

UK Businesses and ICTs: Where is the Productivity Growth?

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Introduction

The future of the competitiveness of British businesses is subject to much debate, in policy as well as academic and business circles. Lagging productivity levels of UK firms compared to those of others are one source of concern: according to one source, British output per hour worked is still 15% lower than in the United States, 25% lower than in the Netherlands, 11% lower than in France and 8% lower than in Germany.¹ A recent Treasury publication shows that output per worker in the UK is 13% below the G7 as a whole.²

Secondly, there is the expansion of the global market place, facilitated by new technologies, improvements in digital and transport infrastructures and lower trade barriers. Gradually, more sectors of the British economy are exposed to foreign markets, which means that many UK companies today face competition from companies all over the world. Closing Britain's productivity gap, and strengthening its international competitiveness are central planks in New Labour's policy programme.

New technologies are important enablers of global economic change. At the same time, they are important to the internal workings of the firm, as they allow firms to work more effectively. Information and Communication Technologies (ICTs) can help businesses to streamline processes, trade online, share and store information and replace low-value and repetitive work with more diverse and higher value jobs. If used correctly, ICTs can help UK firms to cut costs and increase competitiveness.

This paper will consider the impact of new ICTs as a potential source of productivity growth. The first section of this paper will give a brief overview of the current debate on new technologies and productivity performance, the second will look at use of ICTs in UK workplaces and barriers that exist for optimal deployment. The last section will discuss whether key policy players see a role for government in stimulating sophisticated use of ICTs in UK workplaces and if so, what this role should involve.

1. An overview of the debate

A New Economy?

The dot.com boom in the early 1990s raised high expectations in the United States on what new technologies could do for business productivity levels. Productivity growth of 3% in the latter half of the 1990s, compared to a 1-1.5

¹ M. Porter & C. Ketels (2003), *UK Competitiveness – Moving to the Next Stage*, DTI.

² HM Treasury (2004), 'Productivity in the UK 5: Benchmarking UK Productivity Performance', October 2004.

% average in the twenty years before 1995, caused a widespread feeling that a new era of economic growth had arrived. Capital investments in new technologies took off, and new software and web-based companies mushroomed all over.

To some observers, ICTs were a critical factor in the arrival of a “New Economy”. To these optimistic analysts, the fundamental structure of the American economy had altered, as a result of various social and technological phenomena. These included the corporate restructurings of the 1980s and early 90s, the globalisation of markets, the waves of both high- and low-skill immigration throughout the 90s, and improvements in the ability of entrepreneurs to access capital. According to New Economy enthusiasts, ICTs were significant, not only in their ability to help large corporations work more effectively, but in the added competition which they injected from small businesses and overseas competitors, who could now compete on similar terms. Netscape, for instance, was a small business that competed aggressively with Microsoft, and forced a change of strategy upon the latter. As Michael Mandel, economics editor of *Business Week* put it, this was “the beginnings of a marketplace in which entrepreneurs with bright ideas [could] actually get enough money to challenge existing companies”.³

Most crucially, the Federal Reserve and its Chairman, Alan Greenspan, appeared to be believers in the New Economy. The acceleration in productivity – associated with heightened competition and digital technology – enabled the Fed to keep interest rates down, despite a rate of economic growth (and of unemployment) that would have been considered inflationary during the 1980s. By the late 90s, New Economy theorists argued that the Non Accelerating Inflation Rate of Unemployment (NAIRU) had dropped, i.e. the economy could now sustain higher levels of employment without the risk of inflation.

Table 1.1: Evidence of a New Economy in the 1990s

	Growth	Productivity growth	Unemployment	Inflation
1991-Aug '95	3%	1.7%	6.6%	3.3%
Aug '95-2000	4.3%	2.8%	4.8%	2.3%

Source: M. Mandel, *The Coming Internet Depression*, 2001

When the bubble burst the viability of the New Economy seemed suddenly less convincing. Sceptical, voices claiming that accelerating productivity growth in the late 1990s had been merely a function of the economic cycle, grew stronger. They said that the economic downturn starting in early 2001 would be the ultimate evidence that high productivity levels were not there to stay. Robert Gordon, economist at the Northwestern University, argued for example that the speeding up of productivity over the period 1995-2000 took place primarily in the IT and software industries, with some spillover to manufactured durable goods. Gordon stated that other sectors of the

³ M. Mandel (2001), *The Coming Internet Depression*

economy remained largely unaffected by the affects of new technologies, despite increased capital expenditure.⁴

But despite the economic downturn, there were still observers who kept on believing in the reality of the New Economy. Martin Baily and Robert Lawrence, researchers with the US National Bureau of Economic Research, argued that the acceleration of labour productivity growth in the US between 1995 and 2000 was non-cyclical and due to structural changes in the economy. Baily and Lawrence claimed that a large share of the increase in growth could be attributed to high investments in new technologies, and that companies who spent more on technology in the late 90s experienced higher levels of productivity growth than those who did not.⁵ Scholars as Baily and Lawrence thus argued that new technology underpinned higher levels of productivity growth. They expected that after a short period of economic recession – which could be considered cyclical – high productivity levels would pick up again.

UK Evidence

With regard to the British economy, evidence has been less hotly contested. Britain's productivity short-fall is a story that begins with the US over-taking it over a hundred years ago. The trend break in labour productivity growth, which took place in the United States in the late 1990s has not occurred in the UK and most other European countries, although annual growth in output per hour has risen from a 2.05% to 2.44% since 1997.⁶ The output-per-worker and output-per-hour gaps between the UK and the US, France and Germany is narrowing.⁷ But the role of ICT in facilitating this (quite meagre) productivity growth has not been debated to the extent that it has in the US.

Measuring the impact of new technologies on productivity levels in terms of investment is extremely complex. For example, the international nature of many companies' activities and the integration of global markets today make it difficult to track down technology investments in relation to individual companies' activities. Also measuring productivity in the service sector is difficult, as investments in intangible goods versus outputs are often unclear. Moreover, existing measures do not take into account the time between the introduction of new technologies and the moment that these translate into improved productivity performance. Technology investments are most often followed by a period of organisational change around the new technologies and their impact only becomes visible after a period of time.⁸ For instance, some observers have suggested that America's productivity gains in the 1990s were the consequence of public (principally, military) investment in technology from *several decades* earlier.

⁴ R. Gordon (2000), *Does the New Economy Measure Up to he Great Inventions of the Past?*, Journal of Economic Perspectives, vol. 4, no. 14, Fall 2000

⁵ M. Baily & R. Lawrence (2001), *Do we have a new e-economy?*, National Bureau of Economic Research.

⁶ HM Treasury (2004)

⁷ HM Treasury (2004)

⁸ D. Coyle & D. Quah (2002), *Getting the Measure of the New Economy*, iSociety/The Work Foundation.

Despite the lack of concrete evidence on ICT as a potential source for British productivity improvement, no one could possibly neglect the fact that new technologies have radically changed the way business is conducted in the UK. 85% of all UK firms are 'connected' in the sense of having their own website or making use of ED, while 25% of staff use email on a daily basis.⁹ The majority of British workers today say that technology is essential for the job they do. In the famous words of Robert Solow: "we can see the computer age everywhere but in the productivity statistics". 'Solow's Paradox' may no longer persist in the US, but is alive and well in the UK.

ICTs have enabled companies to streamline processes, share and store information, and automate certain kinds of low-value and repetitive work. Increased effectiveness, made possible by new technologies, has resulted in lower costs for businesses. New working practices such as teleworking, enabled by new technologies, have also appeared to have a positive effect on companies' productivity performance.

The latest research in the UK has focused on the management, organisation and use of ICT, rather than ICT investment. Evidence has shown that effective deployment of ICT, or the failure to do so, are determinants of productivity growth far more important than ICT expenditure. In order to get the most out of their ICT, companies will have to make sophisticated use of ICT and manage the process change required to embed technology in the company organisation.

2. Why is ICT not improving productivity growth?

Barriers to adoption

Most present-day companies have access to new technologies and are connected by means of Internet and email. In a much debated article, American scholar Nicholas Carr argued that "IT doesn't matter": as virtually all companies make use of ICT, technology by itself cannot make much difference anymore to companies' competitive capacity.¹⁰ However the question that Carr neglects is the ways *in which* companies employ ICT. Most commentators today agree that refined use of ICT can lead to cost efficiency, whereas failure to make effective use of new technologies, or to deploy them in the wrong way, can hold down or even reduce productivity levels. The main challenge for businesses today thus lies in making efficient use of the available technology.

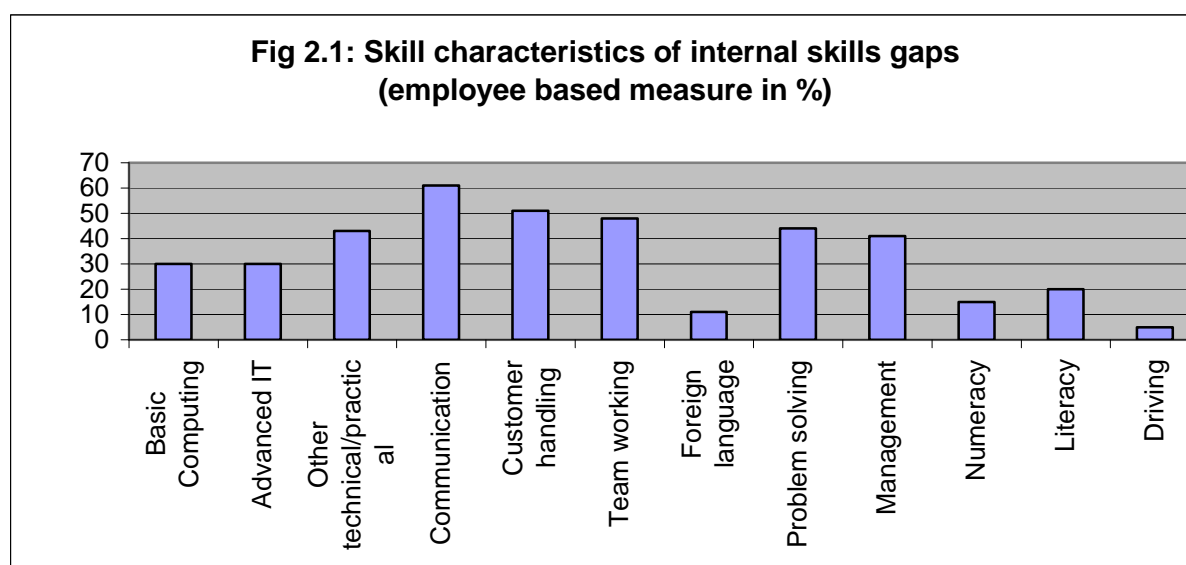
Recent work on deployment of ICTs in UK workplaces has identified a number of barriers for success that have little to do with the technology itself, but are strongly related to organisational and personal circumstances of the people who have to make use of them.

⁹ Booz Allen Hamilton (2003), *Business in the Information Age*, DTI.

¹⁰ Nicholas Carr (2003), *IT Doesn't Matter*, Harvard Business Review, May 2003

Skills shortages in ICT might represent one barrier that prevents UK companies from making the most out of their joint annual ICT investment of £23billion.¹¹ The widespread use of ICT in organisations, varying from the use of data processing software to a whole range of technological devices, means that ICT skills are more important than ever before. Employees are required to have a basic knowledge of ICT as well as the flexibility to adapt to new programmes and tools as technology progresses. According to the Department for Education and Skills (DfES), by 2010, nine out of ten jobs will require a basic level of ICT literacy.¹²

Despite the importance of ICT skills in present-day workplaces, recent work in this area argues that ICT skills among UK companies' employees are generally below the level required for the job they do.¹³ In a survey of e-skills UK, the Sector Skills Council for IT, Telecom and Contact Centres the employers interviewed state that less than half of their new employees had appropriate ICT skills.¹⁴



Source: Employer Skills Survey 2002

We should, however, place this data in a relative context. British employers do not themselves place much emphasis on the importance of ICT skills, nor do they highlight ICT skills shortages as particularly worrying. Only 5% of vacancies ask specifically for basic ICT literacy¹⁵, and in the Employers Skills Survey 2002, the most important areas of skills shortages as indicated by employers included mainly soft skills, such as communication, team-working

¹¹ The Royal Academy of Engineering / The British Computing Society (2004), *The Challenges of Complex IT Projects*.

¹² Speech by John Healey, Minister for Adult Skills, at the E-Skills Summit hosted by Greenwich University, 29 May 2003. Available online on http://www.ssda.org.uk/cgi-bin/go.pl/news/show_release.html?uid=18

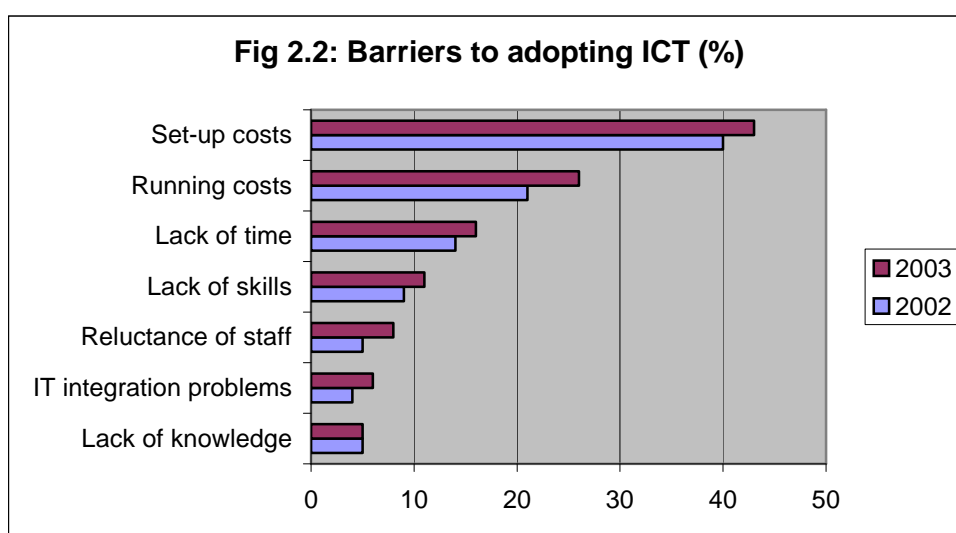
¹³ A. Westwood and G. Carpenter (2004), *The e-skills paradox: mind the gap – Technology, Training and Workforce Development*, iSociety/The Work Foundation.

¹⁴ e-skills UK (2003), *IT User Skills in the Workplace*.

¹⁵ Learning and Skills Council (2003), *Skills in England*

and problem-solving, and not ICT.¹⁶ (Fig. 2.1) There is, however, a proven relationship between ICT skills and earnings, by which we may assume that employers do value ICT skills as contributing to the overall performance of the firm.¹⁷

A second possible barrier to effective use of ICT are **costs**. Costs of technological equipment and even more so costs involved with change management processes are experienced as important barriers for ICT deployment. (Fig. 2.2) Especially for smaller companies, sophisticated deployment of new technologies is simply too expensive. Whereas larger businesses can take advantage of decreasing costs for leased broadband Internet and in-house ICT specialists, many smaller businesses cannot afford such services, with the result that they generally work on a low-tech equilibrium and do not get optimal returns. Many smaller companies increased ICT spending over the past years, but now find that productivity gains are limited. ‘Clicking off’, quitting a website or resorting to simpler means of ICT, after assessing the costs/benefit relation of their ICT systems, seems to be the current trend among many SMEs.¹⁸ (Fig. 2.3)

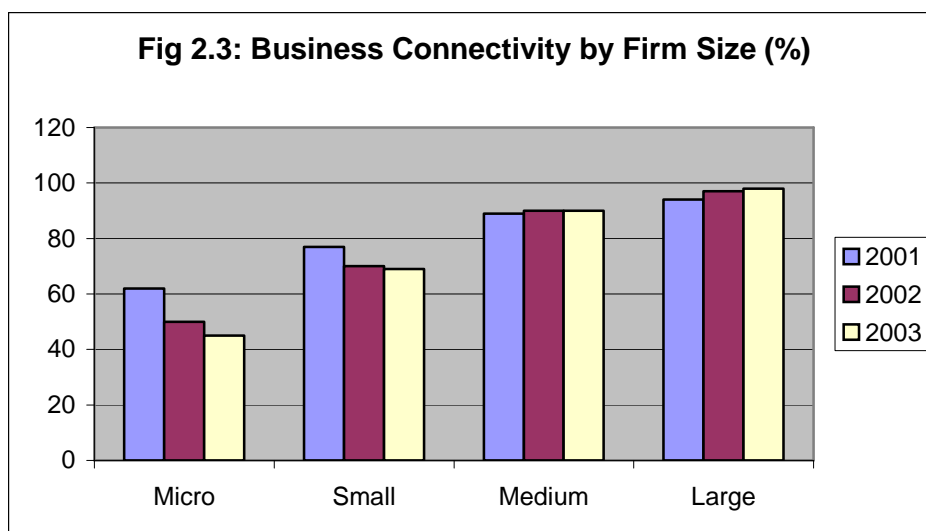


Source: Business in the Information Age (BAH/DTI 2003)

¹⁶ Learning and Skills Council (2002) *National Employment Skills Survey 2002*

¹⁷ A, Felstead et al (2002), *Work Skills in Britain 1986-2001*, DfES, p. 160

¹⁸ Booz Allen Hamilton (2003)



Source: Business in the Information Age (BAH/DTI 2003)

Thirdly, there are a number **psychological issues** that have yet to be resolved. The dot.com boom raised high expectations about what ICT could do for companies' productivity levels. But when high-tech markets collapsed it became clear that ICT was not the wonder medicine the early supporters of the new economy believed it would be. Many businesses today are wary about what ICT can deliver, and have slowed down spending on ICT. The fact that the majority of managers and employees in UK firms are from a generation that did not grow up with technology and have natural reservations against it does not help. There exists a general lack of consumer confidence that needs to be restored if UK businesses want to make ICT work.

Lastly, a barrier exists in the field of **best-practice** adoption: the capacity of firms to implement technological and non-technological innovations that have proven to be successful in improving productivity performance in similar circumstances. Several commentators have suggested that British firms are generally slower in picking up best management practices, compared to their American and European counterparts.¹⁹ This can result in a comparative disadvantage on the market and can be one of the factors which hold back productivity growth.

One argument for the failure of UK businesses to pick up best practices has to do with market failure. Still many firms operate only locally or nationally and do not have access to information about innovative work practices outside of the sector in which they operate. Nor are they pressured by an international competitive environment which pushes them into 'high road strategies' – including the adoption of best practices in the field of management and ICT. Many UK firms manage to get by on a bottom-line performance because the competitive pressure of the market is not high enough. The 'paranoia' of managers working in ultra-competitive business environments such as Silicon

¹⁹ See, for example, M. Porter & C. Ketels (2003) or speech by Dominic Casserley, McKinsey, *How can the UK close the productivity gap?*, 15 March 2004

Valley to stay ahead of the market is much more common in the US than in the UK.²⁰

Another explanation for the low take-up of best practice by UK firms puts the blame on firms' internal weaknesses. As has already been pointed out above, modern technology is expensive, and if firms are not willing or able to make the investments required for both technical equipment and organisational changes, they will not look for new techniques and technologies either. The same goes for skills: why look for best practice and new ideas if the company's skills base is too weak to support them. Low capital investments and skills shortages thus have a negative effect on uptake of best practices.

Are we looking in the wrong places?

Macroeconomic data and supply-side evidence may not be the best basis for analysis of the relationship between ICT and productivity. The diffusion of ICT continues apace, but the sheer quantity of technologies may not be a very useful benchmark. Increasingly, researchers are seeking to get inside firms to understand how ICTs interweave with organisational change and new management techniques.²¹ In these instances, evidence of a linkage between firm-level productivity growth and ICT is firmer, although only where investment is accompanied by human capital investment and reorganisation.²²

The OECD recommends two areas of future research that are still relatively under-explored.²³ Firstly, international studies of firm-level productivity are still relatively scarce. For instance, US firm-level productivity varies considerably from firm to firm, to a far greater extent than in Germany, and explanations for this are lacking. Secondly, there is still insufficient evidence of how ICT affects firm-level productivity per se, especially in the service sector where measurement issues are more problematic.

3. Role of government

The government, most importantly the Department for Trade and Industry (DTI) and Department for Education and Skills (DfES), is already taking an active role in supporting businesses with ICT, primarily through general business support and skills policy. Under the wider umbrella of 'Business Support Solutions' the DTI offers UK firms both information and practical support. A website on Best Practices features a number of case studies and provides advice on various business issues, including ICT. Business Link is an agency run by the RDAs, which provides practical advice to small businesses and a scheme, and pays for part of the costs of a professional consultant.

²⁰ Speech by Dominic Casserley, McKinsey, *How can the UK close the productivity gap?*, 15 March 2004

²¹ See for example M. Nathan et al (2003)

²² See OECD (2004), *The Economic Impact of ICT: Measurement, Evidence and Implications*

²³ OECD (2004)

The government's Skills Strategy deals with ICT skills shortages and skills shortages in general.²⁴ Policy in this field is primarily concerned with the supply side: providing the market with a highly-skilled workforce through initial education and extra-curricular training. The Strategy is delivered through a number of organisations, which deal with national, local and sector-specific demand: the National Skills Alliance, the Skills Task Force, and the Sector Skills Councils. E-skills UK is the Sector Skills Council for the IT, Telecoms and Contact Centre industry and deals particularly with ICT skills in the wider economy.

The primary responsibility for skills training for those already employed lies with company managers and owners. Encouragement and raising awareness are the main tools employed by government to stimulate managers and staff to keep ICT skills up-to-date. However there are a few initiatives which target those already in employment, such as the Home Computing Initiative. This scheme, initiated by the DTI, the DfES and the E-Envoy to boost ICT skills in UK workplaces, enables companies to loan computers to their employees. Employees gradually pay for the equipment through a small reduction in their salaries. The scheme was made possible by a £500 annual tax redemption in the 1999 Budget.

In addition to practical business support, many see a role for government in spreading best practice and innovation by investing smartly in ICT. In 2001-2002 the government accounted for 55% of the total amount spent on ICT in the UK,²⁵ which makes the government one of the most important consumers of technology in the national market. Not only can government provide incentives for companies to invent new products and services, it can also contribute to the debate on best practice through smart procurement, electronic service delivery and management of change processes around ICT. The measures proposed in the Gershon Report, commissioned by the Treasury as input for the 2004 Spending Review, are a welcome addition to this discussion.

Main policy players' views on government's role in supporting businesses with ICT should be considered within the broader debates on government's involvement in markets, economic regulation and skills.

Generally speaking, those on the liberal side of the political spectrum view government's role in stimulating businesses to make better use of ICT as a limited one. They believe that businesses will adopt new technologies if they believe it will eventually lead to higher returns. Government's role in this is to maintain macro-economic stability and to keep regulation down.

The **Institute of Directors (IoD)** for example criticizes the increase in tax and regulatory burdens on businesses by the Labour Government in the period 1996-2001. According to the IoD, the government should leave "more money in the hands of owners and managers" to pay for company innovation, such

²⁴ DfES (2003) *21st Century Skills – Realising Our Potential – Individuals, Employers, Nation*

²⁵ DTI (2003), *Competing in the Global Economy: The Innovation Challenge*

as the introduction of new technologies. The IoD doubts whether government grants and tax credit schemes are the way forward in making businesses more innovative in their working practices. In an IoD member survey, only a small percentage of the respondents found these measures stimulated them to be more innovative. Nevertheless, the government's Business Link programme, which aims to stimulate knowledge transfer and best practice adoption between businesses and research institutions was found to be useful by 34% of the participants.²⁶

The **Confederation of British Industry (CBI)** takes a similar position with regards to regulation. The CBI does, however, believe that tax incentives can have an important impact on companies' capacity to improve productivity performance. Although the CBI states that the overall burden of taxation should not be increased, it encourages initiatives such as the R&D tax credit and incentives targeting SMEs.²⁷

Those on the left generally ask for a more active role of government. The **Trade Union Congress (TUC)**, in a response to Michael Porter's analysis of UK competitiveness, goes against the notion that excessive red tape would prevent businesses from applying new innovations internally. According to the TUC and Porter's report, the UK has one of the lowest levels of government regulation in the European Union and the tendency of UK businesses to take the 'low road' (competing on low costs, low skills and low technology) instead of the 'high road' (competing on high-value added jobs, high-tech and innovation) cannot be attributed to excessive levels of regulation.

The TUC recommends an increase in the minimum wage to push businesses into 'high road strategies'. This would affect use of ICT: successful deployment of ICT can enable companies to partly automate low-wage jobs and to create more work in high-skill professions. Furthermore, the TUC demands a more integrated approach to the skills strategy that takes into account not only education and training but also the existing lack of employer demand. The skills agenda should include not only the DfES, but also the DTI, the Small Business Service, and the Regional Development Agencies, the TUC states.²⁸

In addition to the position of employers' organisations and unions it might be worth mentioning the views of a number of research institutes and third sector organisations.

Robert Taylor of the **ESRC's Future of Work programme** argues that the present approach of government towards business innovation is too top-down and fragmented. With regards to skills, Taylor argues that current policy is too much focused on the supply side: securing that UK workers possess both the skills and the minimum educational standards that organisations competing in the Knowledge Economy require. According to Taylor, this generic approach does not take into account the specific needs of businesses. The fact that

²⁶ R. Wilson (2004), *Business and Innovation – A Fresh Approach to Public Policy*, IoD policy paper.

²⁷ CBI (2004) *Investing to meet the UK productivity Challenge*

²⁸ TUC (2003) *Government's job to stop business 'building on sand'*

many recent graduates work in administrative and accounting jobs far below their educational and skills levels is, in Taylor's view, part of the evidence for the current "mismatch" of supply and demand.²⁹

Also, Taylor states that the flexible labour markets in the UK make it less attractive for managers to invest in training and skills of their workers. Government-backed workplace development programmes, such as already exist in continental Europe might be an example for improvements in UK policy. Taylor concludes that present policy will not turn UK firms into high-performance workplaces which can compete in the global economy.³⁰

The Work Foundation demands more emphasis on the need for ICT skills in government policy. It applauds the fact that ICT skills are now considered basic skills in government documents, equally as important as 'soft skills' such communication and team-playing skills. However the Work Foundation wants government to go further: organisations should receive financial support for offering ICT courses to employees and government should consider the introduction of a 'technology driving licence' for school leavers. Businesses should be encouraged more actively to make smarter use of ICT, most preferably though already existing infrastructures for workplace development.³¹

A recent **Institute for Public Policy Research (ippr)** report considers the government's role in promoting best practice among UK businesses. Best practices are, according to the report, almost a public good: businesses are no worse off if others make use of their work practices. However, firms tend to keep information about best practices to themselves. Here lies the theoretical argument for government intervention: where the market fails, government should come in.³² The government's partnerships with professional and industrial organisations and its roles in encouraging best practice among companies should therefore be encouraged. The ippr also recommends a more integrated government strategy for business support: Sector Skills Councils should become Sector Councils, which would deal with a whole range of business support solutions, instead of only skills issues.

A report of **Booz Allen Hamilton** for the Department of Trade and Industry (DTI) has a few recommendations to make with regards to smaller businesses and ICT. According to BAH there is a role for government in supporting smaller businesses in making sophisticated use ICTs, for example by sharing part of the risk of ICT investments.³³

²⁹ R. Taylor (2003), *Skills and Innovation in Modern Workplaces*, ESRC Future of Work Programme Seminar Series

³⁰ Ibid.

³¹ M. Nathan et al (2003), *Getting by, not getting on – Technology in UK Workplaces*, iSociety/The Work Foundation

³² R. Brooks & P. Robinson (2003), *Manufacturing in the UK*, ippr .

³³ Booz Allen Hamilton (2003)

Conclusion

The relationship between ICT investment and productivity growth is extremely difficult to measure. Supporters and sceptics of the New Economy strongly disagree on whether technology drives productivity performance and as a lot of the data applies to US economy only, concrete predictions on the productivity impact of technology in UK companies cannot be made.

What is clear, however, is that ICT can only work if it is properly embedded in companies' organisations. Both managers and employees need the right skills to work with modern technology and evidence indicates that these skills are too often absent. Also the high costs of ICT and technology expertise are often too much for (smaller) organisations to bear, and the lack of best practice diffusion has a strongly negative effect on the competitiveness of many British companies.

As a result, many UK businesses operate their ICT systems on a low-tech and low-skill equilibrium. They do have access to technology, however they fail to make the most out of it. How can government help? The DTI and DfES are active in providing general business support and equipping the labour force with the necessary skills. Commentators however argue that there is still much room for extra initiative, for instance in providing financial support to smaller businesses struggling with the costs of technology, improving the existing infrastructures for implementation of the Skills Strategy and introducing financial incentives for businesses to train their staff in ICT. Although improvements will have to come from within the business community, government has a role to fulfil where the market fails.