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ICT in Small Firms: Factors Affecting the Adoption and Use of ICT in Southeast England SMEs

G. Harindranath
University of London, g.harindranath@rhul.ac.uk

R. Dyerson
University of London, r.dyerson@rhul.ac.uk

D. Barnes
University of London, david.barnes@rhul.ac.uk

ICT IN SMALL FIRMS: FACTORS AFFECTING THE ADOPTION AND USE OF ICT IN SOUTHEAST ENGLAND SMES

G. Harindranath, Royal Holloway, University of London, Egham, Surrey TW20 0EX, g.harindranath@rhul.ac.uk

Romano Dyerson, Royal Holloway, University of London, Egham, Surrey TW20 0EX, r.dyerson@rhul.ac.uk

David Barnes, Royal Holloway, University of London, Egham, Surrey TW20 0EX, david.barnes@rhul.ac.uk

Abstract

This paper explores patterns of adoption and use of information and communications technology (ICT) by small and medium sized enterprises (SMEs) in the southwest London and Thames Valley region of England. The paper presents preliminary results of a survey of around 400 SMEs drawn from four economically significant sectors in the region: food processing, transport and logistics, media and Internet services. The main objectives of the study were to explore ICT adoption and use patterns by SMEs, to identify factors enabling or inhibiting the successful adoption and use of ICT, and to explore the effectiveness of government policy mechanisms at national and regional levels. While our main result indicates a generally favourable attitude to ICT amongst the SMEs surveyed, it also suggests a failure to recognise ICT's strategic potential. A surprising result was the overwhelming ignorance of regional, national and European Union wide policy initiatives to support SMEs. This strikes at the very heart of regional, national and European policy that have identified SMEs as requiring specific support mechanisms. Our findings from one of the UK's most productive regions therefore have important implications for policy aimed at ICT adoption and use by SMEs.

Keywords: Information and communications technology (ICT), small and medium sized enterprises (SMEs), adoption, policy

1.   INTRODUCTION

Small and medium sized enterprises (SMEs) are an important part of the European economy (the most widely used definition of an SME is that of a firm with 0-250 employees (DTI, 2007); small being less then 50 employees and medium sized between 50 and 249). According to the Observatory of European SMEs (2003), 92% of all European enterprises employ less than 10 people. In the UK, 99.9% of the nation's 4.3 million business enterprises are SMEs. They account for well over half of employment (58.9%) and turnover (51.9%) (DBERR, 2007). Policy makers at European Union (EU), national and regional levels have sought to actively promote SMEs with the aim of bolstering competitiveness and encouraging collaboration with like-minded businesses, providing the basis for innovation and accelerated growth (for instance, see OECD, 2004). In the UK, the Southeast England Development Agency (SEEDA) has called for a 'southeast commitment to mirror the EU's ambition of becoming the most competitive knowledge-based economy by 2010' (SEEDA, 2003).

In this context, the adoption and use of information and communications technology (ICT) is widely seen as critical for the competitiveness of SMEs in the emerging global market. Given this backdrop, how can SMEs be better equipped to use ICT? Are SMEs in the southeast of England, perhaps the most dynamic region within the UK, making adequate use of ICT? What factors enable or inhibit the successful adoption and use of ICT by SMEs in this region? Are EU and UK regional policies perceived by SMEs as successful and relevant to their business reality? This paper seeks to answer these questions through a survey of SMEs in the southwest London and Thames Valley region of England.

2.   ICT ADOPTION AND USE IN SMES

Although ICT adoption studies constitute a significant area of research within the information systems domain (Fichman, 2000), there continues to be a need for better understanding of the factors that drive or inhibit the adoption and use of ICT within the specific context of SMEs (Caldeira and Ward, 2002; Al-Qirim, 2004; Bharati and Chaudhury, 2006). The Observatory of European SMEs has specifically identified the need to build ICT-related capabilities and competencies within European SMEs (see Observatory of European SMEs, 2003). Despite this recognition, there is evidence that SMEs have not been quick to respond to changes in ICT and that their take-up of such technologies has not been widespread (Pool *et al.*, 2006).

SMEs are generally seen as being at a disadvantage to larger businesses. They are likely to have a limited availability of resources in terms of time, money and expertise (Wymer and Regan, 2005). Their inferior technology and managerial capabilities have often shown to be a constraint on their effective use of new technologies (Caldeira and Ward, 2002). Furthermore, small businesses are likely to have a heavy reliance on the expertise and motivations of an owner-manager. In particular, their technical expertise and their attitude towards ICT can affect their company's ability and willingness to engage with ICT matters.

However, SMEs could be seen as being no different from their larger corporate cousins in one key aspect, i.e. to survive and prosper in competitive business arenas both sets of firms have to successfully sustain a competitive advantage. Following Porter (1985), sustained competitive advantage requires above average profitability over a number of years. How that is achieved requires a fit between the structural conditions of the industry that the firm trades in and the strategic choice that they make. Essentially, strategic choice refers to the pursuit of either a cost leadership position or differentiated position predicated on offering a superior value proposition to customers. How useful ICT is here in helping to facilitate one or more strategic choice is debatable. Porter (2001) and Carr (2003) for example have expressed opposing views as to the value of IT in achieving superior business performance (see also Dixon *et al*, 2002). The evidence in terms of SMEs' use of ICT for strategic

objectives is somewhat mixed. Although Levy *et al.* (2005) found that strategic intent did influence the decisions by SMEs in the UK West Midlands to invest in electronic business, much of the literature on ICT use by SMEs highlight the mostly operational nature of such use.

Pavic *et al.* (2007) argue that SMEs have the opportunity to achieve a competitive advantage from advances in ICT through innovation, marketing, efficiency gains, better quality and customer responsiveness. However, their study of e-business adoption and use by UK SMEs points to an inability to make effective strategic use of the technology. In particular they identify owner's attitudes and lack of relevant knowledge and skills as problematic issues.

Are SMEs then using ICT in a proactive or reactive manner? While Levy *et al* (2002) found some evidence that SMEs can act proactively in relation to ICT use, other researchers have found that SMEs continue to deploy ICT in a reactive, cost reducing manner (Hagmann and McCahon, 1993; Yetton *et al,* 1994). In an interesting albeit small study, Grandon and Pearson (2004) found that the perceptions of senior managers as to the strategic value of e-commerce related primarily to improving managerial decision making.

Wymer and Regan (2005)'s study of SMEs from the US emphasised cost as the overarching determining factor for ICT adoption. Swedish research points towards SMEs engaging in e-commerce in an evolutionary rather than a revolutionary manner, with SMEs changing the way they conduct business only very slowly (Eriksson and Hultman, 2005). Research into electronic commerce adoption amongst New Zealand SMEs shows that unless there are strong driving factors there was a marked reluctance to commit scarce resources to perceived risky ICT initiatives (Al-Qirim, 2006). This lack of engagement with electronic business in practice tends to further disadvantage SMEs compared to larger companies.

Other US research may offer an explanation for this slow uptake, with Bharadwaj and Soni (2007) finding that a major reason for businesses not engaging in e-commerce is their perception that it is not strategically important for their businesses. A major report on e-business activities across 10 different sectors in the EU, however, demonstrated that IT does matter as a strategic device (E-Business Watch, 2004). But SMEs are often constrained by the lack of skills, managerial capabilities, as well as the paucity of internal and external relationships (with skilled personnel, and partner organisations and networks) that enable them to exploit ICT strategically (Ritchie and Brindley, 2005; Stroeken, 2001).

This brief review of the literature illustrates the mixed picture that emerges in relation to ICT adoption and use by SMEs. The situation is no different in the context of UK SMEs. Many of the studies on ICT use by British SMEs (for instance, Thwaites and Wynarckzyk, 1993; Naylor and William, 1994; Levy *et al.*, 2001; Martin and Matlay, 2001; Simpson and Docherty, 2004) are now dated owing to changes in both markets and technologies. A few recent studies have focused on particular UK regions such as the West Midlands (Costello *et al.*, 2007), Yorkshire (Pritchard, 2006), and South West England (Igonor, 2007). This paper aims to provide a complementary snapshot of the current patterns of adoption and use of ICT by SMEs in the South East of England, the UK's most dynamic and productive region.

3.   RESEARCH METHODOLOGY

We used a telephone survey method with a standardised questionnaire of 66 questions organised into 6 major sections: business specific questions, current ICT use, use of Internet and e-commerce, ICT investments, staff skills and training for ICT use, and ICT advice. Each question also gave the respondent the option of providing additional comments.

The business specific questions asked for company and respondent details as well as questions on firm size, firm history, firm's main products and services, key customers and markets. We also asked respondents questions concerning their key business strengths (e.g., low cost, product quality, innovation, other specialised expertise etc), main business plans (in terms of increase in sales or market share etc), and whether the firm had any formal strategy documentation. Questions on current ICT use focused on types of ICT used (such as email, Internet, wireless etc) and kinds of ICT applications (stock control, sales, marketing, HR, ERP etc). This section also included questions on business benefits from ICT, key ICT problems faced by the company and a question on whether the firm's ICT investment represented value for money.

The section on Internet and e-commerce usage asked a series of questions on the type of Internet connection used, whether the firm used the Internet for online sales/purchase or for information gathering and sharing, and whether the Internet had any impact on sales (for example through increased sales). We also asked a question on e-commerce challenges faced by the firm. The section on ICT investment included questions on the firm's IT strategy, how they funded and justified their ICT investments, choice of ICT supplier, and a series of questions on ICT implementation and post-implementation evaluation. We also asked about any implementation challenges faced by the organisation. The section on staff skills focused on existing IT skills, skills shortages, how training was provided and any barriers to the provision of such training. The final section on ICT advice sought replies on where the firm obtained ICT advice, and if they had sought help or advice from government agencies.

Although there were 66 questions in total, we used various filtering mechanisms so that respondents could skip questions deemed irrelevant in their context. The telephone survey was carried out by a team of two individuals experienced in telephone surveys. The survey was conducted over a period of three months. Each telephone interview took on average between 30 to 40 minutes to complete. In the majority of cases the survey was answered by the SME owner/manager. In a small number of cases, the respondent was either an IT manager or a finance manager. The questionnaire was piloted in two companies prior to the formal survey.

Sector	Proportion of firms (%)
Food processing	24.46
Transport and logistics	26.46
Media	23.81
Internet	23.28

Table 1.   Breakdown of firms

We received a total of 378 responses from a total SME population of 2800 drawn from four economically significant sectors in one of most productive regions in the UK, the southwest London and Thames Valley region of England. The sectors chosen were: food, transport and logistics, media, and the Internet. See Table 1 for a sector breakdown. Companies were chosen for the survey from the Dunn and Bradstreet list.

In this paper, we present a preliminary analysis of our key findings from the four sectors covered in the survey.

4. PATTERNS OF ICT ADOPTION AND USE IN SOUTHEAST ENGLAND SMES

In this section, we present some of the key findings from the survey of the food, logistics and transport, media, and Internet sectors. We found some interesting differences between what we could characterise as 'traditional' sectors (food, transport and logistics) and 'new' sectors (media, and Internet).

4.1 Commonly used ICT applications

As Table 2 shows, SMEs focused overwhelmingly on functional applications, mostly sales and marketing functions, and document management systems. We also found that most SMEs surveyed used some form of accounting software. A surprising 50% of firms used ICT applications for human resources management. While almost all companies irrespective of sector used email and Internet, only a minority used Intranet and electronic data interchange systems.

	Computerised Systems Used (*number of replies*)							
	stock control	sales or marketing	design	market research	document management	production planning & control systems	HRM	ERP
Media	35	61	69	36	70	56	39	28
Logistics	29	67	17	28	91	44	54	21
Internet services	17	80	77	56	79	47	48	35
Food processing	77	74	41	40	94	57	56	19

Table 2.   Commonly used ICT applications

4.2 Reasons for investing in ICT

The predominantly operational nature of most ICT investments made by the SMEs can be clearly seen in Table 3. We found very little indication that investments were motivated by strategic or innovative considerations. When viewed against the paucity of ICT expertise within many of the firms surveyed, this result is not surprising. However, among the four sectors surveyed we found some evidence of sophisticated ICT usage in the most unexpected quarters, i.e. the traditional sectors of food, and transport and logistics. In both sectors, the usage of ICT was driven by the need to comply with government regulation for health and safety in the case of food, and for recording and controlling truck drivers' journey times in the case of the transport sector.

Main Reasons For ICT Investments Made Recently *(%)*						
increase operational efficiency	improve communications with suppliers	improve enhance customer service	keep up with competitors	enhance joint working in collaborative ventures	increase staff satisfaction	because customers demanded it
83	25	45	34	23	33	19

Table 3.   Reasons for investing in ICT

Table 4 below suggests that the SMEs in our survey are primarily focused on increasing sales rather than reducing costs, although both plans are not necessarily incompatible.

	Immediate business plan (number of replies)				
	Increasing sales	Increasing the number of trading locations	Increasing the number of markets served	Increasing collaboration with trading partners	Reducing costs
Media	66	12	23	28	27
Logistics	79	15	20	25	44
Internet services	78	9	14	22	13
Food processing	93	25	35	23	33

Table 4.   SMEs' immediate business plans/objectives

However, Table 5 gives some insight into what SMEs perceive to be their main capabilities or business strengths. What is striking is that most firms surveyed do not consider producing at low costs as a major business strength. Instead, many cited producing a quality product or service utilising specialised expertise as their key strength. This suggests that the SMEs in our survey are pursuing the goal of increasing sales through added value rather than lower cost. However, comparatively fewer SMEs referred to innovation as one of their key strengths. This suggests that SMEs may be missing out on opportunities to innovate using ICT.

	Business Strengths (number of replies)					
	low costs	quality of product or service	customer service	industry contacts & personal networks	innovation	specialised expertise/ products/services
media	27	67	44	41	28	71
logistics	25	76	63	29	17	60
Internet services	23	64	49	18	42	61
Food processing	20	88	55	24	46	65

Table 5.   Business strengths identified by SMEs

4.3   Barriers to ICT adoption

Table 6 and Figure 1 below highlight what SMEs perceive as key barriers to ICT adoption and use and major ICT concerns, respectively. As Table 6 shows, costs posed the biggest barrier to continued adoption of ICT, with over 55% of respondents identifying this as a problem. Surprisingly staff attitudes formed a very low barrier to further adoption.

After cost, the single biggest constraint on ICT investment was the uncertainty over the potential business benefit from such investments. Perhaps linked to this, a fifth of the respondents also cited lack of internal IT expertise as a barrier to ICT adoption.

Barriers to ICT Investment *(%)*				
Concern over costs	Uncertainty over business benefits	concerns over security	lack of internal IT expertise	concern over attitudes of staff
52	37	9	20	7

Table 6.   Barriers to ICT investment

Figure 1 highlights clearly the consequence of this poor internal expertise. It shows that many SMEs are concerned by their dependence on vendors and external contractors. This combined with technology challenges such as system crashes, technical complexity and technological obsolescence, all end up creating a rather difficult environment for ICT use within SMEs.
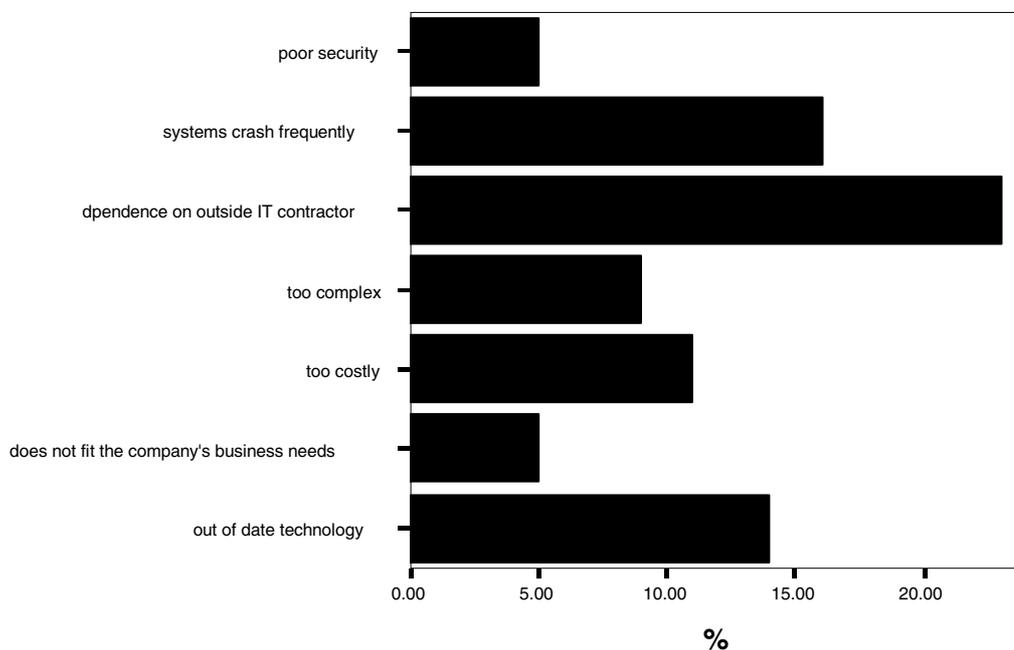

Figure 1.   Major ICT concerns

4.4   Perceived benefits from ICT, including impact of online sales

Table 7 reports the main perceived benefits from the respondents' past adoption of ICT. Although there were some variations between sectors, the influence of the customer (primarily business-to-business) and competitors appeared particularly strong. Broadly speaking, respondents viewed the benefits arising from ICT as one of product and service enhancement, not just resource saving. For example, the opportunity to make staff savings were mentioned by very few of the firms surveyed.

The overwhelming response in our survey suggests that irrespective of sector, SMEs questioned perceived that their ICT investment represented good value for money. The business impact of online sales differed between the old and new sectors. Firms reported comparatively greater impact for media and internet services than for logistics and food processing. The logistics and food processing sectors had the highest "no impact" response. It may be that the traditional sectors such as food, and transport and logistics were simply responding to new regulations that required them to adopt certain working practices using ICT, rather than acting on any specific business expectations or potential benefits from those ICT investments.

Perceived ICT Benefits (number of replies)						
	improved productivity	improved product/ service quality	faster response to customers	improved customer satisfaction	improved working on joint projects with other firms	keep up with competitors
Media	77	75	79	71	54	81
Logistics	56	77	75	62	34	72
Internet services	78	79	79	76	66	77
Food processing	71	60	78	67	45	83

Table 7.   Perceived benefits from ICT

4.5   Sources of ICT advice and funding

We found that the vast majority of firms sought help and advice from friends and family (37%), ICT suppliers (35%), and ICT consultants (nearly 50%). As Table 8 shows, most firms surveyed also pointed to some level of anxiety in being dependent on consultants. We noted a high level of distrust of external consultants and vendors; SME owner/managers often preferred to work with consultants recommended by known contacts or with friends and family members who had the required levels of ICT expertise.

Sources of Advice (number of replies)					
suppliers	personal sources friends family	trade associations	the media	government funded sources	consultants
129	134	36	40	15	150

Table 8.   Source of ICT advice

In terms of funding for ICT investments, the overwhelming majority of SMEs relied almost entirely on retained profits as opposed to commercial loans or venture capital (see Table 9). Government grants or loans did not appeal to our SMEs. Not only does this illustrate the cautious nature of most SME owner/managers but also a surprising unwillingness to engage with government bodies and initiatives.

Funding Sources (number of replies)				
commercia l loan	venture capital	government grant or loan	friends family	retained profits
16	11	3	6	321

Table 9.   Source of ICT funding

We will explore specifically this lack of engagement with government agencies in the following section.

4.6 Awareness of government policy

Despite the existence of a range of policy mechanisms aimed at SMEs, our firms demonstrated a high level of ignorance about these initiatives (see Table 10). Those that did comment on policies displayed a level of indifference to these as they were often seen as bureaucratic and cumbersome. This clearly highlights the challenge faced by policy makers and regional development agencies in the UK to drive ICT adoption and capability building within SMEs. Clearly, this would be an interesting area for future research.

Government Agencies Used (*number of replies*)						
business link	e skills into Business (sector development agency ESIB)	central government DTI trade partners UK	regional development agencies (SEEDA)	local government agencies borough or county council	learn direct IT courses	None used
73	1	11	7	5	4	268

Table 10.   Awareness of government policy

5. KEY ICT PROBLEMS FACING SMEs

While our main result indicates a generally favourable attitude to ICT amongst the SMEs surveyed, it also suggests a failure to recognise ICT's strategic potential. This result echoes that of a major OECD report (OECD, 2004) on European SMEs which found that while SMEs are generally positive about ICT, they are often constrained by other factors such as time, expertise and cost resource constraints.

The fact that SMEs often compete by differentiating their products and services through quality/niche strategies (Schubert and Leimstoll, 2007; Love *et al.,* 2004) implies a real opportunity to innovate using ICT. However, the majority of ICT applications implemented by SMEs in our survey are at a strictly operational level. A number of SMEs in the 'traditional' sectors such as food, and transport and logistics, did make use of sophisticated ICT but these were driven more by the needs of regulatory compliance than through any real understanding of ICT's innovative capacity. Competitive pressures do not figure highly amongst the SMEs surveyed. As Knol and Stroeken (2001) point out, the lack of strategic insights (often resulting from poor ICT literacy and an inability to understand its potential) constrain ICT adoption by SMEs.

SMEs surveyed were concerned about their technology being out of date and were keen to upgrade when the opportunities arose. But this favourable attitude to ICT was often tempered by harsh business realities of the costs involved in purchasing the required technologies and the levels of complexity that SME owner/managers often associated with those technologies. Overworked SME owner/managers found themselves repeatedly dependent on ICT suppliers and external consultants in dealing with technology problems and implementation challenges. When this is seen in combination with high levels of distrust of ICT consultants and vendors, we see a general picture of helplessness and frustration for these SME managers.

Within this context of resource constraints, SMEs tend to behave opportunistically driven by concerns of cost effectiveness rather than any strategic considerations (for instance, see Sadowski *et al*, 2002). Therefore, managers are keen to establish value for money and often question if new ICT can help meet their business needs better. This is very much in keeping with the literature on ICT adoption by SMEs that shows cost to be the single most important affecting ICT use (Wymer and Regan, 2005).

Again, any felt need for new ICT to improve business efficiency or effectiveness in dealing with clients and customers is often tempered by the lack of internal expertise to judge the appropriate ICT investments and to fix specific ICT-related problems. Research from across Europe shows that a substantial number of SMEs do not engage in e-business or attach priority to ICT because they do not consider ICT as suited to the nature of their businesses (European Commission, 2002; OECD 2002). This demonstrates the high level of ignorance concerning the capabilities ICT can afford SMEs.

Surprisingly, while the literature points to the lack of internal ICT expertise as a major challenge for SMEs (Pavic *et al,* 2007; Wymer and Regan, 2005), in our survey less than a quarter of respondents felt this to be a constraint. However, as shown elsewhere (Mehrtens *et al*, 2001), those firms with easy access to even limited ICT-literate staff were more likely to adopt ICT than those without. As shown by this study and others (for instance, OECD, 2004), often such individuals are not ICT professionals but regular employees with a keen interest in ICT matters.

6.   CONCLUSIONS

In this paper, we explored patterns of ICT adoption and use by SMEs in four economically significant sectors in the southeast of England. Our broad conclusion would be that SMEs have a generally positive attitude to ICT. Much of this attitude is generated by owner/manager perceptions that ICT can have a positive impact on operational efficiency. We found far less confidence in the explicit use of ICT for more strategic purposes. At best ICT was used in a defensive or reactive manner in order to help the firm keep up with competitors.

SMEs are generally distrustful of ICT consultants and fear being trapped by spiralling costs associated with wasteful ICT expenditure. In keeping with much of the literature, the owner/manager had significant influence on ICT adoption. Their ability to understand and appreciate the capabilities afforded by ICT had an impact on adoption decisions. Some owner/managers were, however, relatively ignorant and even fearful of ICT, demonstrating that efforts to spread awareness of ICT through a range of policy mechanisms have not had much success even in a highly urban environment within the heart of England's most dynamic region.

Our survey points to a number of key factors that inhibit the widespread adoption and use of ICT, and these include the cost of technology, uncertainty over the business benefits and impacts, and the lack of relevant internal ICT expertise. Day to day challenges such as dependence on external consultants and vendors and the unreliability of systems, potentially owing to technological obsolescence and technical complexity, were also important constraints on ICT use.

This serious lack of technology capabilities combined with the overwhelming ignorance of regional, national and European Union wide SME policy initiatives amongst SME owner/managers was one of the most surprising of our findings. And this strikes at the very heart of EU and UK policy that have identified SMEs as requiring support mechanisms. Our findings therefore have important implications for policy aimed at ICT adoption and use by SMEs.

Future research could explore regional and sectoral variations in ICT adoption patterns within the UK as well as differences across regions within the EU. We are currently undertaking a UK wide survey of ICT adoption and use patterns in SMEs in a range of sectors. We also have plans to explore specifically the range and impact of national, regional and EU wide policy initiatives relating to ICT adoption and use by SMEs.

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