

Is the Knowledge Society Gendered?

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The article comprehensively reviews the theoretical and empirical work on gender and the knowledge society and introduces the articles of the special issue. Three ways in which the knowledge society and economy are gendered are distinguished: the gendering of human capital; the gendering of networks and the gendering of the definitions of the knowledge society. Using data from the Labour Force Survey, an original analysis of the gendering of the UK knowledge economy is presented. It finds that the choice of definition of the knowledge economy makes a difference to its gender composition: the more centred on technology and fixed capital, the more masculine, the more centred on human capital, the more gender balanced. The knowledge economy provides better work and conditions. Gender gaps are narrower in the knowledge economy than the overall economy: occupational hierarchies are narrowed to women's advantage, while differences in work temporalities are narrowed to men's advantage.

Keywords: knowledge economy, knowledge society, gender, human capital, social capital, employment

Introduction

Is the knowledge society gendered? The development of the knowledge society has the potential to change the nature of gender relations, with implications for work and organization. The knowledge society and economy draw on increases in human and social capital. If human capital and social capital are gendered, then this has the potential to change the gendered nature of the workplace, with implications for work and organization.

There has been much celebration of the knowledge economy as the next stage of economic development (Castells, 1996), from early accounts of the coming of post-industrial society (Bell, 1973) and the second industrial divide

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(Piore and Sabel, 1984) that requires flexibility in working practices (Handy, 1994) and delivers human capital-rich work (Reich, 1993) with horizontal networks and personal autonomy replacing vertical hierarchies (Leadbeater, 2000, 2008). Some writers extend this celebratory approach to gender relations: Castells (1997) looks forward to the end of patriarchy, with women's employment leading to the transformation of family life.

Numerous governmental reports have asserted the simultaneous potential benefits of more women in science and technology for both gender equality and the economy in the UK (Blackwell and Glover, 2008), the European Union (EU) (European Commission, 2005) and internationally (UNESCO, 2007). UK governmental reports from the 1960s onwards including the Dainton Report in 1968, the Finniston Report in 1980, the White Paper, *Realising Our Potential*, in 1993, *Excellence and Opportunity* in 2000, *Maximising Returns to Science, Engineering and Technology Careers*, and the Department of Trade and Industry Greenfield Report in 2002 promoted this synergy (Blackwell and Glover, 2008). In parallel, the EU's Lisbon Agenda seeks to develop the European economy into the leading knowledge economy in the world (Kok, 2004; European Commission, 2005) and simultaneously to narrow gender gaps in employment and pay; these agendas overlapping in the European Employment Strategy (European Commission, 2005) and in policies for gender equality (Pascual *et al.*, 2001; Rees, 1998; Walby, 2004, 2005, 2009).

However, there are also hesitations, caveats and critiques. Castells (1998) is careful to note that not all are likely to participate and that there will be areas without the skills and connections to benefit. Boltanski and Chiapello (2005) show that autonomy can be recuperated to a fierce work ethic to the benefit of modern capitalism. Quah (2003) notes that the sale of easily multiplied products made by a few can increase the gaps in rewards between the top and the bottom. There has long been ambivalence as to the implications of science and technology for women and pessimism about the implications of deeply embedded gender inequality in its practices, cultures and institutions (Adam, 1998, 2005; Etzkowitz *et al.*, 1994; Haraway, 1997; Wajcman, 1991, 2004). Reviews of the evidence on the emerging knowledge economy do not suggest a clear increase in gender equality and suggest that governmental interventions have made little impact (Mósesdóttir *et al.*, 2006; Stanworth, 2000; Walby *et al.*, 2007).

In this context, how should the implications of the emerging knowledge society and economy for gender relations and gender equality be analysed? This article over-viewing the possible answers to this question has four sections. Firstly, is the increase in human capital that underpins much of the knowledge economy gendered? Secondly, are the networks through which the knowledge economy is increasingly organized gendered? Thirdly, what are the implications of the different definitions of the knowledge economy for gender relations? Fourthly, what are the gendered contours of the knowledge economy?

Firstly, in a knowledge economy and society, human capital has an increased importance in production and many social activities. Since women are increasingly more successful than men in gaining school-based and university-based education and qualifications they might be expected to do well in the knowledge economy and society. But many doubt that this has happened. Is this due to women gaining the wrong sort of qualifications or cultural stereotypes, inappropriate governmental regulation or for other reasons? These issues are addressed in the articles in this issue by Mósesdóttir and Caprile and Pascual.

Secondly, in a knowledge economy and society there is a shift in organizational form away from domestic relations, markets and hierarchies towards networks. Since women are often seen as more likely than men to possess the social skills that make for successful networking, this change in organizational form might be expected to be advantageous to women. But has this occurred? Do the informal practices in networks instead facilitate various forms of informal social closure against women? These issues are addressed in articles in this issue by Banks and Milestone and by Durbin.

Thirdly, what are the different definitions of the knowledge society and economy and what are their implications for the understanding of gender relations here? Does a more technological focus produce a more masculinist picture than one that includes a wider range? How explicit and formal must knowledge be in order to be counted as such? Boundary issues in the definition and construction of knowledge are addressed by Nishikawa in this issue.

Fourthly, the article provides an empirical overview of conditions of work in the gendered knowledge economy, using data from the UK in 2005 from the Labour Force Survey, comparing the implications of different definitions of the knowledge economy. This addresses gendered inequalities in occupational hierarchies and the gendered variations in the quality of work conceptualized as spatialities, contractualities and temporalities, and multiple engagements with space, different forms of contracts, and different ways of organizing working time. Distinctive spatialities include working at or from home, especially with the use of information and communication technologies (ICT) such as computers and telephones. Contractualities include distancing from the employer in practices such as self-employment and temporary rather than permanent contracts. Temporalities include part-time working, special working hours' arrangements, overtime and shift working (Aneesh, 2006; Gottfried, 2003; Gottschall and Kroos, 2007; Holtgrewe, 2007; Huws *et al.*, 1999; Sassen, 2000; Walby, 2009; Walby *et al.*, 2007).

The articles in this special issue of *Gender, Work & Organization* on the knowledge society address these issues in original and innovative ways. In this introductory overview article, the contours of the various debates are mapped out.

Is human capital gendered?

The early understanding of capital was developed in relation to fixed capital: capital institutionalized in machines, buildings and technologies. However, it is possible to identify three additional major forms of capital that are becoming more important in the information age: finance capital (Soros, 2008), human capital (Becker, 1964) and social capital (Bourdieu and Wacquant, 1992; Putnam, 2000).

There is an increasing separation between fixed or industrial capital and finance capital. Finance capital is not made up of fixed objects but circulates in a virtual form as money, credit, debt, mortgages, shares, including stock options and securitized debt obligations (Strange, 1986; Tavakoli, 2003). Its increased prominence is dependent upon the development of electronic information, communication and computing technologies that increase the speed of transactions and facilitate specific forms of risk and speculative assessments, as well as a specific politico-regulatory environment that allows (or did allow, until 2009) new financial instruments to operate and be deployed at a distance from other forms of capital (Stiglitz, 2006; Krugman, 2008).

Knowledge can be understood as a form of capital, as human and social capital, when capital is understood broadly as a set of resources and a social relationship that is stabilized and institutionalized. One advantage of using the concept of capital is that it embeds the concept of social relations at the centre of discussions of economic forms. The knowledge economy and society is distinctive in the increased use of knowledge as a factor of production (Castells, 1996) and in the reflexive constitution of social relations and institutions (Beck, 2002; Beck *et al.*, 1994).

The concept of human capital is intended to capture the resources brought by workers to their jobs. It is composed of the skills, qualifications and experience owned by individuals and embedded in their person, which can be sold on the labour market. Human capital can be acquired through education in schools, universities and adult education courses and also through training on the job (Becker, 1964). How human capital is gendered is the main focus of this section.

In the 'old' economy the most important form of capital was that of fixed capital, though there has always been some small presence of the other three forms. In the 'new' economy there is an increase in the significance of human capital, finance capital and social capital, as well as changes in the form of fixed capital. The discussion of the knowledge society and economy is most usually focused on human and social capital; however, all these four forms of capital, their gendering and their relationship with other social relations are interrelated.

The knowledge economy and society privilege those with greater amounts of human capital. In both qualifications and social skills women appear to be

advantaged. Young women have not only closed the gender gap in enrolments and exam passes at school and university but have overtaken young men in most countries of the global North, although among older people, gender gaps in education remain. Women more often than men have highly developed and effective social skills. This might mean that women would do well in the knowledge economy. However, this does not appear to be happening (Mósesdóttir *et al.*, 2006). There are several potential explanations for this, including gaps in education policy, specialized rather than general human capital, motherhood, occupational segregation, gender stereotypes and the devaluation of women's human capital.

Are there still significant gendered educational gaps resulting in gender gaps in human capital? Although gender gaps among young people do not favour men there are still gender gaps that favour men among older people. Educational policy in the UK that is supposed to increase educational levels among older people through a strategy of life-long learning is not as focused on older people, as might have been expected. Instead it benefits most those aged 16–19, thereby doing little to address gender inequalities among older people (Appleby and Bathmaker, 2006).

While women do well in acquiring the general forms of human capital that can be acquired in formal education, they do less well in acquiring the specific technical skills that appear most relevant to science, engineering and technology (SET). They may achieve high levels of general human capital, but not necessarily the specific types of human capital needed for high technology jobs (Tam, 1997; Tomaskovic-Devey and Skaggs, 2002). The gender segregation in education and training can feed through to segregation in employment. The debates here are not so much over the fact of segregation but, more importantly, over the reasons for the lesser value placed on women's skills and areas of work and the reasons for the segregation of women in areas other than SET. Why are the skills and qualifications that women possess treated as being of so little value in the knowledge economy? Why do women acquire the wrong sort of skills for the knowledge economy?

The traditional explanation for the absence of women from higher levels of jobs and pay is that motherhood precludes the equal development of women's human capital (Budig and England, 2001). Blackwell and Glover (2008) find that women in science-based employment have both low rates of motherhood and very low retention rates, suggesting that women leave such occupations when they have children and have lower rates of return than in other sectors of the economy. This implies that SET occupations are worse than others in providing the environment needed to combine paid work and care work.

One explanation for the relative absence of women in higher positions is that the value of their human capital is underestimated as a result of the cultural devaluation of women's skills (Kilbourne *et al.*, 1994), which is often considered to be a general process. This type of explanation focuses on

culture and gendered stereotypes. In this approach, educational and occupational sex segregation is said to be due to gendered culture, ideas and stereotypes while technology is seen to be masculine.

These gendered ideas, stereotypes and discourses about women's capabilities that limit women in SET can be held by women (their choice, their fault), employers or male colleagues, or by all of these groups (Erwin and Mauratto, 1998; Frenkel, 2008; Knights and Kerfoot, 2004; Phipps, 2007). In many cases the focus of the analysis is largely on the stereotypes of SET work held by girls and women. This approach has long been important in UK programmes that seek to increase the proportion of women in science and engineering, offering as a remedy a revisioning of science and engineering as gender neutral and the provision of additional routes of access to education and training (Henwood, 1996). In other cases the approach to cultural stereotypes focuses instead on the beliefs held by dominant groups, thereby avoiding the tendency to blame the victim. One way in which this process operates is by the naturalizing of skills found in women's work, treating them as if they are always available to women as a consequence of their human nature, so they do not need a financial or status reward. This approach is found in a wide variety of works in the literature, as discussed by Adkins (1995, 1999) and Adkins and Lury, (1999).

In some studies it is suggested that women, bosses and co-workers share these cultural stereotypes. Ruiz Ben (2007) considers the continuing gender gap in software development and Germany's information technology (IT) sector more broadly, finding that women are a very small proportion of workers in the technical side of the software industry. Although she is interested in the use of the concept of profession and its relationship to power, her reported empirical findings concern the definition of expertise: the ideas held by men and women about technology and customer service. The women defined themselves as using social rather than technical skills, and this corresponds with the expectations of the personnel managers. Thus, the article focuses on the ideational world, on the role of stereotypes. In a similar way Peterson (2007) focuses on the way stereotyped images of gendered qualities are used to justify the exclusion of women from IT consultancy.

While some studies appear to show men and women agreeing on gendered valuations of science and technology, others find diverse multiple co-existing gendered discourses that indicate a less than perfect mapping of practice and ideology. This is perhaps made most visible when jobs are restructured and there are potentially new opportunities for new gender configurations. An example of this is the development of new hybrid positions in information systems that need not only high level technical skills but also social skills to engage appropriately with the user and customer (Woodfield 2002; Moore *et al.*, 2008). Woodfield (2002) investigates whether this was an opportunity in which women who have both technical and social skills could do better than men who only have technical skills and much

poorer social skills. The outcome, however, was not one in which women did better. This was despite the official rhetoric celebrating the opportunities the new hybrid positions offered to women while simultaneously meeting an industry need. Rather, two alternative discourses became dominant. In one women's social skills were treated as naturally available to women and thus not important enough to be rewarded, while in the other, men's social skills to 'close the deal' and to shine with wizardry were fêted. Woodfield draws the conclusion that the general devaluation of women's skills in society is the main cause of the disappointing outcome for these female hybrid workers. However, while Woodfield's description of this situation is fascinating, her explanation is unpersuasive. The curious absence at the heart of this work is any analysis of power. In the context of multiple existing discourses, who had what power to make some discourses, rather than others, hegemonic? This requires an investigation of the resources available to different groups to produce hegemony.

While the perception that science and technology are culturally masculine clearly exists in some locations, it is a leap too far to conclude this is a major cause of the gender composition of this field. This is because the gendered culture of science and technology might be a consequence rather than a cause of its gendered composition, a mere correlation, or they might be mutually determining. Critical discourse analysts, such as Fairclough (1992), caution against simple cultural determinism, suggesting that the relationship between discourse and the social environment requires investigation. Hegemonic discourses are the outcome of struggles in which a variety of resources are deployed by contesting groups (Gramsci, 1971).

In some accounts the contestation between competing discourses is made more visible. Henwood (2000) finds that young women did just as well as if not better than young men in educational courses in technology in terms of their exam results but did not report to the interviewer the same level of confidence in their abilities as did the young men, describing themselves as less competent despite their exam achievements. Henwood (1996) draws attention to studies (such as Devine, 1992) that show prejudice, negative attitudes, discrimination and active hostility towards women from the 'male culture of the workplace' in science and engineering.

To conclude: human capital is gendered in various ways. Although women are increasingly gaining educational qualifications this has not had the significant impact on their position in employment that might have been expected. This is partly because education and training are themselves gendered, so that women are slightly less likely than men to acquire the specialized human capital that is needed for jobs in science and technology. A further aspect of this is the devaluation of women's human capital as a consequence of the uneven distribution of gendered power that allows masculinist discourse to become hegemonic despite multiple competing discourses on gender and human capital.

Are networks gendered?

The development of the knowledge society and economy is linked with the development of networked forms of the organization of work. There are four main forms of work organization: domestic, markets, hierarchies and networks. The increase in the network forms of organization is linked with the increased significance of social capital as compared with human capital: 'who you know, not only what you know'. These changes have complex and contested implications for gender relations.

The most traditional form of work organization is the domestic form; not all work organization is modern. Knowledge work still depends on the performance of care work (Perrons, 2007). Further, there are remnants or reinventions of domestic relations in some contexts, such as the use of couples as the employment unit in some aspects of the hospitality trade (Adkins, 1995, 1999). With modernity, the major form of work organization is that of markets. However, alongside markets there exist also hierarchies and networks. The very existence of the firm implies the existence of practices to organize work other than markets (Coase, 1937; Williamson, 1975). Networks are the form of work organization most often associated with knowledge work (Leadbeater, 2008).

While there is often a presumption that there is an ongoing change from hierarchies to networks, the changes in the organization of highly educated labour are not entirely one way. In some universities there has been an increase in commodification and marketization, on the one hand, and an increase in bureaucratization (linked to an increase in audit) on the other (Fletcher *et al.*, 2007). There appear to be contrary trends in the industrialization of the academy and the collegialization of industrial research, suggesting a partial or asymmetrical convergence. While traditional hierarchical management practices are entering the academy, collegiality and networking are increasingly found among some workers in some high technology firms (Kleinman and Vallas, 2001).

The most important new form of organization in the knowledge economy is that of networks (Castells, 1996). Networks are linked to informal, flexible working practices that enable nimble responses to rapidly changing economic opportunities (Powell, 1991). The concept of network is linked to that of social capital; indeed, access to networks is the key resource that constitutes social capital (Portes, 1998).

Networks have been seen as producing more egalitarian forms of working relations than markets or hierarchies (Leadbeater, 2008). Much of the enthusiasm for the knowledge economy is built around its potential for a better quality of working life. But are network forms of work organization more egalitarian than other forms; do they deliver a better quality of working life (Gill, 2002; Walby *et al.*, 2007)? There are strong divides in the literature as to

the implications of networked organizational forms for equality in general and gender equality in particular.

A key contrast is between hierarchical and networked forms of organization. Are formal hierarchies worse than networks for gender equality? The answer to this question depends on whether the hierarchies are governed by principles that support or reduce gender equality. Traditionally it has been the former (Walby, 1986; Witz, 1992). However, the bureaucratic nature of hierarchical work organization has proved more open than networks to recent intervention by states and other polities such as the EU that seek to regulate inequalities in the workplace. The documentation and evaluation of work tasks and the regularization of recruitment and promotion means that equalities issues can be made visible and subject to controls (Walby, 1999). Fordism is vulnerable to feminism in so far as this has become embedded in trade unions and the polity.

Powell (1991) compares networks with markets and hierarchies. He suggests that networks have methods of conflict resolution that involve norms of reciprocity, as compared with haggling, court enforcement, administrative fiat and supervision. The tone or climate of networks is open-ended with mutual benefits, as compared with precision, suspicion, formal and bureaucratic structures. Leadbeater (2000, 2008) is a leading proponent of the advantages of networked organizational forms, in that they deliver creativity, sharing, egalitarian, independent and fulfilling working lives. He celebrates the development of horizontal connections between people in networks, rather than hierarchal relations. While noting that there are some inequalities due to variations in connectedness to the e-world, he counters this with the advantages to the global South of easier access to knowledge.

However, networks are not only about horizontal connections and sharing but concern resources and power. Varied access to networks that have power and uneven power resources available from different networks means that power is central to the operation and consequences of networks (Burt, 1992). Indeed, the concept of social capital is predicated upon networks collectively providing access to resources to those who are in the network and not to those who are not (Bourdieu and Wacquant, 1992; Putnam, 2000). Often, networks are made up of people of the same sex, the same ethnicity, the same religion and the same sexual orientation. Networks may be centred on occupational groups, professions, trade unions and professional associations, which use their resources to maintain and enhance their positions (Devine, 1992). Networks can thus act as forms of gendered social closure in a variety of ways. Male subcultures in employment can act as old boys' networks that create barriers to women in technical areas of work (Lindsay, 2008). Their exclusiveness can be maintained by informal practices and shared leisure activities, from golf to football to lap-dancing clubs, as financial services work in the City (of London) involves various shared post-work activities (McDowell, 1997). They can: provide privileged access to information about

job and promotion opportunities to members of strong or weak networks (Burt, 1992; Granovetter, 1973); create informal rules of preferment that contain criteria that benefit insiders, such as long hours and presenteeism that are hard for care-givers to meet (Rutherford, 2001); provide support and encouragement to insiders to help them over difficulties, but offer a hostile (Devine, 1992) or chilly climate (Blickenstaff, 2005) to others; as well as gang up on, bully, or harass outsiders (Stanko, 1988).

New organizational forms can be associated with new contractualities, new spatialities and new temporalities. There is a tendency to shift away from long-term employment by a single employer with standard hours of 9–5 on weekdays towards shorter contracts with more employers and unsocial hours. In this way, workers rather than employers tend to bear the risks associated with employment, such as the costs of sickness, unemployment and pensions. The work, while highly skilled, may be precarious. However, this varies significantly between different sections of the knowledge economy (Walby *et al.*, 2007).

New organizational forms offer different forms of gendering of working relations. While networks are often celebrated for increasing the likelihood of horizontal and collegial forms of working relations, their informality reduces the possibility of using conventional equal treatment laws and opens the door to informal social closure.

Are the definitions of the knowledge society and economy gendered?

The definitions of the knowledge society and knowledge economy vary in what they encompass, with significant gender implications. The knowledge society is a more encompassing term than the knowledge economy, for example including education and governance. The definition of the knowledge economy varies in the extent to which 'knowledge' is centred on the technical or broadened to include a wider range of forms of science or structured knowledge, with implications for the picture of the gender composition of the knowledge economy.

In a knowledge society a wide range of social institutions have been restructured or inflected by new forms of knowledge, from education to governance. Institutions may be more reflexive, drawing on expertise (Beck *et al.*, 1994). There may be new ways of doing politics as a result of new ways of circulating information by e-mail and the Internet and the development of epistemic communities (Haas, 1992; Leadbeater, 2008). There may be new forms of sociality from Facebook to virtual games, with consequences for identity (Agger, 2004). There are new forms of online consumption, from shopping to gaming to porn (Adam, 2005). Education is a social institution with key implications for the shape of social relations in the knowledge

economy (Appleby and Bathmaker, 2006; Brine, 2006), although not all are convinced that the development of the knowledge economy has been held back by insufficient development of human capital (Livingstone, 1999).

These changes have varied implications for gender equality. While there is greater inclusion of women in some areas, such as education, this is not uniform. There are forms of relative gendered digital exclusion in society, in the differential gendered use of the computer and Internet, e-mail, information searching and online services, buying goods and services online and interaction with public authorities. Women can be information-poor because of their income levels, socioeconomic situations and traditional cultures. New forms of Internet provision, such as pornography, may reproduce traditional gender imagery. The use of market mechanisms may exacerbate these gender divides. There are both increases and decreases in gender equality (Adam, 2005; Törenli, 2006).

Governmental institutions are important in regulating and shaping the knowledge society and economy, including its gendering. The EU has promoted both the development of the knowledge economy (European Commission, 2005) and the development gender equality (European Commission, 2007) and argued for a synergy between the two in the European Employment Strategy (EES) (European Commission, 2005). However, there has been a softening in the priority accorded to gender equality over the last decade. Gender mainstreaming was once one of 10 policy goals of the EES. However, the revised 2005 EES, following the Kok Report (2004), has increased the focus on growth and jobs at the expense of the reduction in the visibility of gender equality goals. As Mósesdóttir *et al.* (2006) have argued, the lack of equal participation of women in economic decision-making holds back the full integration of gender equality policies.

The choice of definition of the knowledge economy has important implications for its gendered image. There are a range of definitions in use, including SET, 'science, technology, engineering and mathematics', 'information', IT, ICT, 'new media' and 'cultural creatives'. Most recent empirical work provides accounts that are specific to particular small parts, industries or occupations including the new media (Gill, 2002), IT (Jansson *et al.*, 2007; Peterson, 2007), ICT (Crump *et al.*, 2007; Moore *et al.*, 2008), software development (Ruiz Ben, 2007) and information systems development (Woodfield, 2002). The choice of definition is gendered. Is call centre work knowledge work because it uses new ICTs or not, since most of the work is done by women and is routine (Durbin, 2007)? Is care work, often performed by women, knowledge work because it involves tacit knowledge or not, because little of the knowledge is made explicit (Lam, 2002; Nishikawa and Tanaka, 2007; Nonaka and Nishiguchi, 2001; Nonaka and Takeuchi, 1995)?

There are three main ways of drawing boundaries around the industries that make up knowledge work put forward by statisticians in the UN (2005), OECD, 2005) and EU (Eurostat, 2005a, 2005b). These define the knowledge

economy as one of three sets of relevant industries: high technology manufacturing, information or ICT and knowledge-intensive services (Shire, 2007). These vary crucially by whether or not technology is given the central place in the conceptualization of the knowledge economy. The first definition restricts the knowledge economy to high technology in manufacturing, the second focuses on the new technologies' associated information and crosses the conventional manufacturing/service divide and the third focuses on the human capital rather than fixed capital aspects of knowledge economy, in including service industries where the labour force is usually educated to university level (Shire, 2007; Walby *et al.*, 2007).

The choice of definition affects the picture of the gender composition of the knowledge economy. In the two categories centred on technology and fixed capital, women are a minority of the workers, in the category centred on human capital, the gender balance is nearly even, with women comprising a slight majority of the workers (Labour Force Survey, 2005a, 2005b; Shire, 2007; Walby, 2006).

The selection of definition has implications for both theory and for policy. If the knowledge economy is defined in relation to fixed or human capital, then the knowledge economy appears to be masculine. But if it is defined in relation to human capital, then it is gender-balanced. This has serious implications for policy. If the state promotes the development of the knowledge economy using a technologically centred definition it helps predominantly male workers but if a human capital-centred definition is used then it helps both male and female workers.

Is the knowledge economy better for women than the old economy?

Are women or men more likely to be found in the knowledge sector or the rest of the economy? Are the jobs in the knowledge economy of higher quality than the rest of the economy and are the gender gaps in the quality of working life narrower here? This section draws on an analysis of employment in the UK in 2005 using data from the Labour Force Survey, a large nationally representative sample survey (Walby, 2006). It compares the gender composition of the knowledge economy with the rest of the economy and investigates the effect of using three different definitions. It compares employment in the knowledge economy with the economy as a whole, assessing the quality of working life and its gendered constitution along a range of characteristics including occupational levels, spatialities, contractualities and temporalities.

There are three major definitions of the knowledge economy: high technology manufacturing, the information sector and knowledge-intensive services (Shire, 2007; Walby, 2006). High technology manufacturing includes:

Table 1: Gendered composition of the knowledge economy according to three definitions

	% of employment	% female
High technology manufacturing	1	32
Information sector	4	36
Knowledge intensive services	42	61
Manufacturing	—	26
Services	—	56
All economy	100	48

Source: Labour Force Survey 2005a.

office machinery, computers and other information-processing equipment; electronic communication equipment, including radio, television, telephone, sound or video recording or reproducing equipment; and scientific instruments, especially those for measuring, checking and testing (Eurostat, 2005a, 2005b). The information sector includes: publishing, printing and reproduction of recorded media; post and telecommunications; computer and related activities including software publishing, data processing and database activities; and television, video, news and library (UN, 2005). Knowledge-intensive services are service industries that have knowledge-intensive work practices, as indicated as the average level of education of the workforce in these industries. They include water transport, air transport, post and telecommunications, financial intermediation, insurance and pensions, auxiliary financial intermediation, real estate, renting equipment, computing, research and development, other business, education, health and social work and recreation, culture and sport (Eurostat, 2005a, 2005b).

When the most technologically focused definition, 'high technology manufacturing' is used the proportion of employment in the economy that is 'knowledge' is just 1% and the proportion of women is 32%, as shown in Table 1. When the category 'information', which straddles the traditional divide between manufacturing and services, is used, then the proportion of employment in the economy that is knowledge is just 4% and the proportion of women is 36%. When the definition that focuses most on human capital, 'knowledge-intensive services' is used, then 42% of total employment is in the knowledge sector and the proportion of women in it is 61%. The more the definition centres on fixed capital and technology, the smaller is the proportion of women working in it, while the more it is centred on human capital the larger is the proportion of women. The gender composition of the knowledge economy depends on the definition of the knowledge economy that is used.

The proportion of women is higher in the knowledge sectors than in the economy overall (48%). The proportion of women in high technology manufacturing (32%) is higher than in all manufacturing (26%). The proportion of women in the knowledge-intensive services is greater (61%) than in all service industries (56%).

Gendered occupational hierarchies

Occupational location is associated with social inequality and the quality of working life. Those in higher level occupations, such as managers, professionals and associate professionals (for example, nurses or teachers), are likely to earn more and have more social prestige and more influence than those in lower level occupations. This section investigates the extent to which the knowledge economy is associated with higher level occupations and the extent to which this association varies according to gender.

The definitions of the knowledge economy used so far have used classifications of industries. Within each industry and enterprise there is a range of occupations. There is a question as to whether occupations in the knowledge economy are on a higher level and are more skilled than those in the economy overall (as implied in the European Council Lisbon declaration 2000). If so the development of the knowledge economy would lead not only to more jobs but also to better jobs. On the other hand there may be no necessary relationship between changes in industrial and occupational structure.

The occupations in the knowledge economy are typically at a higher level than those in the economy as a whole, as shown in Table 2. A higher proportion of workers are to be found in the three top occupational groups of managers, professionals and associate professionals in the knowledge economy: high technology manufacturing 59%, information 69%, knowledge-intensive services 54%, compared with the economy as a whole (42%) or manufacturing (37%) or services (45%).

The gendering of the occupational hierarchy in the knowledge economy is different from its gendering in the economy as a whole, as shown in Table 3. In each of the knowledge economy sectors, high technology manufacturing, information and knowledge-intensive services, women are more likely to be in the three higher level occupational groupings than when working in the economy as a whole, as are men also.

A slightly different way of looking at the gendering of the occupational hierarchy is to compare the gender gaps in the composition of the higher level occupations between the knowledge sectors and the economy as a whole. Looking just at the gender composition of the top three occupations there is little difference between high technology manufacturing and manufacturing as a whole, while when comparing knowledge intensive services and services as a whole, women are in slightly higher occupations in knowledge-intensive services, as shown in Table 4.

Table 2: Occupations in the knowledge and other industrial sectors (percentage)

Major occupational group	High tech manufacturing	Information	Knowledge-intensive services	Manufacturing	Services	All
Managers	25	24	13	18	15	15
Professionals	17	23	22	9	14	13
Associate prof. & technical	17	22	19	10	16	14
Admin & secretarial	9	12	15	8	14	13
Skilled trades	10	7	3	21	5	11
Personal services	0.3	1	15	0.1	10	8
Sales	2	7	3	2	10	8
Machine operatives	15	1	2	23	5	8
Elementary	6	4	9	9	12	12
Total	100	100	100	100	100	100
Top 3 occupations	59	69	54	37	45	42

Associate prof, associated professionals. Source: Labour Force Survey 2005a.

Table 3: Distribution of genders in occupations in knowledge and other industrial sectors

Major occupational group	High-manufacturing		High-tech manufacturing		Information		Knowledge-intensive services		Knowledge-intensive services		Manufacturing		Manufacturing		Services		Services		All		All	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Managers	30	16	27	18	19	9	20	14	19	11	20	14	19	11	18	11	19	11	18	11	18	11
Professionals	23	4	30	11	29	18	10	5	17	12	10	5	17	12	14	11	17	12	14	11	14	11
Assoc prof. & technical	15	21	22	24	20	19	9	14	16	15	9	14	16	15	13	15	16	15	13	15	13	15
Admin & secretarial	2	22	4	27	5	21	2	26	6	21	2	26	6	21	4	22	6	21	4	22	4	22
Skilled trades	14	2	9	2	5	1	26	6	9	2	26	6	9	2	20	2	9	2	20	2	20	2
Personal services	1	4	1	2	5	21	.	.	4	15	.	.	4	15	2	14	4	15	2	14	2	14
Sales	1	4	4	12	3	3	1	5	7	12	1	5	7	12	5	12	7	12	5	12	5	12
Machine operatives	10	26	1	.	3	1	24	20	10	1	24	20	10	1	13	2	10	1	13	2	13	2
Elementary	6	6	3	4	11	9	9	10	13	11	9	10	13	11	12	11	13	11	12	11	12	11
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Top 3 occupational groups	68	41	79	53	68	46	39	33	52	38	39	33	52	38	45	37	52	38	45	37	45	37

Associate prof, associated professionals. Source: Labour Force Survey 2005a.

Table 4: Gender composition of occupations in knowledge and other industrial sectors (Percentage women)

Major occupational group	High-tech manufacturing	Information	Knowledge-intensive services	Manufacturing	Services	All
Managers	20	28	43	20	41	36
Professionals	7	18	50	16	48	44
Associate prof. & technical	40	39	60	36	54	51
Admin & secretarial	82	81	86	81	82	82
Skilled trades	7	12	23	7	18	8
Personal services	.	67	86	44	85	85
Sales	67	63	63	64	71	70
Machine operatives	56	6	18	23	10	14
Elementary	34	43	57	30	53	47
Associate prof, associated professionals. Source: Labour Force Survey.						

The implications are that more workers in the knowledge sectors of the economy are in the higher level occupations than in the economy as a whole; but the gender gap between men and women has only slightly narrowed — a little in the knowledge intensive services but has not in high technology manufacturing. The knowledge economy is good for the occupational level of both women and men but there is little difference in gender inequality between the knowledge sector and the whole economy.

Gendered spatialities, contractualities and temporalities

Occupational hierarchies are not the only source of variation in the quality and equality of working life.

The knowledge economy is associated with new spatialities in the organization of work (see Table 5). The information sector is the most associated with working at home. In each of the knowledge sectors (high-tech manufacturing, information, knowledge intensive services) those employed were slightly more likely to work at different places with home as a base in the economy as a whole. Working at home often involved using a phone and computer (men 80%, women 73%).

These spatialities are gendered but in non-traditional ways, in that men are much more likely than women to work at home or in different places with

Table 5: *Spatialities in knowledge work*

	Own home	Different places with home as a base	Not worked at home during reference week
High-tech manufacturing			
Men	2	9	89
Women	2	5	92
Information			
Men	21	6	72
Women	15	3	82
Knowledge-intensive services			
Men	4	11	84
Women	4	4	92
Whole economy			
Men	8	5	86
Women	8	2	90

Source: Labour Force Survey 2005a.

Table 6: Contractualities in knowledge work

	Self-employment	Temporary working
High-tech manufacturing	3	4
Men	4	4
Women	1	4
Information	13	5
Men	15	7
Women	8	4
Knowledge-intensive services	11	7
Men	17	7
Women	7	7
Whole economy	13	6
Men	18	5
Women	7	6

Source: Labour Force Survey 2005a.

their home as a base (see Table 5). It is not the case that gender patterns of caring have led to women disproportionately working from home; rather it is men who are more likely to work away from their employer, either at home or at different places using their home as a base.

Is the knowledge economy linked to new contractualities, such as self-employment and temporary employment? This is not the case in the UK, with only small exceptions. Self-employment is not more common in the knowledge economy than the economy as a whole, with the exception of software publishing and data processing (see Table 6). In the UK self-employment is a mixed category: for example, it more prevalent among men than women and is common in the construction industry. Temporary work is relatively uncommon in the UK and is not significantly gendered (men 5%, women 6%). The knowledge economy is not generally associated with greater temporary rather than permanent employment except in education (men 13%, women 12%).

The knowledge economy has been associated with new temporalities of working life, with a move away from standard to non-standard working hours (see Table 7). The temporalities of work take many forms; some new, some old, some constituting an increase in the quality of working life, others a decrease. Temporalities include special hours working arrangements, especially flexitime, but also annualized hours contracts, term-time working, job sharing, a 9-day fortnight or a 4.5 day week, a zero hours contract, part-time working, overtime, unsocial hours working including working in the evening or at night, working at the weekend and shift working. Working time

Table 7: Temporalities in knowledge work

	Special hours working	Part-time working	Overtime	Night working	Sunday working	Shift working
High-tech manufacturing	23	7	54	7	6	10
Men	24	2	60	8	6	9
Women	22	17	42	4	6	10
Information	19	17	45	9	13	8
Men	17	8	50	10	14	8
Women	21	33	38	6	11	7
Knowledge-intensive services	27	31	42	11	16	13
Men	20	13	45	12	17	12
Women	31	42	41	10	15	14
Whole economy	21	27	39	11	18	14
Men	16	12	42	14	19	16
Women	27	46	36	8	16	12
Manufacturing	17	9	49	11	11	19
Men	17	3	53	18	12	23
Women	18	26	36	5	6	8
Services	23	32	38	11	20	15
Men	18	15	41	15	23	17
Women	28	46	36	9	17	13

Source: Labour Force Survey 2005a.

practices in the knowledge economy are different from those in the overall economy in several important respects; these differences are gendered.

Special hours working arrangements are slightly more common in most of the knowledge economy (high technology manufacturing 23%, knowledge-intensive services 27%) than in the economy as a whole (21%). Women are more likely to use special working time arrangements than men in the economy as a whole (men 16%, women 27%) including manufacturing (men 17%, women 18%) and services (men 18%, women 28%) but the gender gap is different in the knowledge economy. In high technology manufacturing men are slightly more likely than women to use special working time arrangements (men 24%, women 22%), while women are more likely to use these in information (men 17%, women 21%) and knowledge-intensive services (men 20%, women 31%).

There is very slightly less part-time working in the knowledge economy than in the equivalent total sectors (high technology manufacturing 7%, manufacturing 9%; knowledge-intensive services 31%, services 32%). Part-time work remains gendered in that women are more likely to follow this practice than men but the gender gap is smaller in the knowledge economy than in the economy overall, primarily as a result of less part-time working by women in these sectors (high technology manufacturing; men 2%, women 17%; manufacturing; men 3%, women 26%; knowledge-intensive services: men 13%, women 42%, services; men 15%, women 46%).

Overtime working is more prevalent in each sector of the knowledge economy (high technology manufacturing 54%, information 45%, knowledge-intensive services 42%) than in the economy as a whole (39%). Men are more likely to work overtime than women in each sector of the economy, whether knowledge or not (high technology manufacturing men 60%, women 42%; manufacturing men 53%, women 36%; knowledge-intensive services: men 45%, women 41%; services overall: men 41%, women 36%).

Unsocial hours working (usually working nights, Sundays and shifts) is generally lower in the knowledge economy than in the overall economy. This is slightly the case for working nights: high technology manufacturing 7%, information 9%, knowledge-intensive services 11%, manufacturing 11%, services 11%, overall economy 11%). This is also the case for Sunday working: high technology manufacturing 6%, information 13%, knowledge-intensive services 16%, manufacturing 11%, services 20%, overall economy 18%. It is most clearly the case for shift working: high technology manufacturing 10%, information 8%, knowledge-intensive services 13%, manufacturing 19%, services 15%, overall economy 14%.

Men do more of this unsocial hours working than women. However, the gender gap in unsocial hours working has disappeared in the knowledge economy as compared with the economy overall (high technology manufacturing, men 9% women 10%; information, men 8% women 7%;

knowledge-intensive services men 12%, women 14%; manufacturing men 23% women 8%; services men 17%, women 13%; overall economy men 16% women 12%. Women's previous advantage in this unsocial hours working dimension in the quality of working life disappears in the knowledge economy.

Summary

Work is organized differently between the knowledge sector of the economy and the economy as a whole. The quality of work in the knowledge economy in the UK in 2005 is better than that in the economy as a whole. This applies whichever definition of the knowledge economy is used, whether high technology manufacturing, information or knowledge-intensive services. However, the choice of definition affects the gender composition of the knowledge economy: high technology and information are predominantly male areas of employment while knowledge-intensive services are slightly more female areas.

The occupations in the industrial sectors of the knowledge economy are at a higher level than those for the economy as a whole, in that a higher proportion of jobs fall into the top three occupational groups. This has been to the advantage not only of the women but also to the men in those positions. The gender gap in occupational hierarchy is very little narrower in the knowledge economy than in the economy as a whole.

Work practices in the knowledge economy tend to be different from those in the economy as a whole in respect to some aspects of spatialities, contractualities and temporalities. Working conditions in the knowledge economy tend to be better than in the economy as a whole, in relation to temporalities involving greater use of special hours working arrangements and a lesser use of unsocial hours working (nights, Sundays and shifts). The gender gaps in these temporalities has narrowed somewhat. However, since these gender gaps had previously been to women's advantage, this is not an improvement in the position of women relative to men.

Thus, the knowledge economy does provide better work and conditions for those working in it. Gender gaps are narrower in the knowledge economy than in the overall economy. When the focus is on occupational hierarchies, this narrowing of the gender gaps is to the advantage of women. When the focus is on work temporalities, the reduction in the gender gap has been to the advantage of men.

Articles in this special issue

The knowledge society and economy are gendered in varied and contested ways. The comparison of the knowledge economy with the overall economy in the UK shows that knowledge workers typically occupy a higher

occupational level than other workers and work more flexible and fewer unsocial hours. While women in the knowledge economy narrow the gender gap in their favour when the focus is on occupational level, it is men who narrow the gender gap in their favour when the focus is on flexible and unsocial hours.

There are three main issues in explaining this complex gendering of the knowledge economy, to which the articles in this special issue offer innovative contributions: human capital, networked organizational forms and definitions of knowledge work.

The development of human capital is of special importance to the knowledge economy. While women do well in education this has not proved sufficient to eliminate gender inequalities in the knowledge society. This gender inequality is linked to the different gendering of the specialized human capital used in the technical side of the knowledge economy, the devaluation of women's human capital, segregation, discriminatory practices and the absence of sufficient regulatory intervention. These issues are addressed further in the articles by Mósesdóttir and by Caprile and Pascual.

The development of networked organizational forms is a feature of key areas of the knowledge economy. However, the organizational form in the knowledge economy is not exclusively that of networks but involves also markets, hierarchies and remnants of domestic relations. This is investigated in the analysis of retraditionalization in the article by Banks and Milestone. While some have fêted networks for leading to flatter hierarchies, networks can also constitute forms of informal closure against women. This is explored in the article by Durbin.

The selection of the definition of the knowledge economy makes a difference to the gender composition and size of the sector. The more the definition is centred on technology and fixed capital, the more masculine the gender composition; the more it is centred on human capital, the more gender balanced the gender composition. The relationship between tacit and explicit knowledge is key to a different tradition in the conceptualization of knowledge, explored by Nishikawa's article.

Mósesdóttir in 'Gender (in)equalities in the knowledge society' asks why the advantage that young women have over young men in education does not lead to the reduction of gender inequalities in the economy. While these women have better overall educational qualifications than men, they are concentrated in the arts and humanities rather than in science and engineering, which are seen as more important for the knowledge economy. In addition, there are still gender inequalities in the division of care work, which has an impact on gender inequalities in employment. Mósesdóttir *et al.* (2006) ask why the EU's policy instruments have been so slow to address these issues, despite their privileging of the development of a knowledge economy and their recognition of the significance of women's labour for achieving this goal. She describes how the importance attached to gender equality in the EES

appears to have diminished over the last decade, with a failure to identify and challenge the problematic issues. Only if women actively participate in political decision-making will the contribution of women to the knowledge economy and to gender equality be adequately addressed. This would require a challenge to the market forces underlying gender inequality.

In 'The move towards the knowledge-based society: a gender approach', Caprile and Pascual examine whether there has been a decrease in gender inequality associated with the development of a knowledge economy. The knowledge-based society is treated as a new production paradigm, involving increasing use of new ICTs, together with new forms of knowledge, the tertiarization of the economy and new forms of work organization and regulation. The authors challenge the notion that the knowledge-based society is reducing gender inequality, although noting the narrowing of the gender gap in employment rates. They show that high-level engagement in the new technologies is less common among women than men and note the tenacity of gender stereotypes and segregation. They develop an analysis of key dimensions of gender inequality: gender gaps in employment rates, in pay and in childcare, and find that variations in education and institutional diversity are important in explaining the differences between countries. They conclude that there is no simple association between different dimensions of equality.

Banks and Milestone, in 'Individualization, gender and cultural work', critique the notion that work in the new economy is 'cool' and egalitarian, suggesting a much more ambiguous and multifaceted set of changes. They argue that processes of detraditionalization, such as suggested by Beck and Giddens, have been much overstated and that there are, even in the cultural work of the new economy, patterns of gender inequality that have much in common with traditional practices. These forms of retraditionalization include the use of couples led by a husband rather than individuals as the unit employed in some service industries, as noted by Adkins: individualization is not universal. In the new media sector, often considered to be at the forefront of new economy developments, they find that women are often expected to adopt traditional female roles of caring and support rather than to contribute to the technical and creative side.

Durbin, in 'creating knowledge through networks', discusses gender segregation in the formal and informal networks through which so much of the work at the managerial level in the knowledge economy is organized. Rejecting the simple assumptions that networks provide a route to equality for women and men, Durbin discusses the different ways in which homophily occurs. Women have skills in networking but these can have limited effects if they are predominantly confined to women-only networks. She shows the implications of this gender segregation not only for the position of women in the occupational hierarchy but also for the exclusion of women from the creation of the tacit knowledge that is essential for the effective working of a knowledge-based organization. The exclusion of women from the production

and exchange of tacit knowledge as a consequence of gender segregated networks can have significant implications for the effective working of an organization.

Nishikawa, in '(Re)defining care workers as knowledge workers', addresses some of the fundamental questions of the definition of knowledge itself and the significance of the interplay between its varied tacit and explicit facets. She explores the issues in an intricate analysis of a traditionally female area of work, that of care work. Are care workers, with their specific ways of exchanging and developing knowledge, tacit knowledge workers? Or should the designation of knowledge workers be retained exclusively for those engaged in the exchange and development of explicit knowledge? Nishikawa argues that care workers could become and, indeed this is an essential change if the quality of care is to be improved.

Together the articles address the themes of the contested definitions of knowledge and of gender, the constitution of human capital and the implications of different organizational forms such as networks to collectively constitute an original and innovative contribution to the field.

References

- Adam, Alison (1998) *Artificial Knowing: Gender and the Thinking Machine*. London: Routledge.
- Adam, Alison (2005) *Gender, Ethics and Information Technology*. Basingstoke: Palgrave Macmillan.
- Adkins, Lisa (1995) *Gendered Work: Sexuality, Family and the Labour Market*. Buckingham: Open University Press.
- Adkins, Lisa (1999) Community and economy: a retraditionalization of gender? *Theory, Culture and Society*, 16,1, 117–37.
- Adkins, Lisa and Lury, Celia (1999) The labour of identity: performing identities, performing economies. *Economy and Society*, 28,4, 598–614.
- Agger, Ben (2004) *The Virtual Self: A Contemporary Sociology*. Malden MA: Blackwell.
- Aneesh, A. (2006) *Virtual Migration: The Programming of Globalization*. Durham, NC: Duke University Press.
- Appleby, Yvon and Ann Marie Bathmaker (2006) The new skills agenda: Increased lifelong learning or new sites of inequality. *British Educational Research Journal*, 32,5, 703–17.
- Beck, Ulrich (2002) *Individualization: Institutionalized Individualisation and its Social and Political Consequences*. London: Sage.
- Beck, Ulrich, Giddens, Anthony and Lash, Scott (1994) *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Cambridge: Polity.
- Becker, Gary (1964) *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. Chicago, IL: Chicago University Press.
- Bell, Daniel (1973) *The Coming of Post-Industrial Society*. London: Penguin.
- Blackwell, Louisa and Glover, Judith (2008) Women's scientific employment and family formation: a longitudinal perspective. *Gender, Work & Organization*, 15,6, 579–99.

- Blickenstaff, Jacob (2005) Women and science careers: leaking pipeline or gender filter. *Gender and Education*, 17,4, 369–86.
- Boltanski, Luc and Chiapello, Eve (2005) *The New Spirit of Capitalism*. London: Verso.
- Bourdieu, Pierre and Wacquant, Loic (1992) *An Invitation to Reflexive Sociology*. Chicago, IL: Chicago University Press.
- Brine, Jacky (2006) Lifelong learning and the knowledge economy: those that know and those that do not: the discourse of the European Union. *British Educational Research Journal*, 32,5, 649–65.
- Budig, Michelle and England, Paula (2001) The wage penalty for motherhood. *American Sociological Review*, 66,2, 204–25.
- Burt, Ronald (1992) *Structural Holes: Social Structure of Competition*. Cambridge, MA: Harvard University Press.
- Castells, Manuel (1996) *The Information Age; Volume 1: The Rise of the Network Society*. Oxford: Blackwell.
- Castells, Manuel (1997) *The Information Age; Volume II: The Power of Identity*. Oxford: Blackwell.
- Castells, Manuel (1998) *The Information Age; Volume III: The End of Millennium*. Oxford: Blackwell.
- Coase, Ronald (1937) The nature of the firm. *Economica*, 4,16, 386–405.
- Crump, Barbara, Logan, Keri and McIlroy, Andrea (2007) Does gender still matter? A study of the views of women in the ICT industry in New Zealand. *Gender, Work & Organization*, 14,4, 349–70.
- Devine, Fiona (1992) Gender segregation in the engineering and science professions: a case of continuity and change. *Work, Employment & Society*, 6,4, 557–75.
- Durbin, Susan (2007) Who gets to be a knowledge worker? The case of UK call centres. In Sylvia Walby, Heidi Gottfried, Karin Gottschall and Mari Osawa (eds) *Gendering the Knowledge Economy: Comparative Perspectives*, pp. 228–47. London: Palgrave.
- Erwin, Lorna and Mauratto, Paula (1998) Beyond access: considering gender deficits in science education. *Gender & Education*, 10,1, 51–69.
- Etzkowitz, Henry, Kemelgor, Carol, Neuschatz, Michael, Uzzi, Brian and Alonzo, Joseph (1994) The paradox of critical mass for women in science. *Science*, 266,5182, 51–54.
- European Commission (2005) Communication to the Spring European Council: Working together for growth and jobs: integrated guidelines for growth and jobs (2005–2008). Available online at http://eur-lex.europa.eu/LexUriServ/site/en/com/2005/com2005_0024en01.pdf Accessed 21 September 2010.
- European Commission (2007) Equal opportunities and equal treatment for women and men in employment and occupation. Available online at http://europa.eu/legislation_summaries/employment_and_social_policy/equality_between_men_and_women/c10940_en.htm Accessed 21 September 2010.
- Eurostat (2005a) Technology and knowledge intensive sectors. Luxembourg: Eurostat.
- Eurostat (2005b) Eurostat science and technology statistics. Luxembourg: Eurostat.
- Fairclough, Norman (1992) *Discourse and Social Change*. Cambridge: Polity.
- Fletcher, Catherine, Boden, Rebecca, Kent, Julie and Tinson, Julie (2007) Performing women: the new gendered dimensions of the UK new research economy. *Gender, Work & Organization*, 14,5, 433–53.
- Frenkel, Michael (2008) Reprogramming femininity: the construction of gender identities in the Israeli hi-tech industry between global and local gender orders. *Gender, Work & Organization*, 15,4, 352–74.
- Gill, Rosalind (2002) Cool, creative and egalitarian? Exploring gender in project-based new media work in Europe. *Information, Communication & Society*, 5,1, 70–89.

- Gottfried, Heidi (2003) Temp(t)ing bodies: shaping gender at work in Japan. *Sociology*, 37,2, 257–76.
- Gottschall, Karin and Kroos, Daniela (2007) Self-employment in comparative perspective: general trends and the case of new media. In Walby, Sylvia, Gottfried, Heidi, Gottschall, Karin and Osawa, Mari (eds) *Gendering the Knowledge Economy*, pp. 163–87. London: Palgrave.
- Gramsci, Antonio (1971) *Selections from the Prison Notebooks of Antonio Gramsci*. London: Lawrence and Wishart.
- Granovetter, Mark (1973) The strength of weak ties. *American Journal of Sociology*, 78,6, 1360–80.
- Haas, Peter M. (1992) Introduction: epistemic communities and international policy coordination. *International Organization*, 46,1, 1–35.
- Handy, Charles (1994) *The Empty Raincoat*. London: Hutchinson.
- Haraway, Donna (1997) *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse: Feminism and Technoscience*. New York: Routledge.
- Henwood, Flis (1996) WISE choices? Understanding occupational decision-making in a climate of equal opportunities for women in science and technology. *Gender and Education*, 8,1, 119–214.
- Henwood, Flis (2000) From the woman question in technology to the technology question in feminism: rethinking gender equality in IT education. *European Journal of Women's Studies*, 7,2, 209–27.
- Holtgrewe, Ursula (2007) Restructuring gendered flexibility in organizations: a comparative analysis of call centres in Germany. In Walby, Sylvia, Gottfried, Heidi, Gottschall, Karin and Osawa, Mari (eds) *Gendering the Knowledge Economy*, pp. 248–70. London: Palgrave.
- Huws, Ursula, Jager, N. and O'Regan, S. (1999) *Teleworking and Globalisation*. Institute of Employment Studies Report 358. London: IES.
- Jansson, Maria, Mörtberg, Christina and Berg, Elisabeth (2007) Old dreams, new means: an exploration of visions and situated knowledge in information technology. *Gender, Work & Organization*, 14,4, 371–87.
- Kilbourne, Barbara Stanek, England, Paula, Farkas, George, Beron, Kurt and Weir, Dorothea (1994) Returns to skill, compensating differentials, and gender bias. *American Journal of Sociology*, 100,3, 689–719.
- Kleinman, Daniel and Vallas, Steven (2001) Science, capitalism, and the rise of the 'knowledge worker': the changing structure of knowledge production in the United States. *Theory & Society*, 30,4, 451–92.
- Knights, David and Kerfoot, Deborah (2004) Between representations and subjectivity: gender binaries and the politics of organizational transformation. *Gender, Work & Organization*, 11,4, 430–54.
- Kok, Wim (2004) Facing the challenge: the Lisbon Strategy for growth and employment. Report from the High Level Group chaired by Wim Kok. Brussels: European Commission.
- Krugman, Paul (2008) *The Return of Depression Economics and the Crisis of 2008*. London: Penguin.
- Labour Force Survey (2005a) Labour Force Survey. Colchester: ESRC Data Archive.
- Labour Force Survey (2005b) User Guide. Colchester: ESRC Data Archive.
- Lam, Alice (2002) Alternative societal models of learning and innovation in the knowledge economy. *International Social Science Journal*, 54,171, 67–82.
- Leadbeater, Charles (2000) *Living on Thin Air: The New Economy*. London: Penguin.
- Leadbeater, Charles (2008) *We-think: Mass Innovation not Mass Production: The Power of Mass Creativity*. London: Profile Books.

- Lindsay, Sally (2008) The care–tech link: an examination of gender, care and technical work in healthcare labour. *Gender, Work & Organization*, 15,4, 333–52.
- Livingstone, D.W. (1999) Lifelong learning and underemployment in the knowledge society: a North American perspective. *Comparative Education*, 35,2, 163–86.
- McDowell, Linda (1997) *Capital Culture: Gender at Work in the City*. Oxford: Wiley-Blackwell.
- Moore, Karenza, Griffiths, Marie, Richardson, Helen and Adam, Alison (2008) Gendered futures? Women, the ICT workplace and stories of the future. *Gender, Work & Organization*, 15,5, 523–42.
- Mósesdóttir, Lilja, Serrano, Amparo Pascual and Remery, Chantal (eds) (2006) *Moving Europe Towards the Knowledge-Based Society and Gender Equality*. Brussels: ETUI-REHS.
- Nishikawa, Makiko and Tanaka, Kazuko (2007) Are care workers knowledge workers? In Walby, Sylvia, Gottfried, Heidi, Gottschall Karin and Osawa Mari (eds) *Gendering the Knowledge Economy*, pp. 207–27. London: Palgrave.
- Nonaka, Ikujiro and Nishiguchi, Toshihiro (eds) (2001) *Knowledge Emergence*. New York: Oxford University.
- Nonaka, Ikujiro and Takeuchi, Hirotaka (1995) *The Knowledge-Creating Company*. Oxford: Oxford University.
- OECD (2005) Guide to measuring the information society. 8 November 2005. JT00193469. DSTI/ICCP/IIS(2005)6/FINAL. Paris: OECD.
- Pascual, Amparo Serrano and Behning, Ute (eds) (2001) Gender mainstreaming in the European Employment Strategy. Brussels: European Trade Union Institute.
- Perrons, Diane (2007) Living and working patterns in the new knowledge economy. In Sylvia Walby, Heidi Gottfried, Karin Gottschall and Mari Osawa (eds) *Gendering the Knowledge Economy*, pp. 188–206. London: Palgrave.
- Peterson, Helen (2007) Gendered work ideals in Swedish IT firms: valued and not valued workers. *Gender, Work & Organization*, 14,4, 333–49.
- Phipps, Alison (2007) Re-inscribing gender binaries: deconstructing the dominant discourse around women’s equality in science, engineering, and technology. *Sociological Review*, 55,4, 768–87.
- Piore Michael J. and Sabel, Charles F. (1984) *The Second Industrial Divide: Possibilities for Prosperity*. New York: Basic Books.
- Portes, Alejandro (1998) Social capital: its origins and applications in modern sociology. *Annual Review of Sociology*, 24, 1–24.
- Powell, Walter (1991) Neither market nor hierarchy: network forms of organization. In Staw, B.M. and Cummings, L.L. *Research in Organizational Behaviour*, Vol. 12, pp. 295–336. Greenwich CT: JAI Press.
- Putnam, Robert (2000) *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon and Schuster.
- Quah, Danny (2003) Digital goods and the new economy. LSE Economics Department. London.
- Rees, Teresa (1998) *Mainstreaming Equality in the European Union*. London: Routledge.
- Reich, Robert (1993) *The Work of Nations*. London: Simon and Schuster.
- Ruiz Ben, Esther (2007) Defining expertise in software development while doing gender. *Gender, Work & Organization*, 14,4, 312–32.
- Rutherford, Sarah (2001) Are you going home already? The long hours culture, women managers and patriarchal closure. *Time and Society*, 10,2–3, 259–76.
- Sassen, Saskia (2000) Spatialities and temporalities of the global: elements for a theorisation. *Public Culture*, 12,1, 215–32.

- Shire, Karen (2007) Gender and the conceptualization of the knowledge economy in comparison. In Sylvia Walby, Heidi Gottfried, Karin Gottschall and Mari Osawa (eds) *Gendering the Knowledge Economy*, pp. 51–77. London: Palgrave.
- Soros, George (2008) *The New Paradigm for Financial Markets*. London: Public Affairs.
- Stanko, Betsy (1988) Sexual harassment. In Sylvia Walby (ed.) *Gender Segregation at Work*, pp. 91–99. Milton Keynes: Open University Press.
- Stanworth, Celia (2000) Women and work in the information age. *Gender, Work & Organization*, 7,1, 20–32.
- Stiglitz, Joseph (2006) *Making Globalization Work*. London: Penguin.
- Strange, Susan (1986) *Casino Capitalism*. Oxford: Blackwell.
- Tam, Tony (1997) Sex segregation and occupational gender inequality in the United States: devaluation or specialized training? *American Journal of Sociology*, 102,6, 1652–92.
- Tavakoli, Janet (2003) *Collateralized Debt Obligations and Structured Finance*. Indianapolis, IN: John Wiley.
- Tomaskovic-Devey, Don and Skaggs, Sheryl (2002) Sex segregation, labor process organization, and gender earnings inequality, *American Journal of Sociology*, 108,1, 102–128.
- Törenli, Norcan (2006) The ‘other’ faces of digital exclusion: ICT gender divides in the broader community. *European Journal of Communication*, 21,4, 435–55.
- UN (2005) Information sector. Statistics Division. Available online at http://unstats.un.org/unsd/cr/registry/docs/i31_information.pdf Accessed 13 December 2005.
- UNESCO (2007) *Science, Technology and Gender: An International Report*. Paris: UNESCO.
- Wajcman, Judy (1991) *Feminism Confronts Technology*. Cambridge: Polity Press.
- Wajcman, Judy (2004) *Technofeminism*. Cambridge: Polity.
- Walby, Sylvia (1986) *Patriarchy at Work*. Cambridge: Polity.
- Walby, Sylvia (1999) The European Union and equal opportunities policies. *European Societies*, 1,1, 59–80.
- Walby, Sylvia (2004) The European Union and gender equality: Emergent varieties of gender regime. *Social Politics*, 11,1, 4–29.
- Walby, Sylvia (2005) Gender mainstreaming: productive tensions in theory and practice. *Social Politics*, 12,3, 1–25.
- Walby, Sylvia (2006) *The Gendered Knowledge Economy in the UK*. Lancaster University and Institute of Social Science, University of Tokyo.
- Walby, Sylvia (2009) *Globalization and Inequalities: Complexity and Contested Modernities*. London: Sage.
- Walby, Sylvia, Gottfried, Heidi, Gottschall, Karin and Osawa, Mari (eds) (2007) *Gendering The Knowledge Economy: Comparative Perspectives* London: Palgrave.
- Williamson, Oliver (1975) *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press.
- Witz, Anne (1992) *Professions and Patriarchy*. London: Routledge.
- Woodfield, Ruth (2002) Women and information systems development: not just a pretty (inter)face? *Information Technology & People*, 15,2, 119–38.