Report for Small Business Service Research Programme

THE COLLEGE OF ESTATE MANAGEMENT

Patron: HRH The Prince of Wales

The Value of ICT for SMEs in the UK: A Critical Literature Review

Authors: Dr Tim Dixon, Bob Thompson and Pat McAllister

September 2002

The Authors

Dr Tim Dixon is Director of Research at The College of Estate Management in Reading. He is a chartered surveyor, member of the Editorial Board of the Journal of Property Investment and Finance and is a member of the IPF, SPR and NACORE in the UK, and ICSC, ARES and ULI in the USA. He has written widely on the subject of ICT applications in property and has acted as property adviser to the National Audit Office. He is particularly interested in the impact of information technology on the built environment and on organisational structure and he is currently working with his team on major funded research projects concerned with the impact of ICT on retail and office property in the UK. He is also an Online Topic Expert at the website, Property Bull. He has written widely on the application of IT in both property and property education, and has been involved in all research programmes and projects as head of research at the College since 1992. He has worked with a variety of clients and sponsors from the private and public sectors (including DTI Foresight, PACE, NAO and former DETR). He has developed a major programme of research, which examines the impact of new technology on real estate (http://www.cem.ac.uk/itribe.htm) and is funded by such organisations as DTI, Retail Foresight and Small Business Support Unit.

Bob Thompson MBCS MBA is a freelance consultant with RETRI. He joined King Sturge & Co in 1986 following a long and distinguished career in statistics, computing and research. From 1978 to 1986 he was a freelance Consultant advising on a number of major projects. Foremost amongst these were the analysis and design of a ticketing system for a ferry operator; the evaluation of office automation proposals for Shell; and data collection and analysis for the World Fertility Survey, studying human fertility in the third world. From 1986 to 2000 he was head of the King Sturge Research team, responsible for company wide information and research output. In 1995 he implemented kingsturge.co.uk, amongst the first commercial property websites in Europe. In May 2000 he became Partner, E-business - responsible for the technology/buildings interface. He undertakes a wide range of consultancy for clients across the business spectrum, contributes regularly to press and academic publications and speaks at leading conferences. (Santa Barbara, Monterey, Alicante, Women in Property). He is currently President of the European Real Estate Society, a visiting research fellow at Reading University and a member of the advisory board of PEFRN.

Patrick McAllister is a lecturer in valuation and property management in the Department of Land Management at the University of Reading. He has published widely on a range of topics related to property investment and valuation. Recently, his research has concentrated on the valuation implications of the generation of 'new economy' income streams by property investors eg from broadband and e-procurement. He is currently completing a research project funded by the RICS Education Trust which investigated the consequences of property owners developing new business opportunities (including broadband) from their tenant base. This has examined the activities of major institutional and property companies in the area of services provision to tenants.

Executive Summary

Main Points

- Government policy has been formulated to promote information technology and communications for SMEs, which are seen as a vital component in the drive to transform online business in the UK.
- With 1.9 million SMEs connected to the Internet in 2001, the UK Government's target of 1.5 million has already been met. But the UK SME sector lags leaders such as Sweden and Germany in terms of connectivity internationally and faces similar problems and issues as other EU member SME sectors.
- Broadband coverage in the UK remains patchy. Only 1% of households and only 1% of SMEs have broadband access. Some 67% of UK businesses still use an ordinary phone/dial-up to access the Internet.
- Despite research showing the very real positive impacts of broadband for SMEs, regional differences in UK SME access to broadband mirror the 'digital divide' effect in society, with London and the South East more likely to be the key beneficiaries. Supply-side policies to encourage broadband adoption could usefully focus on building owners as agents for change.
- Little research has been carried out into the impact of ICT on SMEs. Much research has been too 'deterministic' in approach.
- The typical linear model of ICT adoption may be inappropriate. Cyclical models have a greater synergy with the reality of ICT adoption in SMEs. The knowledge and skills bases of SMEs is also important to consider as well as age of firm, size and maturity of ICT usage.

Key statistics

Statistics from a range of sources (see references at the end of the Executive Summary) show that:

- In 2001 1.9 million SMEs were connected to the Internet (DTI, 2001) and Oftel (2002a) report that 63% of all UK SMEs were connected to the Internet in 2001.
- In 2001 540,000 SMEs were trading online (DTI, 2001).
- In 2002 only 1% of SMEs had a broadband connection (Oftel, 2002b).
- Over half of SMEs (57%) attribute braodband to improved profits and two thirds to lowering the cost base (Fletcher Advisory, 2001).
- Regional differences in access to ICT for SMEs occur: Yell (2001) reports that SMEs in London and the South East were more likely than other regions to have their own website. The highest usage of computers amongst SMEs is in London (Federation for Small Businesses, 2002).
- The use of the web by small businesses is still relatively undeveloped. SMEs still tend to use the Internet to send emails, transfer files or documents or gather information. Many small businesses still do not own a computer and cost is still a major barrier for those companies with a turnover of less than £50,000. The slow rollout of broadband has also frustrated many SMEs (Federation for Small Businesses, 2002).

An overview of research into SMEs and ICT

Previous research and literature have highlighted the definitional problems of SMEs. Firms differ in size, maturity, nature of business, location and turnover, and so a single stick or carrot policy is unlikely to be applicable to all SMEs. Although Government recognises this, much of SME policy has been shaped by a consideration of the lowest common denominator from a purely pragmatic standpoint.

We would argue that further research needs to be undertaken in the SME sector that recognises the diversity of firm and culture so that policy can more accurately be tailored to fit the SME sector's requirements.

There is currently a lack of empirical research on the impact of ICT on SMEs. Often the research that has been carried out has taken a deterministic view of ICT. This has been predicated on the assumption that ICT must be a 'good thing' for SMEs, and has in turn led to such models as the 'e-adoption' ladder being implemented, perhaps too uncritically.

Research has also found it difficult to isolate trends in IT from more general economic and organisational change drivers, such as the changing work paradigm. Moreover, research has often failed to examine the role of size, age, sector experience of ICT and management support within single, integrated studies. Other factors are likely to include level of internationalisation, types of exporting activities, awareness of benefits, types of customer and the influence of larger trading partners.

This has also exacerbated the patchy nature of much research. Empirical work has also tended to be cross-sectional in nature, making time-series comparison much more difficult. There has also been a failure to move outside the realms of normative or descriptive research in many instances. A case in point is remote SMEs in more marginal parts of the UK: although ecommerce can potentially provide global markets through 'richness and reach', the companies still require the fundamentals of distribution networks and direct markets to be successful.

More successful, qualitative research, built on case studies, has found that managerial support and a sense of strategic direction have been fundamental in ensuring ICT success in SMEs.

Given the focus of SME performance and productivity to this study, there is a research vacuum on the relative costs and benefits of ICT-broadband adoption. A key issue is that whereas many of the costs of adoption are tangible and quantifiable, the benefits may be often either speculative, intangible or difficult to quantify. However, research has shown that companies who have adopted broadband believe that it contributes to improved performance in four main ways

- The development of new products and services;
- The generation of new customers;
- Reductions in costs; and,
- Improved productivity.

The difficulty with such research is that samples are often self-selecting. In essence firms who have adopted broadband may have done so because they were aware in advance that their business would benefit in these ways. Consequently, there is no suggestion that all SMEs can obtain these benefits. A key research issue must be the identification of the categories of SMEs who can gain greatest competitive advantage from broadband adoption.

Although this report focuses mainly on the demand-side of broadband provision, improvements in supply may improve the rate of adoption. There has to date been very little attention paid to the role of property and broadband. Many of the large-scale landlords of SMEs such as pension funds, property companies and insurance companies have identified broadband supply to SMEs as a *potential* source of new revenue. Following initial enthusiasm associated with the 'technology bubble' a number of commercial landlords formed alliances with broadband providers. Given their ownership of premises and existing relationships with tenants, broadband providers have identified landlords as an important gateway to the SME market.

Given the importance of the landlord–tenant relationship in commercial property, we also suggest that more research work is needed to examine how landlords will influence the shape and form of broadband roll-out in the UK. It will therefore be important to examine how applied technology, property and related economic and organisational factors all work to impact on the SME sector.

Policy implications of the research review

SMEs face particular problems when it comes to introducing ICT within Europe. Statistics suggest across the EU that the smaller the enterprise the less likely it is to use ICT. However, this does not imply that specific SME policies will necessarily solve these problems. SMEs benefit from a reliable, stable and open business environment. Therefore policies which encourage this as well as liberalisation of telecomms supply, and the inter-operability of ICT solutions, and easier access to finance through 'horizontal' policy initiatives are likely to succeed in tandem with SME-specific initiatives.

In a European context, the 'SMe-Ecommerce' programme highlighted six key policy measures, which included supporting access to high quality consultancy for SMEs; promoting information on ICT potential; encouraging the more active role of business associations; raising skills levels in SMEs; developing standards for ecommerce and eprocurement and increasing fast and cheap internet connections.

If broadband is going to make a real impact in the UK, then the 'virtuous circle' will require stimulation, as the Government already recognises. The part played by SMEs in this process is an important one and such schemes as UK Online for Business will be fundamental to the successful roll-out of broadband over the next 5 years. However, other factors at a micro and macro level will all play a part, and factors such as social exclusion and clusters of SMEs which can act as key drivers should not be overlooked in a policy context.

Knowledge gaps and a future research agenda

Our review of available literature and statistics has enabled us to identify future research questions which we believe need addressing and which include:

- How is ICT impacting on SMEs across a range of size and sector groups?
- What evidence is there that ICT really improves SME performance, and how can this be measured?
- What role does managerial leadership and other 'softer', human resource issues play in the introduction of ICT?
- How are SMEs changing in their use of ICT?
- How are SMEs using ICT currently, and how do they plan to use it?
- What are the most important factors influencing ICT use in SMEs?
- What role does property and infrastructure play in the ICT–SME interface?

Main Report

Please note that a copy of the full report on which this summary is based is available from:

CPD Sales
Telephone: +44 (0) 118 9861101
Fax: +44 (0) 118 9755344
E-Mail: info@cem.ac.uk

For further details of this research and related research see the College of Estate Management's iTRIBE website at : http://www.cem.ac.uk/itribe.htm

Contents

1 Introduction

1.1 Background

The 3.7 million Small and Medium Enterprises (SMEs) in the UK produce 40% of GDP and have an annual turnover of approximately one trillion pounds. Employing 12 million people, they account for some 55% of the private sector workforce. At the same time, the Government is committed to making the UK the best place in which to trade electronically by 2002, and set a target of getting 1.5 million small businesses online by 2002. This was exceeded two years early and now 1.9 million businesses are online compared with 380,000 in 1998.

Nonetheless, the UK SME sector lags leaders such as Sweden and Germany in terms of connectivity internationally and faces similar problems and issues as other EU member states. Broadband coverage in the UK also remains patchy with only 1% of SMEs with broadband access.

Moreover, despite research showing the very real positive impacts of broadband for SMEs, access levels mirror the digital divide effect in society as a whole with larger firms and firms based in London and the South east more likely to be key beneficiaries of broadband.

1.2 Aim and Objectives of Research

This research synthesises key statistics of ICT penetration and usage, and provides a critical literature review of the role of ICT in SMEs.

The key objectives of this research are therefore to:

- Compare relevant statistics on take-up of ICT by SMEs (internationally, nationally, regionally and locally).
- Explore the use of ICT by SMEs and its relationship to business performance.
- Review ICT evolution and use by SMEs.
- Identify the policy implications arising from the research.
- Provide a rationale for future research.

However, it should be noted that the study is a snapshot or cross-section in time and, to that extent, the data and statistics will be subject to rapid change. It is also fundamental to appreciate the synergy and inter-relatedness between ecommerce, ebusiness, broadband and ICT, as concepts.

1.3 Format of Report

The format of the report is as follows:

Section 2 - ICT and SMEs: Some Comparative Statistics;

Section 3 - ICT and SMEs: A Review of Research; and,

Section 4 - Summary and Key Issues.

A full list of references is provided at the end of the report.

2 ICT and SMEs: Some Comparative Statistics

2.1 Background

UK government policy has also been designed to encourage successful ebusiness. For example, the 'Opportunity for All in a World of Change' White Paper (DTI, 2000) announced a significant £30 million expansion from 2001 for a 3-year period to help businesses move beyond having a website or trading online to transform themselves through the effective use of ICT. The intention is to enable businesses to move up the e-adoption ladder and produce a faster uptake of ICT.

Government policy in the UK has therefore been designed not only to nurture and promote the SME sector, but also the 'connectivity' (access to ICT and the extent of use) of the sector. The Government also has three key goals for ebusiness that by 2002:

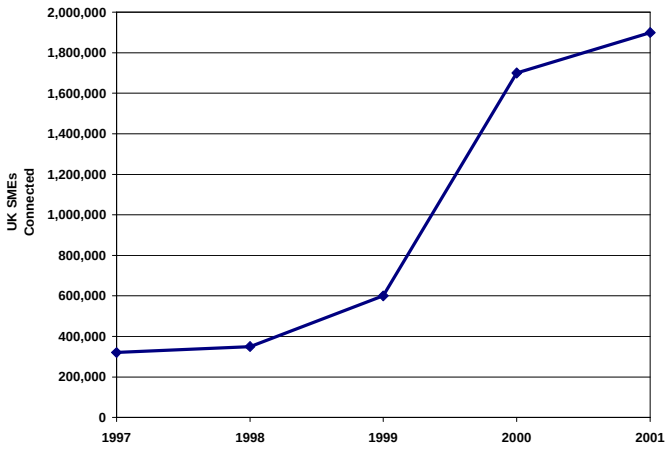
- Target 1 – 1.5 million micro, small and medium-sized businesses[1] are online[2];
- Target 2 – 1 million micro, small and medium-sized businesses are trading online;
- Target 3 – the UK's micro, small and medium-sized businesses have reached the level of the international best in use of ebusiness.

The following sections explores progress towards these targets in more detail, based on findings from DTI (2001) and other sources.

2.2 Connectivity

According to the latest DTI figures (DTI, 2001), with 1.9 million SMEs connected in the UK by 2001, the target of 1.5 million has already been surpasssed. This is shown in Figure 2.1.

Figure 2.1 UK SME connectivity levels (DTI, 2001)



[1] Businesses with up to 250 employees
[2] A business is online if it has a website or EDI or makes frequent use of external email.

The study by DTI in 2001 showed that the performance of the UK's small and micro business sector lagged other countries such as Sweden and Germany when compared internationally, and more needed to be done to raise their performance level to the best. However, the UK increased its rank from fifth to third in terms of the proportion of micro businesses connected (up from 55% in 2000 to 62% in 2001). Again, the proportion of small businesses in the UK that are connected has increased during the last year from 70% to 77%, placing the UK third behind Sweden and Germany.

Oftel (2002a) report that 63% of all UK SMEs are connected to the Internet (94% medium businesses; 60% small businesses). Three-quarters of small businesses used ordinary phoneline/dial-up access to connect to the Internet, and a third of medium-sized businesses did so, with 37% of SMEs with Internet access using an unmetered package. The survey also found that the number of small businesses expecting not to connect to the Internet has fallen.

Figure 2.2 UK businesses connected/connecting to Internet by business size – November 2001 (Oftel, 2002a)

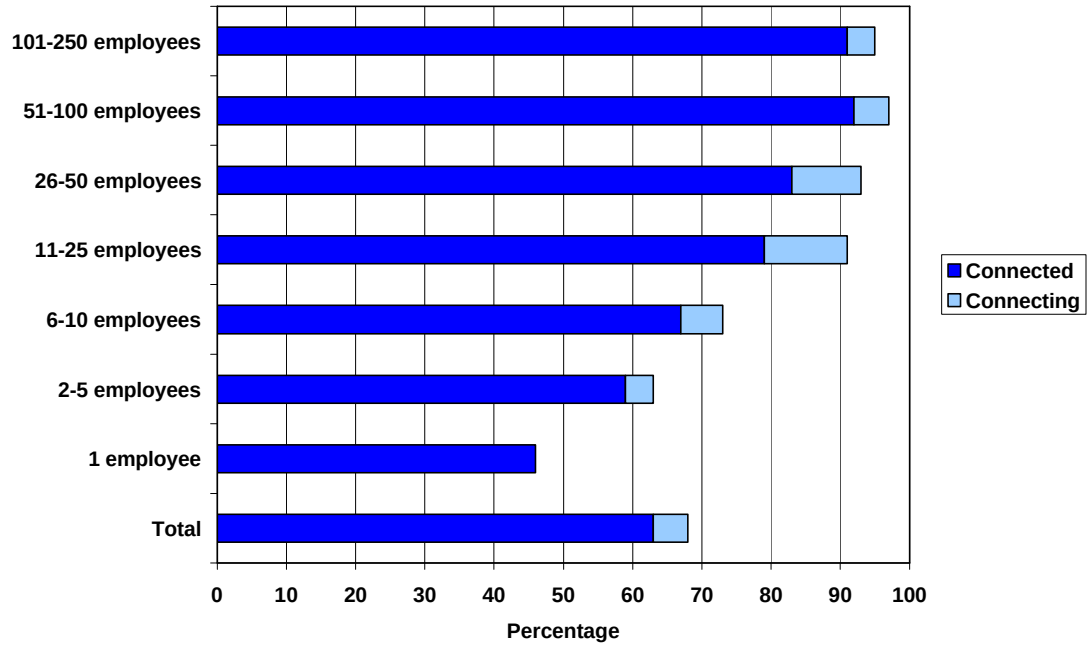


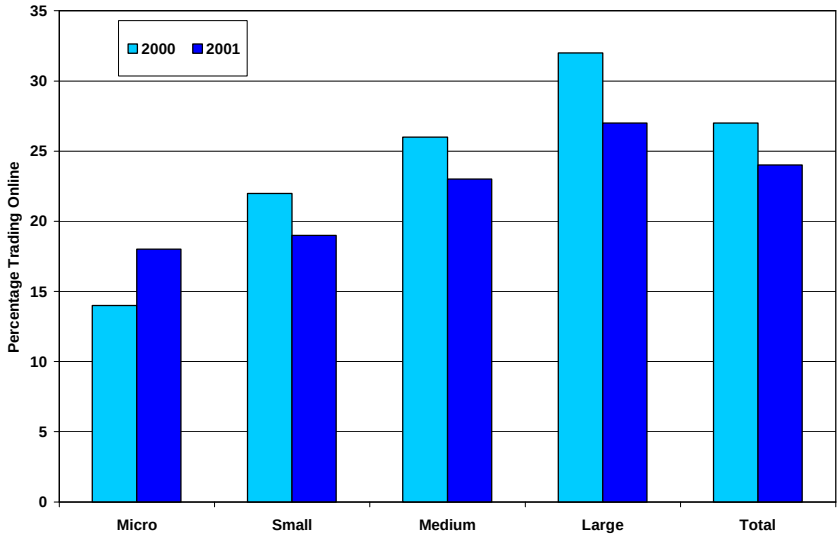
Figure 2.2 shows how Internet penetration varies with size rising from 46% in single employee businesses to 92% at the larger end of the market.

2.3 Trading online[3]

In 2001 some 540,000 UK SMEs (including micro businesses of less than 10 employees) were trading online, which is an increase of 20% from the 2000 figure of 450,000. The biggest growth in the percentage of businesses trading online has been amongst micro businesses – in the small, medium-sized and large bands the percentage has fallen (Figure 2.3).

[3] Trading online is defined in the DTI study as engaging in both ordering and paying online with either customers or suppliers.

Figure 2.3 UK businesses trading online by size band, 2000 and 2001 (DTI, 2001)



A survey by National Statistics (2001) in 2000 of UK businesses estimated total Internet sales to be £56.6bn, which represents some 2.04% of sales[4]. Table 2.1 shows how the overall levels of ecommerce are split between different sized businesses and by sector. Larger businesses account for nearly 80% of all ecommerce sales, whereas the financial sector accounts for 77% of all ecommerce sales. If the financial sector is excluded, the value of Internet sales drops to £12.9bn, which represents 0.94% of all sales excluding the financial sector. This shows that SMEs are less likely to trade online than larger enterprises.

The proportion of micro businesses that trade online has increased during the last year in five of the eight countries in the DTI survey, including the UK – up from 14% to 18%. The UK is third on this measure behind Germany (30%) and Australia (21%), whereas last year it was fifth. The proportion of small businesses that trade online has decreased during the last year, including the UK, from 22% to 19%. The UK now ranks fifth, behind Australia (30%), Germany (24%), Sweden (23%) and USA (18%), whereas last year it was joint second.

2.4 Broadband and other Internet access methods

'Broadband' is the term used for 'always on', higher speed access to the Internet. This additional bandwidth (over and above typical 56kbps provided by standard dial-up modems) allows new high capacity services to be provided to consumers and businesses.

The Government believes that rapid roll-out and adoption of broadband across the UK is important to fulfil its economic and social objectives, and its UK Online report (2001) set the target for the UK to have the most extensive and competitive broadband market in the G7 by 2005.

[4] This is total sales, and not simply retail sales. Retail sales would represent a lower percentage of less than 1%.

The Government has also highlighted the virtuous circle argument of broadband, stressing that until compelling new mass market broadband content and applications are available, speed of progress will be slow. The key drivers for broadband are its speed, immediacy and unmetered access. Initially, therefore, demand for broadband is likely to come from narrowband users wanting to upgrade[5].

Table 2.1 Value of UK ecommerce sales by sizeband and sector (after National Statistics, 2001)

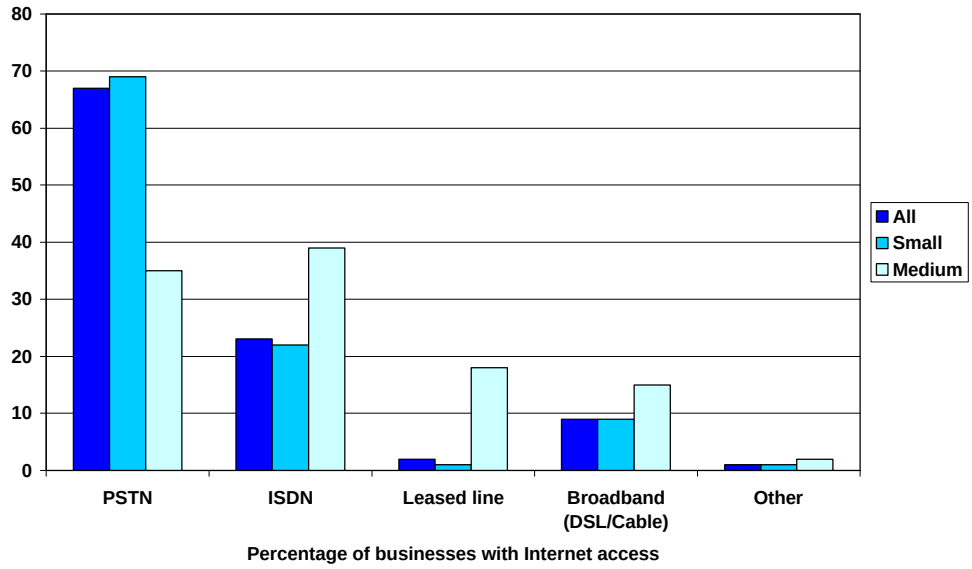
	Internet sales		**All electronic networked**	
	£bn	**%**	**£bn**	**%**
Total	***56.6***	***2.04***	***161.75***	***5.83***
Sizeband of business				
10-49	3.43	0.12	5.97	0.21
50-249	8.11	0.29	24.27	0.87
250-999	23.21	0.84	58.17	2.1
1000+	21.88	0.79	73.35	2.64
Sector				
Manufacturing	3.99	0.14	49.46	1.78
W'sale/retail/ catering/travel	7.61	0.27	29.65	1.07
Financial and insurance	43.74	1.58	79.9	2.88
Computing and other business services	1.28	0.05	2.75	0.1

It comes as no surprise, therefore, that in February 2002 some 67%[6] of UK businesses connecting to the Internet still used an ordinary phone/dial-up to access the Internet (Figure 2.4), but only 9% used broadband (Oftel 2002b). This equates to 1% of all SMEs which use broadband.

[5] Key Government e-Envoy reports include:
Next steps for UK Broadband -
http://www.e-envoy.gov.uk/ecommerce/broadband/bbsgrep_menu.htm
UK Online Annual Report -
http://www.e-envoy.gov.uk/ukonline/champions/anrep_menu.htm
UK Online; The Broadband Future
http://www.e-envoy.gov.uk/ecommerce/broadband/

[6] This has decreased from a figure of 76% in November 2001, driven largely by a fall in business connectivity amongst small businesses.

Figure 2.4 Internet access methods used by UK businesses (Oftel 2002b)



Small businesses prefer ordinary phone-line/dial-up access, whilst medium-sized businesses remain more likely to use ISDN or leased lines. Almost twice as many medium-sized businesses use ISDN lines to access the Internet than small businesses (39% and 22% respectively).

Fletcher Advisory (2001) were commissioned by BT Openworld to assess the behaviour of the first SME users of broadband in the UK[7]. Their findings were as follows:

- Larger firms have had broadband longer than SMEs (10 months as against 6 months).
- Those SMEs that use broadband find their connection important for business (92%), but, within this group, bigger companies consider broadband more important than smaller companies.
- One third of SMEs regarded their Internet connection as very important in offering new products and generating new revenue streams and customers, compared with only 14% of narrowband SMEs.
- More than half (51%) of SMEs in the survey attribute broadband to increasing their teleworking opportunities.
- UK broadband SMEs spend about £456 million per year online on B2B.
- Over half of SMEs in the survey (57%) attribute improved profits to broadband and over two-thirds (69%) with lowering their cost base.
- About half of SMEs in the survey improved their productivity because of ASDL (by about 11%), and this percentage is expected to rise to 75% over the next 1–2 years.
- More than half of SMEs see themselves as improving turnover because of ASDL, again of the order of 11% since installing broadband.

[7] Report available online at: http://www.btinterface.co.uk/reports/sme_broadband.html

- Nearly half (49%) of SME broadband users have improved their employee satisfaction because of ADSL, and this will rise to 69% over the next 1–2 years.
- Some 60% of SMEs see ADSL as providing them with competitive advantage.

Recent research by Actinic (2002) shows that, in their sample of UK SMEs, 72% believe their ecommerce site is profitable, and that increased sales remain the main justification for ecommerce adoption. Of those adopting ecommerce, 50% of respondents experienced increased sales or wider market coverage. However, it should be noted that 'early adopters' may have done so because they could obtain these benefits and it does not follow that all SMEs will benefit in the same ways.

The DTI benchmarking study (2001) suggested that for ***all*** businesses in the UK there were few large differences in terms of connectivity or access to the Internet. For example, in all regions 90% of businesses or more have access to the Internet. In most UK regions the proportion grew from 2000-2001, but at a slower rate than in previous years. In previous years Greater London has had more businesses using ICTs. In terms of the number of employees using the Internet at least once per month, however, it is still 12% ahead of any other region.

Other research has shown that within the UK there are regional variations between SMEs. Yell's Small Business Watch (2001), for example, showed that SMEs in London and the South East were more likely than other regions to have their own website. Nearly two-thirds of SMEs in the Thames Valley and more than 60% in London are now online, but in contrast only 39% of SMEs were in the West Midlands and just over 40% in Yorkshire and Wales. More positively, current and potential users during 2001 saw themselves as growing their ebusiness. Some 70% believed they would be purchasing and 54% selling online by next year. Just under 50% will be selling to other businesses and government. More negatively, 25% of SMEs did not believe the Internet was relevant to their business and 11% felt they lacked the skills or knowledge to go online.

The dominance of London in the SME ICT stakes was also confirmed by the Federation for Small Business (2002). In their annual survey it was found that the highest usage of computers was in London, where only 8% of those surveyed did not use computer technology. London also had a much higher uptake of broadband technology (11%) then elsewhere. The survey also confirmed that nationally, costs remained the biggest restraint to new technology uptake. However recent research by Dixon and Marston (2002) of companies in the City of London indicates a digital divide between SMEs and other companies particularly in relation to broadband access.

A survey of North West SMEs in 2000 (KP Associates, 2000) highlighted lack of time and quantity of products and services available as being key barriers to ICT in SMEs. Initiatives such as Business Link were seen as being vital to promote ICT. This was also a finding in the Local Futures Group (2000) research on West London SMEs. Being a successful 'e-SME' meant incorporating industry-specific skills, business and ICT skills, as well as meta skills, or the ability to learn how to learn. Moreover, delivering ecommerce means integrating the following:

- Coordination – providing services at point of delivery.
- Continuity – long-term relationships with agencies and individuals representing the public infrastructure.
- Communications – one-stop shops for information and advice.

- Close to the user – ideally ecommerce support services should be delivered in SME workplaces, but the key to the future is cultivating a 'teleculture' in SMEs where there is trust and acceptance.
- Case studies – more research is needed to inform business of best practice.

Finally, a recent survey by HSBC (2001) found that 80% of respondents (two-thirds of sample were SMEs) believed the Internet would be the key to their future, although this was especially so amongst larger businesses.

2.5 International comparisons

The EU places great emphasis on achieving the goal of becoming the world's most dynamic and competitive knowledge-based economy by 2010. To achieve this the EU has recognised the need to promote an 'Information Society for All', and to address the issues of the digital divide in the adoption of the Internet and eBusiness adoption and use (European Commission, 2002)[8].

Currently statistical evidence (see DTI (2001) for example) points to two main digital divides across member states:

- Regional digital divide arising from different rates of progress in eBusiness development in the EU, generally seen as between the leaders in Nordic/Western Europe and the laggards in Southern Europe.
- The digital divide by company size arising from the gaps between SMEs and larger enterprises in terms of eCommerce and eBusiness. Generally the smaller the company the less likely it is to use ICT.

The effect of these two divides is cumulative and therefore gaps tend to widen.

SMEs seem to lag larger enterprises in Europe because:

- SMEs are often forced to accept market conditions as they find them, and are not able to shape conditions as easily as larger firms.
- SMEs have limited resources for experimentation and cannot afford to make expensive mistakes.
- SMEs often have small and clearly defined niche markets which are restricted to certain regions and certain parts of the value chain.
- SMEs frequently have legacy systems which have become outdated, and which require further expenditure to replace.

Research by the EU (European Commission, 2002) has also shown that the most important factor impeding SMEs of all sizes from going digital is the belief that ecommerce is not applicable to their type of products or services and the lack of perceived commercial benefit. However, this may be due to the survey's focus on ecommerce rather than ebusiness. ICT skills gaps seem also to be more important for small enterprises than for larger and medium ones.

[8] Available at http://europa.eu.int/comm/enterprise/ict/policy/benchmarking.htm

2.6 Conclusions

This chapter has shown how the UK government has set targets to achieve key goals for ebusiness. In terms of online SMEs, the target of 1.5 million micro, small and medium-sized businesses online by 2002 has already been achieved, and the UK features reasonably well (i.e. good, but not the best) in terms of overall connectivity and other measures. Digital divides also occur nationally and regionally in EU member states and between SMEs and larger organisations.

This is only part of the story, however. Only 1% of all SMEs use broadband in the UK. The UK does less well here in terms of its international rankings. Regional differences in ICT use and broadband access are also present in the UK, mirroring elements of a digital divide in the business world. Trading online also comes less easily to SMEs than to larger organisations.

Moreover, there is a presumption in this that ICT is a 'good thing' for SMEs. The next section of this report critically examines this viewpoint.

3 ICT and SMEs – A Review of Research

3.1 Introduction

There has been a range of research that has analysed the relationship between ICT and company performance. The work of Paul Strassman (1997) has been particularly sceptical. He suggested there was no correlation between expenditure on IT and any known measure of productivity. Using a simple scattergram between return on equity and IT spending per employee, Strassmann suggested that spending more on IT does not in itself boost economic performance. This does not contradict the fact, however, that frequently computers make decisive contributions to efficiency, competitive viability, and value creation. But high and low spending levels were associated with both inferior and superior results. The same lack of correlation occurred when a single industry was examined.

However, the accepted wisdom amongst many observers has been that IT delivers competitive gains, speeds up business transactions, increases customer satisfaction, delivers superior quality and leads to improved profitability. Brynjolffsson and Hitt (2000) suggest that the fundamental economic role of IT becomes clearer if one thinks about organisations and markets as information processors. Most of our economic institutions and intuitions emerged in an era of relatively high communications costs, limited computational capability and related constraints. IT has the ability to reduce co-ordination costs, communications and information processing. Moreover, IT is best seen as 'general purpose technology' where the economic contributions are larger than simply the result of multiplying quantity of capital investment by a normal rate of return. Instead they facilitate complementary innovations.

Much of the research in the field has focused on companies, irrespective of their size, but there has also been a body of work that has examined SMEs, and in particular small firms. This chapter summarises the work in this field and draws conclusions.

3.2 The unique nature of SMEs

Although the relationship between ICT and SMEs is firmly linked to UK government policy, there have been problems with developing research in the area (Brock, 2000).

Southern and Tilley (2000) suggest that this is because:

- There is a lack of analytical clarity on the small firm and how it should be viewed, which has led to a limited conceptual understanding of the relationship between small firms and ICTs.
- Little is known about how small firms are responding to the opportunities provided by ICTs, if indeed small firms see the technology as an opportunity.
- Even less is known about why and how small firms use ICTs, and it is often assumed using technology is a 'good thing'. Many impact studies have therefore used a technologically deterministic approach that overlooks key actors: managers and employees.

Much of what applies to large firms simply does not apply to SMEs. Structural differences can be observed between large and small firms:

- Large organisations often use ICT to co-ordinate and communicate across different organisational levels and divisions, whereas SMEs often use ICT for less formal communication;

- Small firms use ICT more as tools to support specific organisational tasks such as administration and accounting, rely on standard, off-the-shelf solutions, and on external support.

3.3 What does the literature tell us?

Brock (op.cit), in a review of empirical literature, suggests that ICT use in SMEs varies according to:

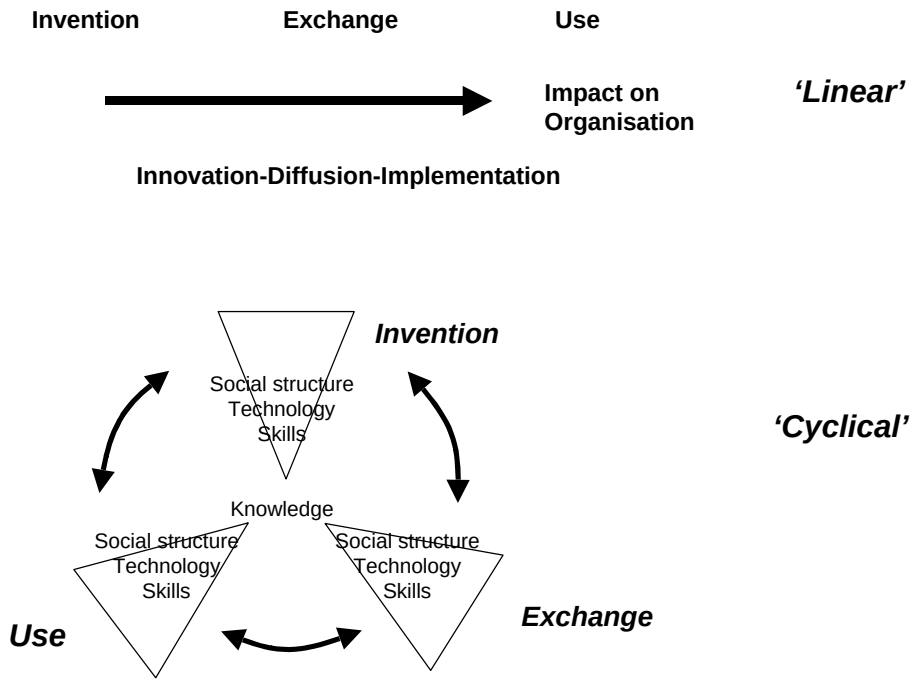
- Size of firm – the smaller the internal resource base, the less likely it is to use ICT;
- Age of firm – younger firms may be more likely to use ICT and SMEs with younger employees may be more likely to use ICT;
- Industry sector of firm – wholesaling and retailing may be more likely to use ICT than other sectors;
- Firm's experience of ICT, including top manager role and end user – ICT experience is important;
- Role of external support – informal and formal sources are very important; and,
- Usage pattern of ICT – SMEs use ICT mainly for operational and administrative support rather than for strategic decision-making.

Southern and Tilley (op.cit) offer a valuable taxonomy of previous research perspectives in the field:

- **Technology**. This type of work has dominated the field and has generally used an information systems or IT perspective (see, for example, Cragg and King, 1993). Such studies have sought to examine which factors lead to IT success within a firm.
- **Management/Organisational**. The emphasis here is on understanding the small firm's strategic approach to using IT and the capabilities and structures of the small firm to use the technology.
- **Small firms**. This approach lies in understanding the domain from the perspective of a small firm manager (see, for example, Blackburn and McClure, 1998; Fuller and Southern, 1999). Essentially this reinforces the view that technology in the small firm only has meaning and can only be measured in the context of business activity.

Scarborough and Corbett (1992) suggest that although the typical linear model of technological innovation highlights the transformational aspects of technology and the key social processes from which it emerges, it clings to a deterministic view of technological change (Figure 3.1). It implies that technological necessity operates by welding science, technology, markets and organisations together into an objective and interlocking causal chain. Scarborough argues for a rather different model, viewing invention, use and exchange of technology in terms of subjective actions and loosely coupled forms of social organisation, giving rise to a cyclical and reciprocal process rather than a linear process.

Figure 3.1 Two contrasting views of technological change (after Scarborough and Corbett, 1992)



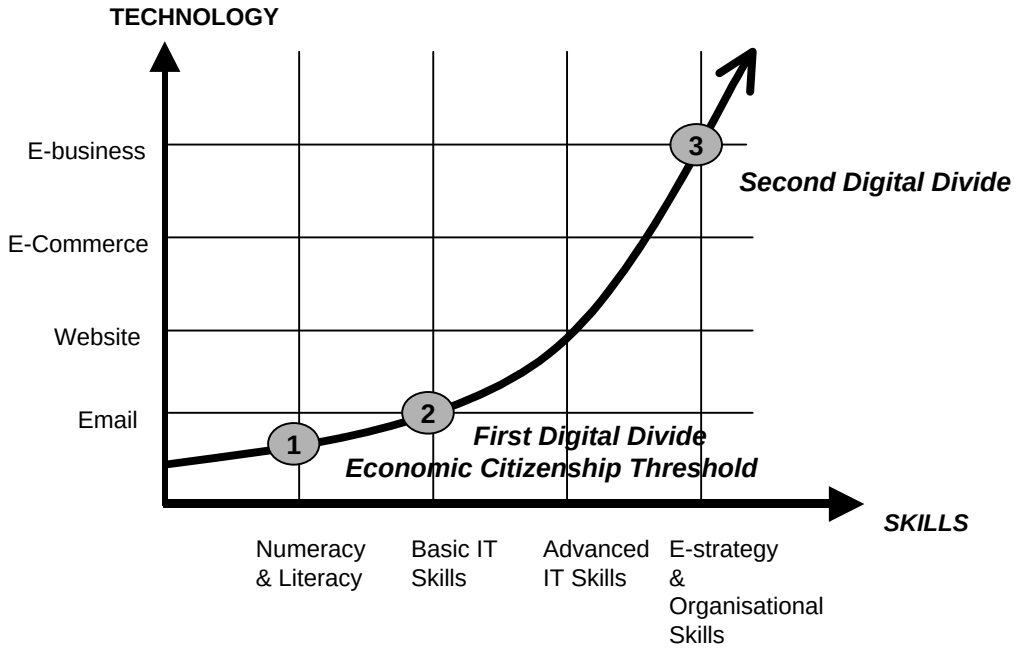
But the linear model (closely aligned to the DTI 'e-adoption' ladder[9]) finds favour with Local Futures Group (2001). In their report on 'e-London' they suggest how SMEs develop new skills and ICT needs on their way to becoming 'e-SMEs', of firms that shift to new business models underpinned by e-commerce (Figure 3.2). They model e-SME business development in terms of crossing two digital divides:

- The first divide requires basic ICT skills to operate email and a simple brochure website
- The second divide requires more advanced technology and ICT skills (including R and D), and a wide range of specialised knowledge (For example, management development and strategy, marketing).

DTI research (2001) shows that about 25% of London's SMEs are not past the first divide, but 25% are with 50% located somewhere between the first and second divides. Local Futures suggest that increasing the knowledge and skills base of SMEs across the board, especially in low knowledge-intensity sectors holds the key to transforming SMEs. Their research shows a high correlation between knowledge intensity in the SME sector, and the state of ecommerce development at a local level. Their data suggest that London is outperforming other regions of Britain in this respect.

[9] The e-adoption ladder is a linear model which implies sequential adoption of ICT from email and website use through ecommerce, ebusiness and to 'transformed organisations'.

Figure 3.2 Local Futures model of ecommerce developments in SMEs (the 'e-SME' curve)



Martin and Matlay (2001) also offer a critical analysis of previous research as well as the implicit assumption in the adoption ladder approach that all firms somehow can subscribe to a linear development in ICT. In their view, this generalist view of small firms operation fails to distinguish between businesses of various sizes, ethnic origin, stages of adoption and so on. They also caution against treating increase in ICT ownership as evidence of use, and suggest much of the increased expenditure in 1999 in the UK and elsewhere was due to Y2K. Essentially they also favour a perspective which examines the reactive or proactive approach of managers to ICT, where perceptions and commitment are all-important.

This view has been supported by Blackburn and McClure (1998), who sought to investigate the use of ICT in small business firms. Their study found an uneven rate of IT innovation and varying use of ICT. Moreover, they found that owner–managers were a key influence in determining use, based on attitudes to ICT, level of ICT skills, and management orientation (i.e. IT-focused or operation/administration-focused). They therefore identified three types of owner manager: enthusiast, pragmatist and artisan (Table 3.1).

Table 3.1 Typology of Owner–Managers (after Blackburn and McClure, 1998)

Enthusiasts	***Pragmatists***	***Artisans***
High IT skills	Low IT skills	Low IT skills
Positive attitude	Pragmatic attitude	Unconvinced attitude
IT management focus	IT management focus	IT operations/administration focus

Southern and Tilley (2000) build on this, using interview-based methods, to develop a model which is based on the typology of the whole firm. This is founded on a non-hierarchical approach, which suggests the relationship between types of ICT use is non-linear, dynamic and relative with fuzzy boundaries. Their typology is:

Low small firm users of ICTs. This group is typically a subset of the small firm population grouped towards the low end of ICT use. They range from those who have no information technology to those firms with stand-alone PCs. In these firms, the primary route for IT is its introduction into the office (the automation of office functions) well before it is integrated into the production process or service delivery. Responsibility for decision making, development and use of IT lies usually with the owner-manager, and importantly the idea of information and communications technology does not fit so well with the mental concept held within the firm of the business. For instance, telephone systems are perceived as a distinct tool with a different purpose compared with computerised information systems.

Medium small firm users of ICTs. In this group of small firm users, it is possible to see a more visible use of IT in the business. Typical features, in addition to those outlined previously for low users, include greater levels of IT (technological) expertise available within the firm; some evidence of IT and communications technology operating as separate systems within the firm; a tendency towards networked information systems and use of fileservers that allow more open access to company data; evidence to suggest use of IT in the production process, such as computer numerically controlled machinery and even some limited use of email. There is evidence of greater planning and the delegation of IT responsibilities within the business, which would incorporate developments in ICTs. Finally, medium users would experience a number of routine upgrades of hardware and software technology, and become accustomed to a continuous process of thinking about IT and how it affects the business.

High small firm users of ICTs. Grouped towards the high end of use, many firms in this category exhibit signs of a much more sophisticated understanding of ICT and how the technology can be applied. In fact, there is some evidence that use may well be leading edge and innovative. Small firms in this group of users will be thinking about how to integrate ICT into their business much more fully, attempting to 'informate' their business processes. The trend in these firms is for digital communications systems to replace analogue systems, meaning seamless interaction between speech and information analysis. File transfer facilities, use of electronic data interchange, email and world wide web pages were common in these firms. High users are well on the way to recognising how the technology can be used to influence the support structures and primary activities within the business. Not only will IT be planned on a much more structured basis, but ICTs will have become a formal responsibility, probably delegated to a dedicated person, such as the IT manager.

Although the above division is a simple grouping, it is intended to avoid determinism and show how social shaping of ICTs is grounded in the technological experiences of the key personnel in the firm. It does not assume access for particular technologies, steers away from a linear adoption ladder, and shows the importance of internal and external factors in shaping small firm use of ICT.

Finally, however, it is clear that, as the importance of the Internet grows, increasing the global reach of SMEs, inter-organisational ICT will become more important if smaller firms are to take advantage of the B2B supply chains being created by larger firms (Brock, op.cit.).

This also highlights the need for further empirical research in this sector. Little is known about ICT use in small firms, and longitudinal research has tended to be

marginalised by cross-sectional studies. Key variables such as size, age of firm, stage of adoption and other factors need investigation. This rich diversity of SME types means that policy makers must also tailor policies to ensure both skills development and financial support schemes reach the range, rather than the lowest common denominator.

3.4 Conclusions

This chapter has shown how both technological change and workplace change has impacted on organisations. Much has been written about how ICT impacts on corporate performance, but the literature is not clear-cut and the work of Paul Strassmann in particular casts doubt on the evidence. There has certainly been a tendency to create a deterministic view of ICT and its role in organisations, and this has been compounded in the SME sector by a lack of clarity in research.

Qualitative factors such as management skills and leadership have often been ignored, and there is a real need to consider other factors such as age of firm, size and maturity of ICT usage as explanatory factors. Southern and Tilley's work presents a useful typology of use, but more research is needed in this field.

4 Summary and Key Issues

4.1 Introduction

The SME sector is clearly a vital cog in the engine of growth of the UK economy. With some 3.7 million SMEs producing 40% of the UK's GDP, the UK government recognises this fact.

Various policy initiatives have been developed to support and stimulate the sector, and the current government has set great store on targeting SMEs as a particular growth opportunity for ICT. Policy has also reflected these concerns. Targets have been set to benchmark the UK against international standards and the target of 1.5 million SMEs online by 2002 has already been met. However, particular concerns remain, which are highlighted in relevant government statistics:

- Internationally, the UK SME sector is 'average' in terms of connectivity;
- Regional differences in SME online access appear to persist in the UK;
- Despite the perceived advantages, a very small proportion of SMEs have adopted broadband, reflecting wider issues over roll-out to the UK as a whole; and
- A very small proportion of SMEs trade online.

This reflects a number of barriers, which can be identified from the relevant literature:

- A lack of awareness of the potential of ICT;
- Lack of IT skills base;
- High initial set-up costs;
- Security/privacy issues; and
- Lack of staff to implement ICT.

However there are three other fundamental issues that our review of research highlights:

- The heterogeneous nature of SMEs;
- The lack of research on the real impact of ICT on SMEs; and
- The role of property and infrastructure in the ICT/SME relationship.

In turn this has implications for policy makers and the setting of a future research agenda to address particular knowledge gaps.

4.2 Heterogeneous nature of UK SMEs

Previous research and literature have highlighted the definitional problems of SMEs. Firms differ in their size, maturity, the nature of the business, location and turnover and so a single stick or carrot policy is unlikely to be applicable to all SMEs. Although Government recognises this, much of SME policy has been shaped by a consideration of the lowest common denominator from a purely pragmatic standpoint.

We would argue that further research needs to be undertaken in the SME sector that recognises the diversity of firm and culture so that policy can more accurately be tailored to fit the SME sector's requirements.

4.3 Lack of research on ICT and UK SMEs

The field is marked by a lack of empirical research on the impact of ICT on SMEs. In more generic terms, there has been much work carried out that has taken a deterministic view of ICT. This has been predicated on the assumption that ICT must be a 'good thing' for SMEs, and has in turn led to such models as the 'e-adoption' ladder being adopted, and perhaps too uncritically.

It has also been difficult for researchers to isolate trends in IT from more general economic and organisational change drivers, such as the changing work paradigm. Moreover, research has often failed to examine the role of size, age, sector experience of ICT and management support within single integrated studies. Other factors are likely to include level of internationalisation, types of exporting activities, awareness of benefits, types of customer and imposition by larger trading partners.

This has exacerbated the patchy nature of much research. Empirical work has also tended to be cross-sectional in nature, making time-series comparison much more difficult. Critically there has also been a failure to move outside the realms of normative or descriptive research in many instances. A case in point is remote SMEs in more marginal parts of the UK: although ecommerce can potentially provide global markets through richness and reach, the companies still require the fundamentals of distribution networks and direct markets to be successful.

More successful, qualitative research built on case studies has found that managerial support and a sense of strategic direction have been fundamental in ensuring ICT success in SMEs.

4.4 Role of property and infrastructure

Commercial property houses the infrastructure of business, including ICT. Landlords have the potential to improve the supply of broadband by 'wiring' their buildings. However, there are a number of questions and uncertainties for landlords. What will be the likely return? What is the critical market size? Where is the market? Will the value of the underlying asset be improved? Therefore we would argue that more research work is needed to examine how landlords in the SME sector will influence the shape and form of broadband roll-out in the UK.

It is clear that commercial property leasing as a business sector has not been immune from the impacts of ICT on business. Some building owners are using Internet-centred technology to transform their relationships with their tenants. For a range of defensive and entrepreneurial motives, they are attempting to aggregate the buying power of their tenant base and provide additional services to their tenants. They have identified SMEs as the core market. Broadband is both a service that they would like to supply and a pre-requisite for many of the services offered.

A key issue for landlords is how they view the operation of their asset. Traditionally they have tended to regard their core business as 'bricks and mortar', whilst the tenant has been far more concerned with the role of the building as economic capacity for their business. As the new economy changes the balance of competitive pressures in favour of the client/tenant, landlords who focus their business upon the provision of capacity believe that they will gain a competitive edge.

It will therefore be important to examine how applied technology, property and related economic and organisational factors all work to impact on the SME sector.

4.5 Policy, knowledge gaps and a future research agenda

Research from the European Commission (2002) has shown that SMEs face particular problems when it comes to introducing ICT. Generally statistics suggests across the EU that the smaller the enterprise the less likely it is to use ICT. However, this does not imply that specific SME policies will necessarily solve these problems. SMEs benefit from a reliable, stable and open business environment. Therefore policies which encourage this as well as liberalisation of telecomms supply, and the interoperability of ICT solutions, and easier access to finance through 'horizontal' policy initiatives are likely to succeed in tandem with SME-specific initiatives.

Moreover policy support has clear limits and must recognise that:

- The main responsibility for going digital lies with SMEs themselves.
- It would be unreasonable to expect every SME would want, or be able to find, profitable opportunities to benefit from eBusiness. In other words target benchmarks do not necessarily need to be 100%.
- There are signs of 'e-Fatigue' with the collapse of dot.coms.

Many EU member states have launched promising policies aimed at helping SMEs make better use of ICT and the Internet as business tools: learning from their success will be critical.

In a European context, the 'SMe-Ecommerce programme[10] highlighted six key policy measures, which included supporting access to high quality consultancy for SMEs; promoting information on ICT potential; encouraging the more active role of business associations; raising skills levels in SMEs; developing standards for ecommerce and eprocurement and increasing fast and cheap internet connections.

But, as Southern and Tilley (2000) state:

> *'Too often, measuring small firms' use of ICT in quantitative terms only misses the complexity of the relationship between small firms and the technology. There can be no simple formulae set out to indicate how and why small firms will adopt, implement and then successfully manage ICTs.'*

Any research agenda must recognise this. Our review of available literature and statistics has enabled us to identify particular research questions which will be important to address:

- How is ICT impacting on SMEs across a range of size and sector groups?
- What evidence is there that ICT really improves SME performance, and how can this be measured?
- What role does managerial leadership and other human resource issues play in the introduction of ICT?
- How are SMEs changing in their use of ICT?
- How are SMEs using ICT currently and how do they plan to use it?

[10] See website at http:/europa.eu.int/ISPO/ecommerce/godigital

- What are the most important factors influencing ICT use in SMEs?
- What role does property and infrastructure play in the ICT-SME interface?
- How do economic and organisational factors interact to drive property and ICT demands in the SME sector?
- Can commercial landlords become important agents in the broadband supply chain?
- How can landlords' services be best provided to include the broadband element for SMEs?

References

Actinic (2002) Ecommerce Report 2002 (at www.actinic.co.uk)

Blackburn R. and McLure R. (1998) The Use of ICTs in Small Business Service Firms, Kingston Business School.

Brock J., Kai-Uwe (2000) 'Information and communication technology in the small firm', in Carter S. and Jones-Evans D.(Eds), Enterprise and Small Business: Principles, Practice and Policy, Prentice Hall

Brynjolfsson E. and Hitt L. (2000) 'Computing Productivity: Firm-level Evidence', MIT Working Paper (see http://ebusiness.mit.edu/erik/)

Cragg, P., and King (1993) 'Small firm computing: motivators and inhibitors', MIS Quarterly, 17(1), 47-60

Dixon, T., and Marston, A. (2002) London's Information Economy: The Impact of eBusiness on the City Office Market, College of Estate Management (see www.cem.ac.uk)

DTI (2000) Opportunity for All in a World of Change

DTI (2001) Business in the Information Age: International Benchmarking Report

DTI/Spectrum International (2000) ICT Benchmarking Study

European Commission (2002) Benchmarking National and Regional e-business policies for SMEs, EC

(available at: http://europa.eu.int/comm/enterprise/ict/policy/benchmarking.htm)

Federation for Small Businesses (2002) Lifting the Barriers to Growth in UK Small Businesses, FBS (available at: http://www.fsb.org.uk/policy/lbg2002/default.asp)

Fletcher Advisory (2001) Analysis Document: SME Broadband User Research (available at http://www.btinterface.co.uk/reports/report_pdfs/sme_broadband.pdf)

Fuller E.C. and Southern A. (1999) 'Small Firms and Communication Technologies: Policy Issues and Some Words of Warning', Environment and Planning C: Government and Policy 17, 287–302

HSBC (2001) The Success in Business Survey – Results Report

(available from http://www.chamberonline.co.uk/)

KP Associates (2000) Report on 2000 e-commerce survey for North West England

Local Futures Group (2001) E-London and the London Plan, A Report to the GLA from the Local Futures Group (available from http://www.localfutures.com/)

Martin L. and Matlay H. (2001) 'Blanket Approaches to promoting ICT in small firms: some lessons from the DTI ladder adoption model in the UK', Internet Research: Electronic Networking Applications and Policy, Vol 11 No 5, 2001, 399–410

National Statistics (2001) First e-commerce survey of business (available at http://www.statistics.gov.uk/pdfdir/ecom0501.pdf)

Oftel (2002a) Business Use of the Internet: Oftel Small and Medium Business Survey: Wave 7 November 2001

(available at http://www.oftel.gov.uk/publications/research/2002/q7intb0202.pdf)

Oftel (2002b) Business Use of Internet: Oftel Small and Medium Business Survey, Q8 February 2002

(available at http://www.oftel.gov.uk/publications/research/2002/q8intb0502.htm)

Scarborough H. and Corbett J.M. (1992) Technology and Organisation: Power, Maning and Design, Routledge

Southern A. and Tilley F. (2000) 'Small Firms and ICTs: toward a typology of ICTs usage', New Technology, Work and Employment, 15:2, 138–154

Strassmann P. (1997) The Squandered Computer, Information Economics Press (see http://www.strassmann.com/)

Yell (2001) Small Business Watch Survey – Summary of National Findings