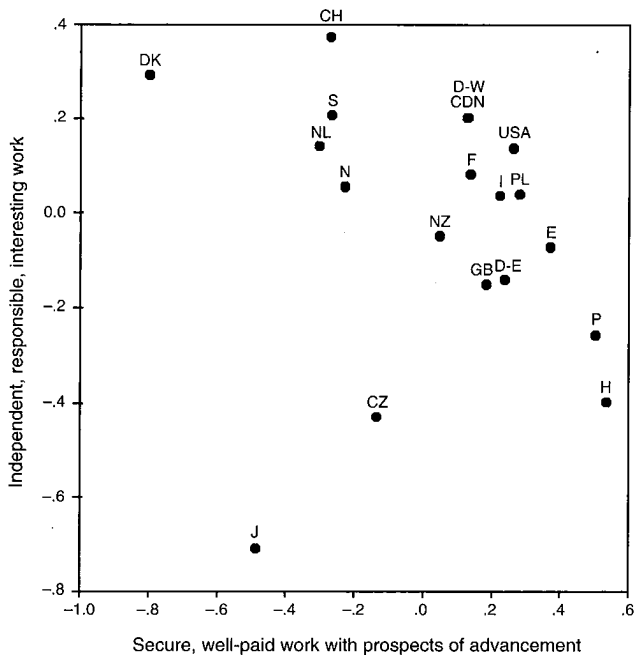
TABLE 8
Working Attitudes of Different Social Groups in 18 OECD Countries
(1997, Unweighted Factor Scores)

Dimension	Category	No. of respondents	Secure, well-paid work with prospects of advancement (Factor 1)	Social usefulness (Factor 2)	Independent, responsible, interesting work (Factor 3)
Education II: categories	Primary completed	5,394	0.09	0.13	-0.23
	Incomplete secondary	4,258	0.22	0.01	-0.17
	Secondary completed	6,281	-0.07	-0.03	0.09
	Incomplete university	2,424	-0.01	-0.04	0.11
	University completed	2,947	-0.23	-0.08	0.32
	Government	3,672	0.02	0.16	-0.07
Working for private—public sector	Public-owned firm/Cooperative/Non-profit organization	1,409	-0.13	0.05	-0.13
	Private firm	8,101	-0.03	-0.15	0.04
	Self employed	1,974	-0.15	-0.09	0.24
Employment status II	Employed full time, main job	10,869	0.03	-0.08	0.08
	Employed part time, main job	2,205	-0.33	0.07	0.19
	Employed less than part time	531	-0.09	0.00	0.06
	Helping family member	170	-0.17	-0.19	-0.15
	Unemployed	1,124	0.21	0.01	-0.07
	Student, school, vocational training	1,235	0.05	-0.06	0.14
	Retired	3,392	0.07	0.16	-0.28
	Housewife	2,076	-0.01	0.10	-0.10
	Permanently disabled	726	0.05	0.15	-0.29
Supervisor?	Yes	4,870	-0.06	-0.14	0.20

Source: Own calculations on the basis of the International Social Survey program, ZA No. 3090. Countries: East and West Germany (D-E and D-W), United Kingdom, United States of America, Hungary, Italy, Netherlands, Norway, Sweden, Czech Republic, Poland, New Zealand, Canada, Japan, Spain, France, Portugal, Denmark, and Switzerland. Further information can be obtained at www.gesis.org.

FIGURE 1

International Comparison of Work Orientations
(18 OECD Member States, 1997)



Source: Calculated on the basis of the International Social Survey Programme ($N = 25,457$; ZA No. 3090). Countries: East and West Germany (D-E and D-W), United Kingdom (GB), United States of America (USA), Hungary (H), Italy (I), Netherlands (NL), Norway (N), Sweden (S), Czech Republic (CZ), Poland (PL), New Zealand (NZ), Canada (CDN), Japan (J), Spain (E), France (F), Portugal (P), Denmark (DK), Switzerland (CH). Further information available at www.gesis.org.

These factor scores can also be calculated for the 18 OECD countries analyzed here (Figure 1). It turns out that an independent, interesting, and autonomous job is especially important for the interviewees from Switzerland, Denmark, Norway, Sweden, the Netherlands, the USA, and West Germany. A stable, well-paid job with prospects of promotion is less important in the first five countries named above. These countries are highly developed service societies, which are characterized by a comparatively high level of social security and a rather individualistic work culture (Hofstede, 1993). On the other hand, in Central Europe's post-socialist countries (the Czech Republic, Hungary, and East Germany), in Japan, and in some South European countries an interesting, autonomous job is less important than decent remuneration. These countries are still characterized by a lower impact of individualistic and intrinsic working attitudes. Respondents from a third, rather heterogeneous group (Canada, the USA, West Germany) combine intrinsic and extrinsic motives.

The job-related interests of employees cannot be understood as a direct reflection of their work situation.

This can be demonstrated on the basis of additional questions that address not only the *importance* of specific aspects of the job, but also the perceived *real work situation* of the employees. In this respect, an interesting discrepancy emerges. On one hand, the importance of a well-paid job is relatively low for the best-paid employees, while those employees who earn the least are the ones who are the most interested in a well-paid job. On the other hand, the desire for an interesting job is mainly expressed by employees with an interesting, demanding, and responsible job. Also, the desire for good prospects for promotion is often accompanied by better prospects for advancement. Desires and perceived reality are therefore closely connected in the intrinsic dimension, while they are separated in the extrinsic dimension. This indicates that good remuneration is regarded as a basic, while not necessarily explicitly formulated, prerequisite for a responsible, self-directed attitude towards work.

Thus, a more individualistic and intrinsic working attitude can be observed in nearly all advanced industrial societies—particularly in the USA, Canada, Switzerland, the Netherlands, and the Scandinavian countries. The transformation of industrial mass production, the impact of new organizational forms, and the rising educational level of the employees favour not only patterns of work based on the competences and problem-solving capabilities of the employees, but also demands for an autonomous, responsible, interesting job. This can be interpreted as an elective affinity between “new” forms of work and the “new” attitudes of self-determination and self-realization. The transformation of organizational patterns of work is recursively linked to different, more intrinsic working attitudes.

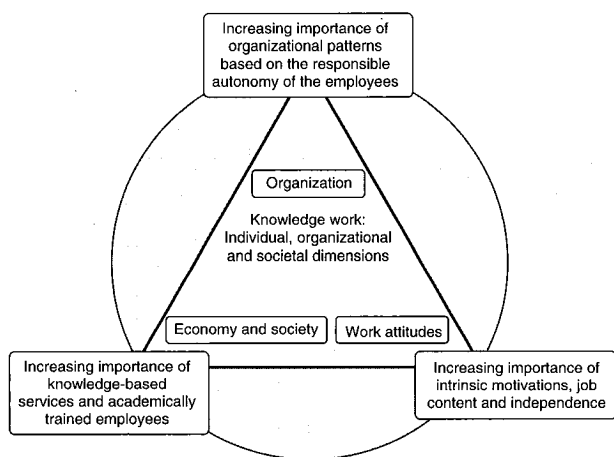
Conclusion

The trend toward more strongly knowledge-based forms of work and organization has been described on the societal, the organizational, and the individual level (see Figure 2). At the societal level, the share of production and social services rises and, with it, so does the share of sophisticated, communicative activities, which are frequently performed by qualified employees. Approximately 40% of the workforce in Scandinavian, Continental European, and Anglo-Saxon countries is employed in these sectors of the economy.

At the organizational level, new forms of work and increasing responsibility and autonomy are accompanied by a shift from extrinsic to intrinsic working attitudes. This does not apply merely to the self-employed, managers, and professionals, but also to employees without executive tasks in production and administration who are, to a large extent, responsible for the type, speed, and organization of their activities. In a cross-national perspective, participative and knowledge-based forms of work and organization are especially important in Scandinavian countries.

FIGURE 2

Individual, Organizational, and Societal Dimensions of Knowledge-Based Forms of Work



Knowledge-based forms of organizational work are accompanied by different employee attitudes. In particular, highly qualified employees in the private sector are not motivated merely by good remuneration, stable employment, and prospects for advancement. Interesting work, job autonomy, and learning possibilities are becoming increasingly important. In particular, high-skilled employees are ready to accept the demands and obligations of greater autonomy, more responsibility, and the increased uncertainties associated with knowledge-based forms of work. This is true not only for Scandinavian countries, but also for Switzerland and the Netherlands.

Empirical findings show that the knowledge society—like the industrial society—is not characterized by uniform, homogeneous patterns of work and management (cf. the concept of “varieties of capitalism” proposed by Streeck, 1991; Hollingsworth & Boyer, 1997; Hall & Soskice, 2001). Knowledge-based forms of work may be organized differently from country to country. These differences can be explained partly by the different weight of service activities that are characterized by highly skilled employees and responsible forms of organization. But even within the same service subsector, we have described different patterns of organization and working attitudes on the basis of two different international surveys. This points to the existence of nationally different patterns of organization and motivation ■

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