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### Recommended Citation

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# **49. ICT industry challenges in adopting ICT: a case study from the West Midlands, UK**

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## ***Abstract***

The successful operation of companies in most industries is becoming increasingly dependent on their ability to adopt and utilise ICT systems. However, ICT adoption often requires: knowledge of business and IT, investment in IT infrastructure, plans to invest and training in new technologies and other aspects. Many companies lack these factors, resulting in a steady increase in the demand for ICT services and products. Often, ICT adoption has been considered to be a complex problem by SMEs, however the problems are mainly due to it being tackled inappropriately. Instead of government initiatives starting to solve the problem by empowering those SMEs which are in ICT industry who are ICT service or product providers, most initiatives have been targeting all SMEs in all sectors. This paper presents a qualitative ICT adoption research conducted on 206 ICT SMEs in West Midlands (UK), the majority of whom were face-to-face interviews. The findings show that most ICT SMEs challenges result from the factors which are related to lack of knowledge and skills to adopt new technologies. Specifically, these companies are not provided with the appropriate training and they find government initiatives not always helpful. The paper suggests the best way to re-train SMES as a key aspect to address the challenges faced by the ICT SMEs in the region.

## ***Keywords***

ICT adoption, ICT SMEs

## **1. Introduction**

The future prosperity of the UK economy depends on its ability to become more productive, mainly because the country is facing a business backdrop of increasing global competition and rapid technological change (DTI, 2007). There is evidence that there is a link between ICT investment and improved productivity. The challenge is to get more companies to adopt new technology that can enhance their efficiency, effectiveness and production (DTI, 2007).

Another problem is based on the recent news that for the first time the UK has lost its place in the elite top five nations for innovation, as measured by the World Intellectual Property Institute (WIPO). WIPO's information is based on the patents registered which showed that UK is not in the top five countries for patents filed under the Patent Co-operation Treaty. In February 2007, Britain fell into sixth place behind the US, Japan, Germany, South Korea and France. This is a matter of concern as China is set to overtake the UK (i2010 Working Group, 2007) at a fast pace.

The benefits of companies using ICT for daily business activities go beyond simply making purchases or sales online. Although it depends on the business context, one of the most important ICT aspects is the computer networks (Reis, 2006). SMEs and large companies use computer networks to integrate their business processes, streamlining and boosting the efficiency of the enterprise. In addition to networks, SMEs from the ICT industry use ICT as a software development environment for their software products or services, and for innovation (Salter & Tether, 2006). Because of its importance, more countries around the globe are making a concerted effort to increase the level of adoption of, and investment in, ICT (Burgess, 2001; Forrest & Leaver, 2007; Sheppard & Hooton, 2006).

In addition, SMEs appear increasingly to be crucial to the success of UK economy as it was shown that the majority of growth between 1995-2000 in size of the business population was from SMEs (Johnston, 2003). There is also evidence that most new innovations come from SMEs as they are not committed to existing practices or products (Maguire et al. 2007). Jutla et al. (2002) support this claim by stating that SMEs are more entrepreneurial and willing to innovate in comparison to larger companies, which have to follow some organisational hierarchy.

Despite the above evidence on the importance of ICT to SMEs, the paper published by Fink & Disterer (2006), claims that in the context of ICT adoption, SMEs are under-researched, and overall understanding of the IT management in SMEs is not strong (Cragg, 2002) and consistent. Southern and Tilley (2000) state that

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

The research aims to show that in order to overcome the above challenges, it is necessary for the government to start by empowering small businesses which are in the ICT industry with a sustainable means to adopt new technologies. This will enable them to provide ICT services and products to other SMEs or industries in non-ICT sectors.

The paper begins by considering in greater detail the challenges faced by ICT SMEs in Section 2, Section 3 illustrates the method used to conduct the research; Section 4 provides the results, Section 5 discuss the key research findings, while Section 6 propose the ICT SME adoption model. Section 7 concludes the paper. This research considers the challenges to ICT SME to be mainly associated with:

- the rapid technological advances and innovation which influence the design and the production processes (Kaillinikos, 2005)
- customers who are increasingly using ICT as a strategic factor, and hence their expectations appear to be more demanding (Hyotylainen & Moller, 2007).

These challenges affect software design and development, marketing and implementation.

- *ICT services*

The demand for ICT services and products is increasing (IDC, 2003; Sarissamlis, 2003), and the ICT services appear to be more complex to deal with than ICT products (Brown et al. 1994). This is because services are some sort of market transactions in which the object of the exchange is not a physical commodity (Judd, 1964), and are characterised as intangible.

Thomas (1978) considers services to be equipment based (e.g. the value of the support from the equipment such as a laptop) or people based (consultancy). Due to their intangibility, services are difficult to pre-assess and measure their value (Levitt, 1981). Also users' competence and utility can influence the performance and the value gained from the service. As a result it may be difficult for the customer to measure, evaluate and compare the performance and ROI (return-on-investment) from different ICT SMEs services.

- *ICT products*

ICT products (such as software) may be intangible but their support to business solutions can be said to be tangible. The challenges involved in this aspect include: software estimation, changes in the requirements, scope and those related to the rapid development in different software languages and other ICT technologies, all these cause uncertainty in ICT industry businesses (Hyotylainen et al. 2005).

Customers pose another challenge as they quickly want to adopt the winning technology solution, this causes the ICT SMEs (as their service and product providers) to be forced to adopt new technologies at a fast rate.

Hyotylainen et al. (2007) state that if such complex challenges are not managed, they may lead to increasing production costs and system failures resulting in serious problems in business processes, leading to customer dissatisfaction and defection.

## **2. Research Methodology**

For this research, qualitative methods were used which included questionnaire and interview approaches. The research went further than the majority of existing research which use contacts identified from the list of companies registered in various directories (e.g. Yellow Pages), government systems (e.g. tax registration records) and other institutions (e.g. banks and the post office). This research obtained its contacts from more 'direct' sources, i.e.:

- A database of SMEs in the region provided by the ICT Cluster in the West Midlands.
- Contacts made via attending business meetings and workshops.
- Contacts made via attending business exhibitions.
- Through visiting Technology (or Science) Parks in the region.
- Through word of mouth referrals.

Using contacts derived from these five sources, 206 company representatives were interviewed in sub-regions of the West Midlands. 83% of the SMEs opted for a face-to-face interview, while 17% opted for a telephone interview. The questions used as a basis for the interview are semi-structured, involving two parts whose results can be analysed qualitatively and quantitatively. The questionnaire recorded the company profile and the response to various issues related to the company readiness, which included factors such as: advice sought, main influences on the adoption, internal pressures to adopt, specialist skills in the company,

alternatives used to reduce investment costs, required support and any implementation issues experienced while adopting new technology.

### 3. The Results

The results presented below are based on controlled (choosing from sets of prescribed answers) and open questions (which can be answered in different ways). Those findings which are controlled are denoted with ‘C’, while the ones which are open as ‘O’. In most controlled questions, some SMEs provided answers which were not listed on the given choices; these answers are represented as ‘others’ in most tables.

- *Total SMEs by category*

Table 1 shows the total number of SMEs involved in this research, their category, and the number of employees in each category.

	Total (%)	Number of Employees
Micro	68	1 - 10
Small	20	11 - 50
Medium	9	51 - 250
Spoiled data	3	-

- *Level of education (C)*

The majority of the interviewees were Managing Directors (MD) and owners of the companies with various levels of education.

Education level	IT professional status	Source of the acquired skills
PhD ..... 1	IT professionals ..... 68	Education ..... 23
Postgraduate ..... 19	Non-IT professionals ... 31	Experience ..... 53
Degree ..... 50	Undisclosed ..... 1	Undisclosed ..... 24
Others ..... 27		
Undisclosed ..... 3		

\*Others = 'A' levels, secondary school, college training

- *IT investment (O)*

This is an interesting aspect as it shows evidence that most SMEs invest in similar ICT items. As ICT companies, they may perceive IT as essential to their business, and so invest on the items shown in Table 3.

SME category	Software	Servers	PCs	Hand held devices	Laptops	Others	Undisclosed
Micro	36	15	25	2	15	4	3
Small	38	27	10	8	8	3	6
Medium	33	22	1	0	2	1	4
All SMEs	36	18	20	3	13	4	6

\*Others = printer, external storage systems, scanners etc.

- *Source of advice (O)*

Before investing in most ICT items, SMEs seek advice from various sources shown in Table 4.

<i>SME category</i>	<i>Internet</i>	<i>External advisor</i>	<i>Company employee</i>	<i>PC magazine</i>	<i>Others</i>	<i>Do not need advice</i>	<i>undisclosed</i>
Micro	28	15	18	7	0	27	5
Small	13	10	47	0	10	13	7
Medium	11	44	17	0	0	17	11
All SMEs	23	16	23	5	2	21	9

\*Others = exhibition, IT Futures, West Midlands Wireless and Mobile, and Wmita

- *Implementation limitations (C)*

Table 5 shows various implementation limitations in ICT SMEs, which may show the significance of conducting this research, and indicate the areas in which the government could focus its efforts.

<i>SME category</i>	<i>Data transfer</i>	<i>Third party support</i>	<i>Compatibility</i>	<i>Lack of skills</i>	<i>Technology know how</i>	<i>None</i>
Micro	12	4	12	15	10	47
Small	8	5	23	25	12	27
Medium	6	0	6	6	5	77
All SMEs	9	4	12	15	52	8

- *Support (O)*

Although the needs vary with the nature of business, the research grouped the required support in to 6 major classes based on SME responses. These are shown in Table 6.

<i>SME category</i>	<i>Training</i>	<i>Human resources</i>	<i>Consultancy</i>	<i>Marketing</i>	<i>Funding</i>	<i>Business facilities</i>	<i>None</i>
Micro	22	6	8	13	16	13	22
Small	10	17	21	6	10	19	17
Medium	6	13	19	6	0	0	56
All SMEs	18	9	12	11	13	13	24

\*Business facilities <sup>1</sup>

## 4. Discussion

Micro enterprises dominate the large percentage of SME involved in the research as shown in Table 1. This may be because most Micro enterprises have a desire to grow, and understand that one way to develop their business is to participate and learn from different sources such as this research. Although 206 ICT SMEs is a fraction of thousands of ICT SMEs in the region, Table 1, may however, be used to reflect the profile of ICT SMEs within the West Midlands region. Small and Medium SMEs may have built experience and confidence when expanding their businesses, hence may treat participation in such research as less important to the growth of their businesses.

Although almost 70% of the company owners are educated to degree, postgraduate or PhD level, only 23% of these owners acquired their IT skills through education. The rest are either non-IT professionals or acquired their skills through experience, and their education is in the areas shown below.

Business Administration, Business studies, Financial management, Chartered accountancy, Mechanical engineering, Automotive engineering, Quality engineering, Neural science, Genetics, Physics and applied physics, Astrophysics, Aeronautical science, Law (LLB), Politics, Education, Humanity communication, Mathematics, Science, Geography, Psychology, Biology, and Tropical animal health, Fine arts.

This is a matter of concern because the results show that the majority of SMEs have no strong IT knowledge and skills, as their educational background is not IT related. In addition, Lawless, Allan, & O'Dwyer (2000) states that the majority of SMEs appear to be resistant to education and training and that most of government sponsored initiatives for learning have been wasted as the targeted SMEs fail to use them. Only 8% of SMEs use the UK government provided local assistance schemes (Lawless *et al.*, 2000). Lack of training, coupled with SMEs heterogeneity (Chittenden & Wildgust, 1999) and transience characteristics, has resulted into less than 20% of SMEs surviving longer than six years and 30% lasting less than 18 months (Cressey & Storey, 1995). An IT skills shortage is rising, and evidence in the press shows that advertisements for IT professionals has been rising for the past six years (Thomson, 2007).

For example, the Microsoft .Net development environment is proving to be popular because it allows firms to rapidly produce web-based software, however, there is shortages of .Net (such as C#) and Java skills. This is a vital issue as many companies (their customers) are increasing their expenditure on web-based software. The obvious need is for ICT SMEs to have up to date skills so that they can be able to provide required services and products to non-ICT companies.

*'Re-skilling the existing workforce is crucial if the UK is to avoid an IT recruitment crisis, although potential workers in the pipeline of school and university are important, most of the IT staff that the UK economy will be relying on in 2020 are already working now'* (Thompson, 2007).

The ICT skilled employees are well qualified to develop strategic plans and to make decisions which are related to ICT investment. Table 3 shows that ICT SMEs invest in software (36%), PCs (20%) and servers (18%), without appropriate skills and knowledge. As a result, the company may not fully benefit from the investment.

Table 4 shows various sources of advice on which SMEs rely. The majority of Micro enterprises rely on the Internet (28%), while 27% claim that they do not need any advice. In addition, they seem not to use other sources of advice such as government initiatives (e.g. UKITA<sup>1</sup>, IT Futures<sup>2</sup>, etc) intended to support small enterprises. However, the Internet gives information as required by the user (for example, comparing the prices of products, the facilities or the functionality of the product etc); it does advise but will not provide solutions to business problem.

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<sup>1</sup> UKITA (UK IT Association) – Is an association (previously called WMITA-west Midlands IT association) which provides a regional and national network of ICT specialists.

<sup>2</sup>IT Futures – is an Advantage West Midlands-funded project which brings the expertise of the Wolverhampton University computing and IT to SMEs in the region.

The majority of Small companies (47%), however, appear to seek advice from their employees. Also, 13% of these Small companies rely on the internet, while 13% claim that they do not need any advice. 10% of Small companies use exhibitions and government set initiatives to seek advice. Medium companies are different as many of them seek advice externally (44%), 11% rely on internet, while 17% claim that they are experienced and do not need advice.

The majority of companies which seek advice externally appear to choose from a close relative, friend, fellow trustworthy SME, or a store attendant. These companies seem not to trust or want to invest in a proficient IT consultant. Flamholtz (1986) states that entrepreneurs do not feel the need to obtain help for organisational problems, but are open to help on marketing and finance. This failure may originate from SMEs owner managers behaviour as some are reluctant to accept external advice preferring to do things “my way” (Goffe & Scase, 1995; Lightfoot, 1998). As a result many SMEs have strong preference for activity-based learning<sup>3</sup> instead of knowledge-based learning<sup>4</sup> (Choueke & Armstrong, 1998).

Bennett & Robson (1999) states that the use of advisers in SMEs may reflect the institutional (from professional assurance) and personal (from relationships and perhaps behaviour and beliefs) trust. This is because most business advisers aim to ‘sell’ new ideas from either a commercial source or government initiatives to SMEs owner/managers to implement in their business. Previous research focused on other advisors, the most common being the accountants and financial advisors (Bennett et al. 1999; Birley & Niktari, 1995; Collins & Javis, 2002; Marriott & Marriott, 2000), followed by academics (Collinson & Quinn, 2002; Stewardson & Coleman, 2003). This study is different as it identifies the sources of technical advice to the majority of ICT SMEs. The findings prove that ICT SMEs seek advice from mainly the Internet, external advisors, company employees, and other sources. This may be because many ICT SMEs lack trust as indicated by the below quote from manager/owners statements:

Company A (18 employees, turnover of £980,000, and 18 years of operation):

*“I have been running this business for 18 years now; I have hired few consultants who claim to be professional. However, I have never found a proficient consultant, most come and waste my time and take my money. Since I decided not to hire one, I have been working long hours to understand the needs of my business and plan accordingly by myself. I think it has helped the company to grow”.*

Company B (25 employees, turnover of £1.2M, and 25 years of operation):

*“I hired few in the previous years but I never saw the benefit. There was a time the government offered us some help by sending a so called a professional consultant to come and advice us in different aspects of our business. He did not tell me anything new, he wasted my day, and I regretted accepting that support. I just don’t trust that most consultants have enough knowledge to give any advice to an experienced business person. I stopped hiring an external advisor. It is better to sort it out by ourselves”.*

<sup>3</sup> Activity-based learning – is when SMEs acquire their technology skills and knowledge through experimentation on the purchased ICT.

<sup>4</sup> Knowledge-based learning - is when SMEs acquire their technology skills and knowledge through training



Overall, SMEs seem to rely on their Internet research to make decision on the types of ICT they should invest in.

Educational background, IT investment and source of advice are the issues which may have impact on the implementation of ICT in ICT SMEs. For instance, if the education background is not related to ICT, and at the same time the company is relying on Internet or a related person (who may be familiar with ICT but not necessarily an ICT consultant) to advice on company IT investment, this may result in implementation problems as shown in Table 5. Table 5 shows that all SME categories have some limitations in implementing ICT, this includes: transferring data, third part support, compatibility, lack of skills and technology know how. A considerable large percentage of SMEs claim that they did not have any implementation problems. However, when these SMEs were asked if they needed support, only 21% stated that they do not need support, while a total of 79% need support in different areas as shown in Figure 2. The results in Table 5 however show that the answers provided by SMEs are contradictory, as 47% of Micro, 27% of Small, and 77% of Medium SMEs claimed that they do not have implementation limitations, while the type of support they need seems to justify the existence of some limitations in implementing ICT. This is supported by the information below which related items in Table 6 to those in Table 5.

Needed support (Table 6)	Implications ( Table 5)
Training	Lack of skills and technical know how
Human resources	Lack of third party support
Consultancy	Lack of knowledge on data transfer, compatibility and associated issues
Marketing	Lack of skills
Funding	Not related with items in Table 5
Business facilities	Not related with items in Table 5

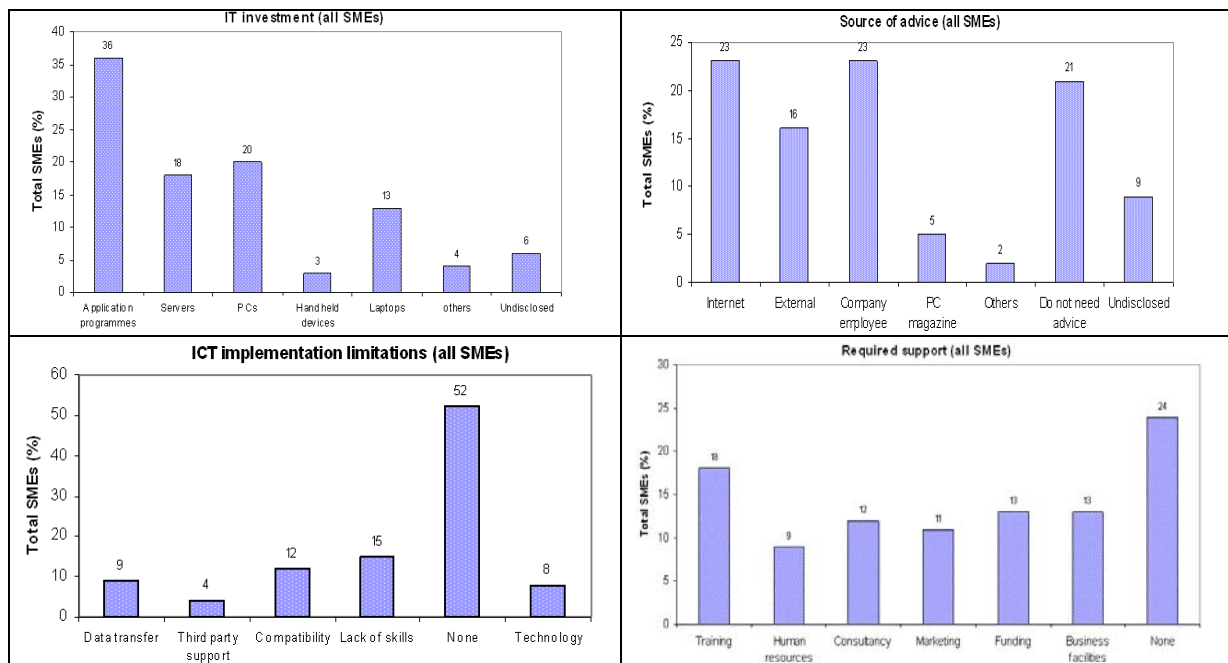
Although issues such as funding and business facilities in Table 6 can not be directly related to any item in Table 5, they may also contribute to the company IT implementation limitations. For example, some SMEs involved in this research claim to invest in ICT because of its low price. The decision to do so may be related to financial constraints or other problems, though not always the case. But low cost investment may mean low quality ICT, which could also result into implementation limitations.

Some have even decided to outsource some of the company's activities without taking into consideration the impact of outsourcing to the long term benefit of the company. This may suggest that many SMEs do not consider ICT in their strategic plans, and as a result they are not successful in implementing ICT in their businesses. This may be related to Table 2 results which show that 53% of the ICT SMEs owners/MDs acquire their IT profession through experience. They learn by experimentation after purchasing the ICT items instead of building knowledge on the required ICT before purchasing.

Business facilities, is another issue not related to any item in Table 5. However, business facilities such as those in Table 6 may build confidence and encourage SMEs to spend more time to retrain their employees and to invest more in ICT.

Figure 2 shows that the majority of ICT SMEs invest in Application programmes (software) and rely on the internet or company employees for advice. 48% of these companies

experienced different ICT implementation problems, while 52% claim not to have any problem. If (according to Figure 2) there are only 24% of these ICT SMEs which do not need support, this may suggest that the remaining 76% have no enough knowledge and skills or they do not have a strategic plan to invest on ICT, instead, they purchase the ICT item and learn how to implement it experimentally.



**Figure 2:** Result for all SME involved in this research

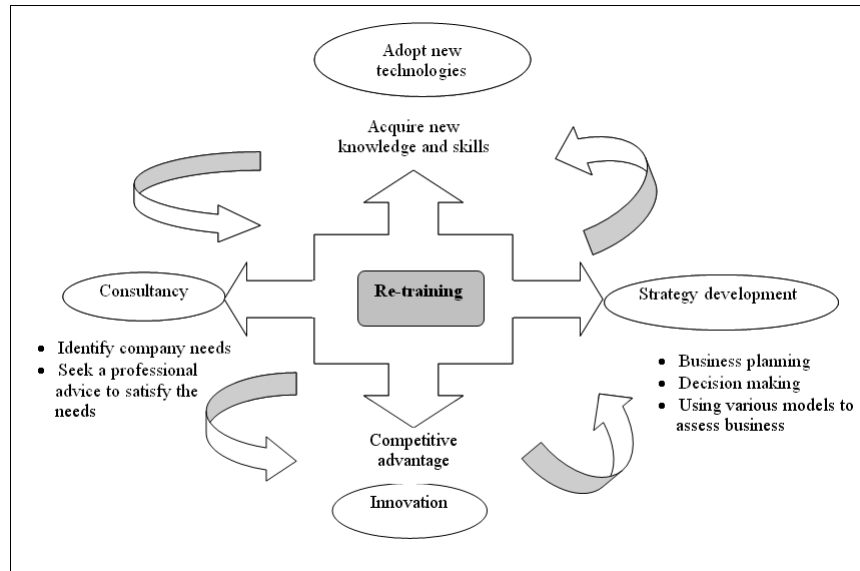
All ICT SMEs involved in this study did not have any formal measure for their ICT performance. This research identified the measures used by these SMEs as either the profitability (categorised as financial performance), number of complaints (as user satisfaction), level of interest (market share), or in terms efficiency (as internal operations). Lack of metrics to measure the ICT performance affects SMEs ICT investment decisions as most could not justify the need for investing, hence preventing them from adopting new technologies for their competitive advantage.

## 5. A Proposed ICT SME Adoption Model

Grandon & Pearson (2004), Mehrtens, Cragg, & Mills (2001), Thong (1999) and Iancovou, Benbasat, & Dexter (1995) models consider: perceived benefits, organisational readiness and external pressures as the main issues which determine the successful adoption of technology. Also, Ritchie & Brindley (2005) focused on the owner's technology, application and relationship perspectives towards ICT, while Rashid & Al-Qirim (2001) examined individual factors, organisational factors, environmental factors, technological factors in relation to E-business. All these factors were considered while developing the basis to study ICT SMEs, resulting into proposed model shown in Figure 3. In order to assure a successful and

sustainable adoption of technology, this research proposes a powerful model whose central factor is re-training.

This research considers re-training to be a critical factor in addressing most ICT SME challenges. This is illustrated using Figure 3.



**Figure 3:** Re-training as a key aspect in addressing ICT SME challenges

*Adopt new technologies:* ICT SMEs will be able to adopt new technologies and use these technologies to its full advantage if the employees are able to acquire new knowledge and skills, or employ new graduates with ICT and business management skills.

*Consultancy:* Having skills to identify company needs, and identify the appropriate source of support to satisfy these needs is a crucial factor to the success of most business. Often, SMEs fail to identify their business needs and also approach non-professionals for advice.

*Innovation:* the innovation concept considered by this research includes not only technical innovation, but also managerial (e.g. business and financial management, and marketing). Companies no longer need only to be fast to provide services or products, but come up with new, improved quality and cost effective products and services. This require continuing education not only for research personnel but the majority of employees should be re-trained (Caputo, Cucchiela, Fratocchi, Pelagagge, & Scacchia, 2002).

*Strategy development:* Business managers and employees need to be retrained in business management issues such as business planning, financial management, marketing and using models such as SWOT (Strength, Weaknesses, Opportunities and Threats)<sup>5</sup> to assess their corporate appraisal. Knowledge from these models can be used to develop strategies necessary for SMEs to gain competitive advantage. The knowledge gained can be used in various decision making (e.g. on the type of ICT to invest on, etc).

<sup>5</sup> Different models can be found from : ACCA, 2007; Johnson, Scholes, & Whittington, 2007; J. Thompson & Martin, 2005; Williamson, Jenkins, Cooke, & Moreton, 2004

The other 5 factors (strategy development, consultancy, innovation, and adoption of new technology) in Figure 3 appear to have a causal relationship. For example, a successful strategy development would have identified company objectives, use consultancy to advise on different business issues, decide on technology investment and set up initiative on its product or service innovation.

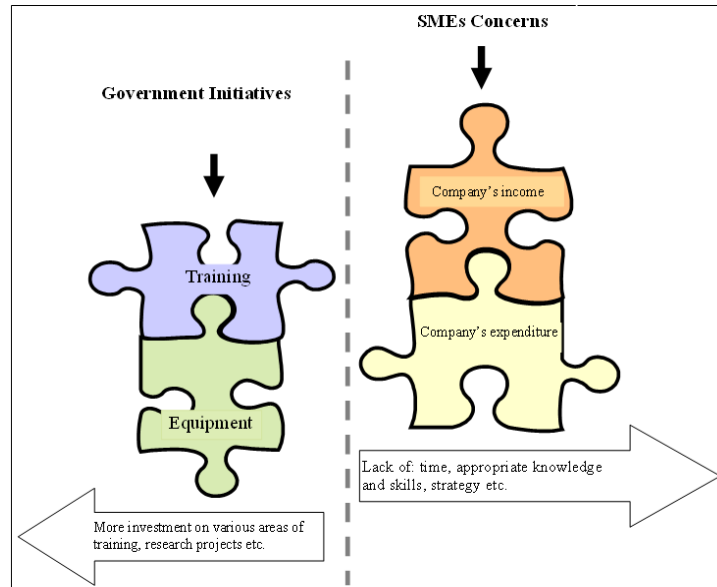
The implication of the research findings and the proposed model provide useful suggestions to government officials on the need to re-examine their support to SMEs.

## **6. Government initiative in supporting ICT SMEs**

Most literature (e.g. Lawless et al. 2000) suggests that the majority of SMEs are unwilling to take part in the education and training, and that most of government sponsored initiatives for learning have been wasted as the targeted SMEs fail to use them. Such literature fails to take into account the business pressures and challenges faced by ICT SMEs. Also, they do not consider that the majority of SMEs are Micro enterprises (1-10) and are often under-resourced. The qualitative findings from this research show that government initiatives designed to support SMEs and SMEs concerns (or pressures) to the survival of their business are the two issues which have not been aligned. These issues are represented as a puzzle in Figure 3 and a different approach to align the two sides of the puzzle is required in order for the SMEs and the government initiatives to achieve a single goal.

The government is concerned with SME employees' training, and providing funding for equipment so that SMEs can be competitive in the market. However, if these SMEs stop providing services or products to their customers and attend the training, these customers may seek another provider, as the result the SME will not have income and will be unable to support its expenditure, hence, losing its market position. In addition, the government fund research projects such as this, to try to identify and understand the needs of SMEs. Often, most of these studies are criticised by the business communities claiming that such research represents an oversimplification of the complex issues and challenges facing SMEs ((Brock & Kai-Uwe, 2000; Southern et al. 2000). The government may need to design new ways to conduct these studies because such criticism may not clearly present the government aims to most SMEs. As a result, ICT SMEs (the majority been Small and Medium companies) may not see the benefits of participating in most research as shown in Table 1.

On the other hand, if SMEs are not trained, they will continue to lack appropriate knowledge and skills, and be unable to plan strategically, which may result in having companies which can not compete in the market. As shown in Figure 4, the government appears to interrupt SMEs business routines and push them in a different direction, while SMEs are heading in the opposite direction, and the two parties are un-aligned. This is another major challenge which ICT SMEs in the West Midlands are facing.



**Figure 4:** Supporting SMEs is a puzzle

In order for government sponsored initiatives for learning to succeed, the government may need to support SMEs by:

- Studying each company and identify their specific training needs
- Support few SMEs at a time by providing them with one to one specialised training at their premises, i.e. conducting training while practically illustrating to SMEs the benefits of acquiring new knowledge and skills for their business.
- Identify those SMEs who are capable or willing to re-train through e-learning methods and provide them with specific training packages to suit their business needs.
- Assuring their business continuity while the employees are been re-trained. That is, to support SMEs so that they can continue to provide services or products without interruption. This may be possible if the government will provide SMEs with temporary skilled human resources to provide services and products while the employees are away re-training.

## 7. Conclusions

This paper provides insights into the challenges facing the ICT SMEs in the West Midlands area. The challenges are a result of an increase in the use of ICT in many sectors which has caused a dramatic increase in the demand for ICT services and products.

The research focused on the challenges associated with technology adoption, and the findings show that ICT SMEs lack necessary knowledge and skills in both ICT and business management. In addition, the majority of these SMEs seek advice from non-professionals, this may be related to poor strategy and ICT investment decisions, which may have lead to the ICT implementation problems seen in Table 5.

The other challenges are inevitable and are associated with the rapid technological advances and innovation, and increasingly high customer expectations.

Overall, this study considers these challenges to be associated with lack of training, and inappropriate government initiatives/activities. Hence, it is suggested in this paper that funding bodies need to consider SMEs business concerns, and involve them to change the approach in which the government is delivering its learning support to SMEs.

The research has given the evidence that ICT SMEs are facing similar or probably even more problems (in relation to ICT adoption) as compared to SMEs in different sectors. If these SMEs are not appropriately supported, then, other sectors which are not in the ICT industry may have difficulties in adopting new technologies for their competitive advantage. This may affect the whole regional economic growth. In order to reduce this, ICT SMEs have to be supported first; they need to be retrained on a regular basis and be assured of their business continuity while they are been re-trained.

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