Knowledge Transfer in Action within the SME Sector

Tom Caira
University of the West of Scotland, Paisley, PA1 2BE, United Kingdom.
E-mail: tom.caira@uws.ac.uk

Brian Cross
University of the West of Scotland, Paisley, PA1 2BE, United Kingdom.
E-mail: brian.cross@uws.ac.uk

Karen Dunleavy
University of the West of Scotland, Paisley, PA1 2BE, United Kingdom.
E-mail: karen.dunleavy@uws.ac.uk

James Bruce Johnston
University of the West of Scotland, Paisley, PA1 2BE, United Kingdom.
E-mail: jamesb.johnston@uws.ac.uk

Abstract: Much of the literature relating to innovation and management of new technology overlooks the importance SMEs place on the value and implications of independent and impartial advice in the area of new technology selection, adoption and implementation.

This paper relates the lessons drawn from the authors’ experiences of working in the SME sector of the economy within the framework of a project whose strategic aim is to assist SMEs in the direct application of technology, in all its forms, to their businesses. This is specifically aimed at the development of new products, processes and procedures that will have a definitive impact on their organisation’s competitive position. It also aims to raise awareness of the advantages of partnering with Universities to bring benefit to companies operating in all sectors of the economy.

The paper contains insights that may help to improve the effectiveness of policy offerings by promoting the value SMEs place on such advice. Academic research could also benefit from absorbing the need for such advice into developing a better understanding of how new technology management works in practice.

Keywords: knowledge transfer; SMEs; action research; technology management; business technology; academic industry partnership
1 Introduction
The world of business computing has changed dramatically over the last decade and there are now very few, if any, small businesses in the UK that do not rely on technology to the extent that their business would be seriously compromised if such technology were to fail or fail to perform as expected. In the recent BERR Information Security Breaches Survey (BERR 2008), some 84% of businesses stated that they are heavily dependent on their IT systems. Small business owners now recognise that information and communication technology is a commodity that is vital to their existence and, as such, must be adequately protected and maintained and constantly enhanced and improved.

The increased dependence of SMEs upon this “business technology” has produced an alarming dichotomy in that the SME community, whilst clearly recognising that technology is now very much a critical success factor for their business, has been somewhat slow to recognise the importance of supporting this technology resource internally but rather places full responsibility for most or all of this requirement with external organisations. This is despite SMEs regarding these external organisations, typically sales-focused technology suppliers or fee-based independent technology consultants, as costly, ineffective and partisan. Consequently, as the level of dependence on technology grows, so do the risks associated with relying on this external support and maintenance resource.

2 Methodology
The methodology used takes the form of action research via direct participation of three of the authors in a jointly funded Scottish Government / European Regional Development Fund (ERDF) project. The Scottish Government funding was provided through the Scottish Executive Expertise, Knowledge & Innovation Transfer (SEEKIT) programme. The project was called the Paisley Innovation Knowledge Transfer (PiKT) project and has operated since June 2005 as part of the University of the West of Scotland (previously University of Paisley) drive to increase the levels of Knowledge Transfer with the Scottish SME community. This project aims to enhance productive knowledge transfer within Scottish SMEs from the University by way of direct intervention by offering SMEs access to University facilities, resources, staff and expertise.

The authors were directly involved with a number of SMEs as part of the PiKT programme and indirectly contributed to a number of others. All of these organisations were small (less than 20 employees) and together formed a quite diverse group. Most of the organisations were in private ownership with the remainder functioning as social enterprises. They ranged across a number of industry sectors including Arts, Sport & Leisure, Tourism, Health, Technology and Fulfilment services. All of the organisations were wholly or primarily service-focused.

The project leverages funds from a wide range of public and private schemes and does not replicate any existing support schemes. The project encourages participation from all sections of the SME base in the local economy, though key sectors including optoelectronics, microelectronics, business, manufacturing, biotechnology and engineering are being actively targeted. The project aims to help a wide range of small and medium sized firms across a wide geographical and business base.

3 Key Features of PiKT Project
The project adopts an innovative and proactive approach to networking and matching company needs to university competences. It aims to create an environment where the university is genuinely accessible to small to medium sized companies and thus to help stimulate research and development activity in participating companies and to promote innovation as a necessary business ethos.

The project provides assistance to a wide range of existing and start-up SMEs through a series of seminars which are followed by a programme of ‘Technology Audit’ visits and finally advice/recommendation/assistance in making applications for other suitable project funding (e.g. SMART, SPUR, SCoRe). The project affords SMEs the opportunity to participate in a funded, 5-man-day Technology Audit which will result in the production of a Technology Audit Report (TAR) that will be used to identify and inform the actions required for follow-up support.

The project aims to engender in companies a strong link with a local University and to embed or enhance a culture of innovation, product and process development and market focus. This cultural shift will be applied to all aspects of the organisation from manufacturing and engineering technology to the people, management processes and business functions of the company.

To date, the PiKT project has resulted in interactions with some 307 SMEs of which 103 have benefited from Technology Audit Reports and 23 have had higher level support. 17 other TARs are underway and 18 are to be potentially allocated to academic experts. The project has involved over 50 Academic members of staff in projects with Scottish SMEs and has generated in excess of 20 government funded follow-on projects.
The output from these interventions highlighted a number of technology-related issues. Most of the organisations had little knowledge of their in-house ICT infrastructure and of how it was setup. Employees used ICT on a daily basis but with minimal knowledge as to what technology they were using, how it worked, what might go wrong, and how to ensure the integrity of the systems and the data that was being processed and stored. Technology training was viewed as a financial and time burden with many of the organisations attempting to “self-learn” from a variety of sources or relying on the intuitive nature or claimed “user-friendliness” of the technology to satisfy their training needs. The organisations universally regarded their ICT as being composed of “piecemeal” systems which had evolved over time through a series of upgrades, reworks and “bolt-ons”. Every organisation dealt with had data integrity issues and had a number of “data islands” – data repositories in a number of different formats spread throughout a number of different PCs, laptops and servers and being utilised by a number of different users in a variety of ways via a number of different applications. In every case, the organisations’ information systems were a combination of electronic and paper-based information. This would often result in a requirement for double or even triple entry of data between the various different applications that ran on the computer systems that were utilised by the organisations. As a result of this, data duplication was rife with paper and electronic versions of the same data often being used as information resources, even though the paper version was often out of date. Multiple occurrences of the same electronic data were often being utilised and being updated in isolation from the other instances. Unsurprisingly, most of the organisations expressed concerns in relation to the validity and integrity of their stored information.

As a direct consequence of the lack of knowledge of the internal ICT infrastructure and an overall lack of knowledge in relation to the technology landscape, most of the organisations expressed concerns relating to an inability to frame business requirements in a technical way and perceived this as the chief cause of their ineffective and inefficient use of ICT within their organisation and of their perception of having disparate and diverse technology systems with little integration. On the one hand, SME owners and managers recognised ICT as being a key resource but, on the other, feared the idea of increased automation and the perceived loss of control that accompanied this. They understood their own business but did not fully understand or appreciate the technology landscape and the opportunities and obstacles present therein. They felt that technology suppliers understood the technology landscape but did not fully understand or appreciate their business requirements. However, SME owners and managers were reluctant to rely on third-party, sales-focussed technology suppliers for advice and assistance with technology procurement given their expensive and confusing past experiences with these suppliers. To address this difficulty, they expressed a strong desire for an independent intermediary who could form a “bridge” between them and their technology suppliers and who could provide effective advice and assistance in regard to the procurement of a suitable technology solution. When asked if they would consider utilising a fee-based independent technology consultant in this role, the general response was that they found such technology consultants to be “a bit hit and miss” and to often cost more in financial terms than the entire budget that had been set aside for technology procurement.

Most organisations involved in the programme therefore expressed concerns about “best fit”, i.e. how suitable their existing technology provision was for their current business needs. Most of the organisations also expressed concerns about the level and quality of their internet adoption and use. All of the organisations had a web presence and all utilised e-mail to some degree but all also expressed a desire to make better use of e-business facilities, but this was tempered with a concern about their ability to manage the fulfilment of any online services and the resulting impact that such might have on their reputation. Concern was also expressed about lack of knowledge of web technology and even of how to access, setup and adequately maintain their web presence.

Most of the organisations were keen to explore the use of newer technologies such as wireless, remote working and XML services and all recognised that considerable benefit could be gleaned from the use of these and other emergent technology but again this was tempered with concern about “adding to their existing mess” rather than necessarily improving it. Concern was also expressed in this respect in relation to increased reliance on external support and maintenance for business critical facilities.

A number of key technology-focused recommendations were produced as a result of the technology audits that were undertaken through the PIKT programme. Whilst some such recommendations were specific and somewhat unique to individual organisations, there was also a great deal of commonality in recommendations across many of the organisations which took part in the programme. These generalised recommendations are included immediately below, in no particular order, and it is our considered opinion that SMEs who wish to stay current in the business technology landscape should focus on addressing as many of the following as possible: -

Better integration of information both internal and external to the organisation, including better interfacing with client and third-party systems. Modernise and standardise the way in which information is received from, and delivered to, customers, suppliers and other relevant third-parties (e.g. marketing material, purchase orders, invoices, account statements, etc.).
Eliminate or reduce double-entry into separate software packages. Data should be entered once only and should then be accessible across the whole organisation. In addition, reduce or eliminate the need for manual cross-checking of data.

Reduce the need for paper by standardising on electronic information wherever possible, perhaps by implementing some form of Intranet-type facility to hold currently paper-based sources of information.

Make more use of web-based technology and facilities in general. Capitalise on technology to streamline business processes and explore the potential for web-enabling relevant business processes for use by customers, suppliers and other relevant third-parties (e.g. purchasing, booking, account status reports, order tracking, customer support, etc.).

Ensure that all existing and any new technology is properly maintained, appropriately secured, and that software is standardised and kept up-to-date across all computer equipment in the organisation. Maintain good documentation and training on network setup and administration, taking backups, use of electronic security facilities such as antivirus and firewall, etc. It is essential that any organisational information system is properly and professionally maintained and supported. If this is not the case, or if ad hoc support arrangements are in place, thought should be given to establishing formal support and maintenance arrangements with guaranteed service level agreements for all hardware, software and web-based systems used throughout the organisation.

Engender more technical competence and confidence in staff.

Establish business intelligence facilities that provide a better decision support mechanism for directors and staff.

Focus on value-add and explore the potential to utilise emergent technology (such as wireless and mobile phone technology) to provide services that enhance and improve customer service and retention.

In essence, the above recommendations demand that SMEs now view ICT as a critical business resource that needs to be fully supported both technically and financially. Technology should no longer be viewed by SMEs as a “necessary evil” that imposes a financial and operational burden. Rather it should be an inherent part of any business strategy and should be viewed as an investment that will reap rich rewards if it is properly planned and diligently implemented and managed. This, in turn, demands access by SMEs to effective and independent technology advice and assistance. To achieve this, SMEs management could take steps to become better educated about technology rather than just focussing on the business, however this is often difficult and unmanageable for SMEs due to limitation of resources such as money and time and competitive pressures.

The authors conclude that the Technology Audit is a good “route in” to explore, evaluate and assist an SME in charting a way forward for their use of ICTs. This was supported by the fact that most SME participants in the PIKT project wished to progress with recommendations and continue to receive independent support and advice. This was not possible in all cases for a number of reasons, but mainly due to funding issues of one kind or another.

4 Research Implications

As Brock (2000) stated

“... little empirical research has addressed the specifics of ICT adoption, implementation and use in small firms.”

Riemenschneider, Mykytyn and Harrison (2003) also argued that the adoption and use of information technology by small businesses in general is a subject that has received very little research attention. Harindranath et al (2008) go further and state that

“Research into SME use of ICT within the UK context has been limited to a few studies that are now dated.”

This is of concern in light of the recent finding by Nathan et al (2003) that

“... in the UK, technology’s potential to transform work is often unfulfilled. ... many UK workplaces are characterised by a ‘low tech equilibrium’. They are still grappling with promise and reality of new technology. They are getting by not getting on.”

The implications of this finding are of particular concern, and the importance of research in this area highlighted, since Nathan et al (2003) also found that
“ICT is everywhere. … seven of out of ten believe using a computer is important or essential for their job.”

This is of significance given the adverse effect of the ‘low tech equilibrium’ on Britain’s international competitiveness which Nathan et al (2003) suggested means that Britain is almost certainly experiencing a productivity lag in comparison with the US.

Beardsley et al (2003) also argued

‘the relationship between economic performance and ICT is not straightforward. … However a relationship definitely exists’

They found when exploring this relationship that management played the most important role when ensuring productivity growth via ICT, succeeding with electronic business and that ICT strategy must be part of a broader business strategy. This is echoed in the work of Raymond and Paré (1992) who proposed the concept of managerial sophistication as part of a wider measure of information technology sophistication.

In light of these difficulties faced by businesses when attempting to exploit the opportunities of ICT it is important to consider the government’s small business ICT support policy. Indeed, it is evident from criticisms of small business support policy in general and specifically of small business ICT support policy that further discussion with respect to policy is needed. Lauder and Westall (1997) considered that:

“[i]f the ICT market were functioning well and the Government’s recent Information Society Initiative (ISI) were adequately spreading the word about the benefits of ICT, there would be no need to assess these issues again. … We are not advocating major government interventions to force companies to invest in the latest technology but are rather asking: what are the needs of small firms and are these being met? If they are not, can policy help to rectify some of the failures” (p. 1).

These criticisms of small business support policy by Curran (2000), Lauder and Westall (1997) and Storey (1994) and small business ICT support policies by Fuller and Southern (1999), Lauder and Westall (1997) and Harindranath et al (2008) are relevant by informing the discussion of the scheme presented here. In brief, the criticisms related to the low take up of government support schemes by small businesses, the inappropriateness of small business support which does not take into account the heterogeneity of small businesses and the inappropriateness of policies which have adopted a technology push focus, that is, which assume technology is the answer and do not take into account small business experiences and ICT business needs.

5 Areas for Further Research

It would be interesting to explore the relevance of an amended version of the Technology Audit Report for other technologies in order to establish how widespread the demand for such advice is for new technology more generally. Although, there is perhaps less demand for independent and impartial advice exists in other more well established technologies.

Specific examination of larger organisations would be worthwhile to establish if the demand for such advice is more prevalent than the focus of government policy suggests.

Other geographical areas could be examined to establish if the need for such advice is limited to those areas included in the PiKT project which are typically less well developed economically and therefore may have less well developed support networks.

6 Research Limitations

Whilst a large number of firms and organisations participated in the project it is important to bear in mind that they were a self selecting sample of participants. It is important not to second guess why other firms and organisations chose not to participate in the project.

7 Practical Implications

One major point that emerged was that many of the more technologically sophisticated SMEs have now reached a point where they recognise the need to establish a business technology expertise internally.
Unfortunately the vast majority of computing graduates were viewed as having specialist degrees (e.g. software engineering, web development, networking, multimedia, etc.) which makes them seem somewhat “one-dimensional” and unattractive to the main SME base as they cannot justify a full-time salary for a specialism that may only be required intermittently and somewhat infrequently within the organisation. SMEs would rather employ a good technical “generalist”, someone who can assist them in all areas of business technology and who also understands enough about the business environment to make them a very useful addition to the organisation; someone who can adopt a technical role when required but can also fill a specific or general business role within the organisation. As a result of this aversion to employing “specialist” computer graduates, SMEs have tended to try to fill these roles by employing non-technical graduates and providing them with some amount of technical training, or expecting them to self-learn. Whilst this can be effective to a degree, there is no doubt that the lack of a proper technical education can hugely restrict the competency and capability of these personnel, resulting in these organisations replacing one potentially high-risk strategy (i.e. utilising an external, technology-aware, third-party technical support and maintenance resource) with an equally high-risk alternative which utilises an internal but very much non-technical support and maintenance resource.

A useful analogy here is to the use of general practitioners in the health profession. When someone is feeling unwell and wishes to seek medical advice as to the nature, extent and severity of their illness, it is the recognised norm to approach a local general health practitioner who can assess the problem and, more often than not, effect a resolution without the need to enlist help from a health specialist such as a cardiologist or oncologist. It is crucial, in this scenario, that the general health practitioner not only knows enough about his or her subject area – through formal education and acquired expertise – but also recognises when an issue merits referral to a specialist. The GP acts as a worthwhile and effective buffer between the problem owner and the health specialist. Transposing this model into the business technology arena necessitates the role of a “general technology practitioner” who can act as a buffer between the technology end-user and the technology specialist and who has had formal training that augments their ability to recognise and resolve general technology issues and problems but also affords them with the knowledge and expertise to be able to clearly identify the need to involve technology specialists as and when the situation demands. SMEs have traditionally used third-party organisations to provide ad hoc or contractual support arrangements as a means of satisfying this generalist role or have occasionally attempted to fill this role internally. Unfortunately, in many SMEs, this internal role, to date, has often fallen into the hands of anyone who has managed to gain a little technical knowledge through reading, experimenting or simply through long-term exposure to the business technology that is utilised within the organisation. There is often no formal education or training behind this role, nor any solid grasp of the business technology landscape. Many SMEs are now placing onerous and time-consuming demands on third-party technology support organisations as a consequence of their increasing reliance on technology and many of the organisations who took part in the PiKT programme expressed concern at a perceived reduction in the level of technology support received. Further investigation indicated that this perception was the result of a marked increase in demand for support rather than any decrease in the provision. This also extends beyond maintenance and support to the development of strategy and direction and the role that technology should play in such. Many SMEs are relying on these third-party support and maintenance providers to also offer advice and assistance in the development of their technology strategy because they do not feel that there are any other avenues for more suitable and independent advice open to them. Given that the SMEs involved in the project, in the main, expressed an element of concern and dissatisfaction with the quantity and quality of maintenance and support facilities that were being provided to them by third-party, support and maintenance providers, the authors suggest that more independent approaches to satisfying this demand for general technology advice and strategic technology development are essential.

There are two main approaches that should be considered by SMEs. The first is for SMEs to consider procuring a suitable human resource to serve as the aforementioned general technology practitioner. The second is to avail themselves of effective, inexpensive, independent advice and assistance from non-sales-focussed organisations such as governmental and other economic development agencies.

This places demands on Further and Higher education institutions to produce this new breed of formally educated “general technology practitioner” and on local and national economic development organisations to recognise the value of providing a more specialist “interventionary” service rather than what the SMEs involved in this study perceived as being the provision of basic and generic ICT information and advice. It also opens the way, as has been shown in this particular project, to SMEs perhaps recognising the value of working with independent organisations, such as the HE sector, to obtain the specialist advice and assistance that will enable them to realise the full benefit of current and future technology which will have lasting economic benefit for them and for the nation as a whole.
References


