The Integration of E-Commerce Tools into the Business Processes of SMEs

TOM EGAN, STEVEN CLANCY AND TOM O'TOOLE

School of Accountancy and Business Studies, Waterford Institute of Technology

Introduction

Since the late 1980s it has been argued that the adoption of information technologies is no longer a means of creating a sustainable competitive advantage (Johnston and Vitale, 1988), but an essential competitive weapon necessary for survival (Benjamin, de Long and Morton, 1990). This is hardly surprising, as information technology (IT) became cheaper and more accessible to users, where by 1990 some commentators were claiming that computers had became as ubiquitous as the telephone (Hopper, 1990). We use the term e-commerce to encompass buying and selling via computer networks (primarily the Internet), use of technologies to exchange information and the development of electronic business processes to complete the order fulfilment cycle and/or purchasing cycle. Under this scenario e-commerce is integrated. Many studies (Venkatraman, 1994; Knol and Stroeken, 2001) have found long-term benefits of an integration of business functions and IT within a company and in an inter-organisational/sector-wide context. This integration of IT and e-commerce into business systems and processes has increased the competitive potential of technology especially for large firms who are able to exploit supply and demand chain efficiencies. Chaffey (2000) describes the levels of e-commerce sophistication which an organisation may possess (see Table 9.1). It is the advanced stage of e-commerce (Chaffey's full electronic commerce) that is at issue in this paper: have SMEs reached this stage? To gain competitive advantage using e-commerce requires firms to be moving to or at this stage depending on their industry group. This stage of e-commerce provides an array of possible competitive efficiencies including cost reduction and bundling of product and service offerings in multiple ways.

For Irish businesses, e-commerce offers an essentially new way of conducting business transactions that have wide-reaching economic and social implications. It will influence new industry structures and competitive practice

Table 9.1 Levels of E-Commerce Sophistication

Level	Characteristics
Primitive	Static web pages or "brochure-ware" Searchable site with dynamic pages such as online catalogue Integration with operational databases, e.g. inventory searching, package tracking, job postings Customer transaction through the Internet, e.g. selling products and services, buying and selling shares, applying for loans
Advanced	Full electronic commerce (i.e. integrated fulfilment cycle of ordering, shipping, billing)

Source: *Chaffey et al. (2000)* Internet Marketing: Strategy, Implementation and Practice, *Financial Times/Prentice Hall, London, p. 329.*

in Irish and international markets, and will offer considerable business opportunities and indeed threats for Irish businesses. Furthermore, e-commerce presents an alternative channel for overcoming some of Ireland's strategic challenges, including our peripheral location on the edge of Europe, the high proportion of SMEs within indigenous industry and regional imbalances in the distribution of industry.

A Forfás study in 1999 found that 99.4 per cent of enterprises are SMEs, and that they account for just under half of total enterprise employment in Ireland (Forfás, 1999). Therefore, significant opportunities exist for the Irish SME sector to create efficiencies in communications, shift the trading power balance in its favour and create new markets. There exists a range of national and commercial studies pertaining to information technology usage amongst Irish SMEs and these generally exhibit high usage levels of basic e-commerce tools such as email and the Internet. An Information Society Commission Report (1999) found that 85 per cent of companies had access to the Internet and an NGM Market Research (2001) study found that almost 80 per cent of companies in the south-east of Ireland with PCs have email and Internet access. However, existing literature has not sufficiently addressed the levels of transformation that e-commerce can have on the business processes of SMEs. For SMEs, or any business, to reach a stage of advanced e-commerce requires their business systems and processes to be electronically integrated. To achieve this can require considerable change and is therefore referred to as having a transformative effect on the business. In addition, this transformation indicates that the business has reached the highest level of e-commerce adoption and has its business defined on such a platform.

Many SMEs are gearing-up at the front-end of their business process through the use of e-commerce tools such as email and having a web page. This paper will assess whether this is met by back-end support that would serve to integrate customer orders or supplier relationships into the business process. Yet given the lack of strategic success by SMEs in exploiting IT in general (Thong and Yap, 1995; Bridge and Peel, 1999), this is a high-order test. Therefore, the

objective of this paper is to examine the level of impact that e-commerce is having on SMEs. Is usage of the Internet and other e-commerce tools integrated into organisational structures and processes? This level of integration is required for strategic exploitation of e-commerce.

Context of the Research

According to the EU Commission, to be classed as an SME or a micro-enterprise, an enterprise has to satisfy the criteria for the number of employees (up to 250 employees) and one of the two financial criteria, either turnover total (up to 7 million ECUs) or balance-sheet total (up to 5 million ECUs). The thresholds for the turnover and the balance sheet total are to be adjusted regularly, to take account of changing economic circumstances in Europe (see Table 9.2).

Table 9.2 SME Definition Adopted by the European Commission 1996

	Medium	Small	Micro-enterprise
Max. number of employees	250	50	10
Max. turnover (in million EUR)	40	7	–
Max. balance sheet total (in million EUR)	27	5	–

Source: *European Commission Recommendation,* Official Journal 107, *30 April 1996, p. 4.*

Using this definition would place most Irish firms in the SME category. In Ireland, 50 per cent of SMEs employ fewer than ten people (Forfás, 1999). This would imply a large proportion of micro-enterprises in the small- and medium-sized set. Therefore, policy directed at this sector is important. At an EU level, SMEs employ the majority of the labour force and have been the main source of employment creation in recent years. In Ireland, multinationals skew this figure somewhat.

This research was carried out under the auspices of an academic/industry liaison, called the "Wirecom" Initiative (Wales and Ireland E-Commerce Initiative), which provided an ideal opportunity to research SMEs in the south-east of Ireland. "Wirecom" is a regional initiative funded by the European Union, designed to stimulate awareness and usage of e-commerce amongst two European regions, south-east Ireland and west Wales. The research of Irish SMEs was conducted by the South-East Business Innovation Centre (SEBIC) and the program ran over an eighteen-month period from September 1999 to March 2001. The Wirecom project operated on three levels:

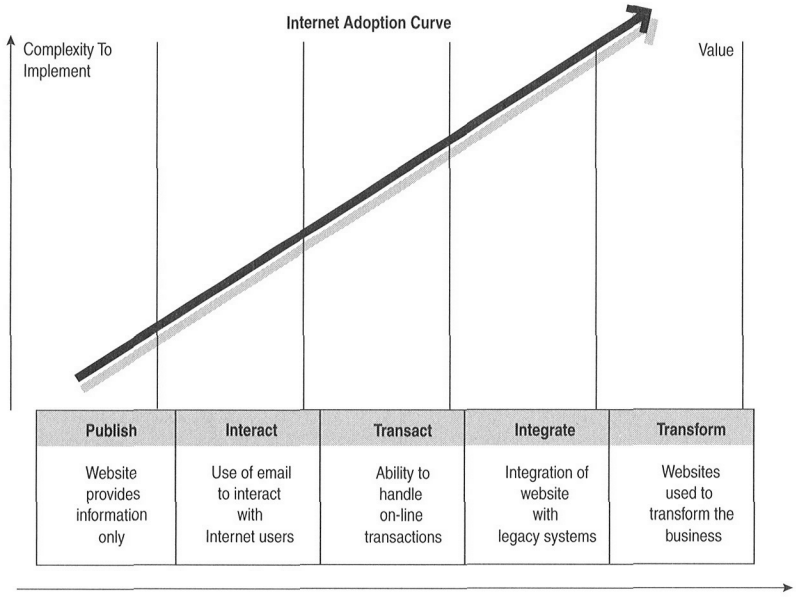
1. *Raising Awareness*: this involved undertaking a marketing campaign to inform SMEs of the opportunities afforded to them through the effective use of IT.
2. *Auditing*: undertaking audits of selected companies to analyse their specific needs as regards e-commerce.

3. *Direct Support*: providing 'hands-on' assistance to SMEs to put into practice the findings of their audits.

Integration of Business Functions and E-commerce

According to Poon and Swatman (1997), little integration between internal systems and the Internet was achieved among their sample group of active Internet users in their SME study. Even though the sample group unanimously used the Internet for exchanging information with their customers, none of the respondents had integrated ordering procedures between their front-end Internet web page and their back-end automatic order fulfilment systems (see Figure 9.1).

Figure 9.1 Stages of Internet Adoption by Government and Business



Source: *Cited in www.forfas.ie/ncc/reports/ncc_telecomm/tele.pdf*

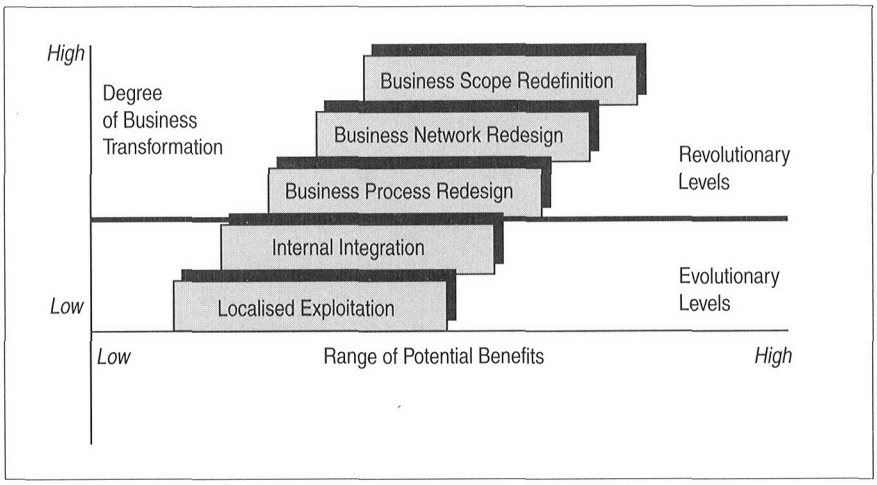
Given the high usage levels of IT in the SME sector, it was expected that Irish SMEs would be positioned between the transact and integrate stages of this curve. This would reinforce the views expressed in a Forfás Report which stated that:

> ... e-business is being recognised by Irish companies as not just involving the use of the Internet for email and web brochures but the use of information communication technologies throughout all business processes to create real, sustainable competitive advantage. (2000: 5)

The key test of the transformative potential of e-commerce is in the linking of these tools to front-end customer support and to back-office processes. This platform can enable significant cost reduction and potential for unique customer response, both of which can contribute to a competitive advantage from e-commerce. However, exploitation of e-commerce tools without this integration may lead to better customer or supplier communication but is difficult to translate into superior business performance.

Venkatraman's (1994) classic model of IT integration with business processes was designed for large organisations. This model suggests that IT-enabled business transformation occurs within five levels, i.e. from a local to a strategic continuum (see Figure 9.2).

Figure 9.2 Five Levels of IT – Enabled Business Transformation



Source: *Venkatraman (1994),* Sloan Management Review, *Vol. 35, winter, p. 75.*

The first two levels of business transformation are *evolutionary*, as they do not require considerable change to the business process, and the derived benefits are low relative to the next three levels. It is important to note that the levels presented in this model are not conceptualised as linear stages, since effective strategies do not adhere to any particular path. SMEs that adopt new technologies can fundamentally reshape their business processes. However, many SMEs fail to realise the strategic importance which IT can have on their businesses and are therefore resigned to the direct operational benefits that IT has to offer. Higher levels of transformation derive greater benefits, the ultimate level of transformation being *business scope redefinition*, but it also requires greater organisational change. Venkatraman (1994) concludes that the full benefits are realised when investment in IT is matched by investment in organisational change. Therefore, the SMEs to be considered in this study would need to be at

the business process redesign stage or higher in order to be deriving the full competitive advantage benefits from their e-commerce usage. While larger organisations are likely to be at a more advanced stage of e-commerce sophistication than SMEs, it is nonetheless possible for SMEs to transform their business processes by adopting the above characteristics. However, to reach an advanced stage will require a significant organisation-wide change.

In summary, the two models presented show the level of IT and e-commerce integration needed to reach stages that would facilitate competitive advantage. The findings presented in this paper will provide an insight into whether this is the case for SMEs in the south-east of Ireland.

Methodology

The focus of the Wirecom project was on SMEs located in the south-east of Ireland. These businesses were initially identified from business directories, government lists, and the yellow pages. Initial contact via telephone was made in a simple random manner with the owner/manager of these companies, explaining what was involved in the Wirecom project and asking companies to participate in the project. Despite the potential benefits of the project (for example 'hands-on' assistance in the use of IT), the authors were very satisfied when 81 SMEs (approximately 20 per cent of the 500 companies contacted) agreed to become involved in the initiative.

For the participating SMEs, it was agreed that an audit of their specific e-commerce needs would take place. These audits took the form of on-site company visits where the possibility for the Wirecom team to observe the company's observations in addition to asking relevant questions was present. Such audits involved collecting quantitative and qualitative data and to achieve the Wirecom objectives, it was necessary to allow for the possibility of interaction with the participants. In this context, it was felt that a semi-structured method would be likely to generate the greatest level of interviewee co-operation and participation. This meant that the interviewer had a list of themes and questions to be covered in each interview, although these can vary from interview to interview. According to Sekaran (1997), semi-structured and in-depth interviews facilitate the probing of answers provided by respondents that should add significance and depth resulting in a *rich set of data*. Furthermore, the interview method is most appropriate where there are a large number of questions to be answered, where the questions are either complex or open-ended or where the order and logic of questioning may need to be varied (Patton, 1990).

Data were recorded by note taking at these meetings (at least two members of the Wirecom team were present at each audit) and a preliminary write up was subsequently made after these meetings, from which a final report was written for the client SME. This document provided an outline of each company's existing position in terms of their use of e-commerce and then attempted to provide the SME with a practical solution to their e-commerce needs in the form of advice. These documents provided the databank upon which the findings of this article are based. In summary, the audits provided an in-depth

examination of each firm's capability to transform their business processes using e-commerce.

Research Findings

In order to assess the transformative effect of e-commerce on the selected SMEs, a mix of quantitative and qualitative data was evaluated. The quantitative data are presented initially and concerned the usage of e-commerce technologies among these companies. In addition, qualitative data, which consisted of observations and themed questions on business processes during the site visits, are presented. The quantitative data proved very conclusive in that it was clear that the SMEs were not at the advanced stage of e-commerce integration.

The data analysis process initially involved quantifying the usage of email and web page and then attempting to classify these figures by industry type. It was felt that a classification of usage of these technologies by industry was important, as it was clear from the audits that significant differences existed in the SMEs examined. Table 9.3 and 9.4 illustrate email and web-page usage according to industry sector and the adoption rate is expressed in terms of number of companies and as a percentage.

Table 9.3 SME Use of Email by Industry Type

Industry Type	Email Adopters		Email Non-Adopters		Total
	Number	%	Number	%	Number
Agriculture/Food	8	57	6	43	14
Engineering/Metals	16	84	3	16	19
Chemical/Pharmaceutical	2	50	2	50	4
Clothing/Textiles	5	71	2	29	7
Construction Products	5	83	1	17	6
Consultancy	5	71	2	29	7
Crafts	3	100	0	0	3
Fishing	3	60	2	40	5
Print/Packaging	3	100	0	0	3
Recycling	4	100	0	0	4
Tourism	4	67	2	33	6
Wood/Furniture	1	33	2	67	3
Total	**59**	**73**	**22**	**27**	**81**

Table 9.4 SME Use of Web Page by Industry Type

Industry Type	Web-page Adopters		Web-page Non-Adopters		Total
	Number	%	Number	%	Number
Agriculture/Food	3	21	11	79	14
Engineering/Metals	10	53	9	47	19
Chemical/Pharmaceutical	2	50	2	50	4
Clothing/Textiles	0	0	7	100	7

Construction Products	2	40	4	60	6
Consultancy	3	43	4	57	7
Crafts	1	33	2	67	3
Fishing	2	40	3	60	5
Print/Packaging	3	100	0	0	3
Recycling	4	100	0	0	4
Tourism	4	67	2	33	6
Wood/Furniture	0	0	3	100	3
Total	**34**	**42**	**47**	**58**	**81**

The overall level of adoption of a web page (42 per cent) was found to be considerably lower than email adoption (73 per cent). This fact is hardly surprising considering the amount of time, expertise and resources required to adopt successfully a web page in comparison to using email. Furthermore, the level of email adoption varies considerably as per industry sector. In particular, the print/packaging, crafts and recycling sectors (representing 10 companies or 12 per cent of the sample group) have 100 per cent adoption levels in comparison to lower adopter groups such as the chemical/pharmaceutical and wood/furniture sectors (representing 7 companies or 9 per cent of the sample).

It is noticeable in the above tables that, apart from the agriculture/food and engineering/metals industries, the number of companies in all other industries is small (less than eight companies per industry). This meant that any statistical findings from these industries were unlikely to be statistically significant. To circumvent this problem and still preserve the differences in technology usage across industries, the authors decided to classify the 81 companies into three broad industry sectors as follows.

1. *Primary*: Agriculture/Food, Fishing, Wood/Furniture;
2. *Secondary*: Chemical/Pharmaceutical, Print/Packaging, Crafts, Construction Products, Clothing/Textiles, Engineering/Metals;
3. *Tertiary*: Consulting, Recycling, Tourism.

This classification is also used by to classify employment levels and is based on Fisher's three stages of economic growth (Fisher, 1939). In short, this amalgamation of industries into three broad sectors would ensure that a reasonable sample size could be generated for each group and yet preserve the differences in technology usage which were evident in Tables 9.3 and 9.4 (the authors felt from the audits that there were similarities in usage within these three broad areas). Tables 9.5 and 9.6 show the use of the two e-commerce technologies across these three industry sectors:

Table 9.5 Use of Email by Sector

Sector	Primary (27%)		Secondary (52%)		Tertiary (21%)		Total(100%)	
	Number	%	Number	%	Number	%	Number	%
Users	12	55	34	81	13	76	59	73
Non-Users	10	45	8	19	4	24	22	27
Total	**22**	**100**	**42**	**100**	**17**	**100**	**81**	**100**

Table 9.6 Use of Web Page by Sector

Sector	Primary (27%)		Secondary (52%)		Tertiary (21%)		Total (100%)	
	Number	%	Number	%	Number	%	Number	%
Users	5	23	16	38	11	65	32	40
Non-Users	17	77	26	62	6	35	49	60
Total	**22**	**100**	**42**	**100**	**17**	**100**	**81**	**100**

It can be seen from the above two tables that the primary sector, which represents 27 per cent of the sample group, has had the lowest level of technology adoption (email 55 per cent, web page 23 per cent), which is to be expected considering that this sector has a lower communication need, as companies from this sector typically produce generic products to established buyers in the business-to-business sector. Statistical tests carried out on this data showed that the difference in email usage of the primary sector *vis à vis* the other two sectors is significant (p-value < 5 per cent). In addition, the tertiary sector, representing 21 per cent of the sample, exhibits a significant increase in web-page adoption (64 per cent), as opposed to the other two sectors (38 per cent) (p-value < 5 per cent).

From these tables and other information collected at the interviews, it is clear to the authors that while no sector had fully integrated e-commerce into business systems, the tertiary sector, which represents service firms, is slightly higher up the transformative path of Venkatraman model presented earlier but still on the evolutionary trajectory. The higher relative adoption levels in both the secondary and tertiary sectors were due to customer-led demand for technology use. While firms found obvious communication and information benefits from using these technologies with customers and suppliers, the high usage levels are not matched with integration. No back-office integration was found; therefore, firms would not be gaining any cost reduction or be able to use e-commerce to differentiate their products/processes. E-commerce is not perceived as a critical component of the business at this stage in its evolution with this sample. It is seen as an add-on and, in particular, as a relational tool to communicate with customers and suppliers.

Further analysis of the interview findings revealed that a significant majority (83 per cent) of SMEs were found to have a domestic focus while the remaining 17 per cent have an international focus. These domestic-focused companies have a high email adoption level (70 per cent) and over one-third (36 per cent) have already adopted a web page. In contrast, the internationally focused companies

have a much higher level of adoption for both email (86 per cent) and web page (71 per cent), which may be attributed to their need for a more efficient communications system required to trade in multiple markets (the p-value for differences in web-page adoption was less than 1 per cent). Additional data to emerge from the audits is summarised in Table 9.7

Table 9.7 Additional Data for the 81 SMEs

	Total Number of Companies (n=81)	
Primary Technology		
Email Users	59	(73%)
Web-page Users	34	(42%)
Usage of Other Technologies		
On-Line Selling	3	(4%)
On-Line Banking	10	(12%)
EDI	5	(6%)
PC	74	(91%)
Turnover (Size)		
<100 K	17	(21%)
101 – 1M	31	(38%)
1M – 5M	18	(23%)
5M +	5	(6%)
n/a[a]	10	(12%)
Employees (Size)		
<10	45	(56%)
<50	29	(36%)
<250	5	(6%)
n/a[a]	2	(2%)

a *In the Wirecom audits, the respondent companies were not required to disclose details of their turnover and staff level, although most did volunteer this information.*

It is clear that while most SMEs have a PC (91 per cent) and use email (73 per cent), the level of usage of other e-commerce technologies, such as on-line selling, on-line banking and EDI, is either quite low or non-existent amongst the sample companies (this is true for all three industry sectors). This confirms that there has been a disappointing level of e-commerce 'take-off' among the SME community as the vast majority of companies has yet to incorporate e-commerce into their IT strategy.

Two main indicators of company size (turnover and number of employees) have been examined and surprisingly, neither variable was found to have a significant effect of the usage of these technologies. It was actually found that as

the number of employees increased, it had a negative effect on web-page adoption – this is due to the fact that the companies in the primary sector had higher employee numbers than those in the secondary or tertiary sectors.

Further probing of the companies revealed that the companies in the primary sector who adopted email did so primarily due to the influence of dominant suppliers (67 per cent), who they rely upon for production inputs. On the other end of the supply chain, their customers (who they rely on to buy their produce) are found to be influential in their decision to adopt a company web page. This scenario is logical as the SME complies with the partner affecting the particular element of trade. This finding is also consistent with Poon and Swatman's (1997) integration model that suggests SMEs begin their e-commerce adoption through inter-organisational interventions (the main forces being customer or supplier demands) rather than through forces internal to the management of the firm. This forced adoption hasn't led to a transformation of the businesses concerned.

Adoption prompted by trading partners is also the driver in the other sectors studied. In the secondary and tertiary sectors, the customer is found to be the key player influencing both email (89 per cent and 84 per cent respectively) and company web page (82 per cent of all companies). Therefore, this study confirms that companies further down the supply chain are driven to use e-commerce to a greater extent, due to the influence of their customers, in comparison to their primary sector counterparts, who typically trade a significant proportion of their sales to a stable small group of large buyers in mature markets. Hence their need to take on new forms of communication to trade is very low due to a lack of demand for e-commerce.

A small minority of SMEs (considered 'exemplars') were using e-commerce to try to achieve competitive gains – "e-commerce provides the opportunity to case niche world markets cheaply, which would otherwise be beyond our scope" (case respondant). One such 'exemplar' which manufactured high-end industrial lighting equipment found that that it achieved relative advantage at operational level over its competitors as it sped up the communication process and transformed data to a format which could be manipulated and stored electronically. Furthermore, this company's web page provided access to company products in a highly segmented fashion, whereby users were allowed access to information depending on their relationship with the company, using a password access system. This company has invested over €50,000 in its e-commerce strategy and has been able to generate cost savings by substituting its sales fleet with an on-line presence. For example, staff members have learned to update their company website in-house using File Transfer Protocol and they use statistical data gathered from the website to assess hit rates and user profiles. This has allowed this company to be a top niche player in a market where it competes with multinationals such as Thorn and Philips. However, this 'exemplar' has been unable to fully transform its business process using e-commerce, not as a result of poor support from top management, the cost of implementing an effective e-commerce strategy or any other impediment, but largely due to the low level of

e-commerce development in their sector, where trading partners, especially customers, have been slow to adopt.

By contrast, most of the SMEs in the audited companies were only realising low-level benefits from the use of e-commerce tools. Many have under-invested in e-commerce development as adequate resources for successful implementation of an appropriate strategy are often not committed. This is because the majority of SMEs are only interested in e-commerce development at the point where it will deliver concrete benefits, and explains why many have adopted a cautious approach to e-commerce as it undergoes a process of evolution especially in terms of security of on-line transactions and legal issues. Cost and resources are additional considerations here: many of the SMEs in the study were production oriented and were incapable of providing the manpower needed to commit to 'peripheral' functions such as e-commerce cultivation. Most SMEs prefer to buy convenient 'off-the-shelf' solutions, rather than dedicate themselves to developing in-house e-commerce expertise.

Conclusions

It is clear from the findings to date that the SMEs sampled in this survey are at an embryonic stage of e-commerce development. The vast majority of the sample of SMEs have made little progress in integrating e-commerce with their business processes and are only deriving operational benefits from its use. These SMEs therefore can be positioned at the publish/interact stage of the Internet adoption curve (Figure 9.1), and at the level of localised explotation in the Venkatraman's model (Figure 9.2). The future predicted for SMEs and e-commerce has not been realised, which is in line with international studies and extant reports. This is despite the high usage of e-commerce tools such as email and web pages. Therefore, headline reports of high usage of e-commerce tools are not a proper reflection of the current business reality. SMEs have not been able to transform their practices and exploit e-commerce's capabilities. The level of integration patterns of general IT has not been altered by e-commerce. Therefore, the much heralded benefits have yet to be exploited.

There are many reasons for the lack of exploitation of e-commerce by the SMEs audited. Some are external and include Internet high-speed access and cost of access, but most are internal and related to the perceived need for the technology, poor technology skills and management's lack of commitment to e-commerce. The adoption of e-commerce tools in this study was forced by customers – a very consistent finding with international studies (Sillince et al., 1998; Poon and Swatman, 1999; Daniel et al., 2002). In contrast, customer non-adoption was also problematic for initiating SMEs (which are in any case a small group). SME e-commerce, and perhaps this term is a misnomer as it can hardly be described as being adopted, appears reactive, which would not be a problem if the opportunity then was seized and exploited to transform the business. Yet given the flexibility of small firms, one could expect them to be the high adopters of e-commerce if a business case was made. The external focus of e-commerce on a future trading system that is developing more slowly than

predicted may be putting firms off, in which case a focus on the internal integration side of e-commerce might be one solution to the slow uptake. A concentration on direct costs and benefits rather than the 'virtual' future may win more persuaders.

Integration of e-commerce into the business process of SMEs could bring major cost reduction and opportunities for differentiation. Major cost savings could be achieved in the order-fulfilment system if it was conducted electronically and in real time. Time delays in order processing and billing would be virtually eliminated. To attain any benefit from e-commerce means business processes have to be re-designed around technology and that systems have to be simple enough to be robust and for everyone to use. Technology dependence without some technology acumen is risky. Perhaps this is a key reason why SMEs haven't fully embraced e-commerce. Developing e-commerce competencies and a focus on a particular process is a place to start operationalising a strategy. Without some technology ability and a focus for results it will remain difficult to convince SMEs to invest in e-commerce. The focus on existing processes and how they might be made more efficient using e-commerce tools is a good place to begin. We suggest that the order fulfilment process be the focus as it is a significant cost element in Irish business given our geographic location. Benefits gained in any part of this process would add to a momentum for further implementation. Most SMEs will use computers in accounts and in order processing – perhaps linking these to e-commerce tools is a place to commence implementation.

The field of research into e-commerce development in SMEs offers many opportunities. Arising directly out of this research is the need for another regional or national sample to compare the south-east to the e-commerce integration performance of the rest of the country. In addition, each firm in the current sample could be revisited to assess their current progress as each company was given an e-commerce development report which identified opportunities for their business. More work with SME owner/managers might usefully address a method for overcoming e-commerce adoption barriers. This research would be very useful if done in focus groups and in an action research mode. In the longer term, a measure that more accurately reflects e-commerce use needs to be advanced if we are to assess properly Ireland's progress in this area.

The pattern of e-commerce impact has major policy implications. Perhaps it is necessary to start back at a very basic level and work closely with SMEs in an e-commerce mentoring programme with owners and managers. Micro-level policy interventions may be a route to develop e-commerce usage and transformative capacity at the SME level. As much e-commerce adoption has been externally led, the focus of policy has to be on factors inside the firm – its owners, people and processes. Clearly, existing macro-enterprise policy aimed at creating awareness and encouragement and support of e-commerce companies is not penetrating SMEs to any significantly deep level. Perhaps anything new may be just too costly. However, without micro-policy interventions that target

changes in the way SMEs operate, the innovation and efficiency that e-commerce can create may be lost to a sizeable component of our enterprise system and may augur poorly for its future competitiveness.

Authors

Tom Egan *is a lecturer in statistics and financial management at the Business School at Waterford Institute of Technology. He is the course leader for the executive MBA. His research interests include initial public offerings (IPOs) and the application of multimedia and E-Commerce tools to business teaching programmes.*

Steven Clancy *has worked as a part-time lecturer in marketing at the Business School at Waterford Institute of Technology. He collected the data for this article and worked as a researcher for the WIRECOM project for a period of eighteen months.*

Tom O'Toole *is the Head of School of Accountancy, Business Studies and Adult Continuing Education at Waterford Institute of Technology. His research specialism is in the governance of inter-organisational relationships. Current research themes include electronic relationships, healthcare networks, and governance structures and competitive advantage.*

References

Benjamin, R.I., de Long, D.W. and Morton, M.S.S. (1990) "Electronic Data Interchange: How Much Competitive Advantage?", *Long Range Planning*, Vol. 23, No. 1, pp. 29–40.

Bridge, J. and Peel, M.J. (1999) "A Study of Computer Usage and Strategic Planning in the SME Sector", *International Small Business Journal*, Vol. 17, No. 4, pp. 82–7.

Chaffey, D, Mayef, F., Johnson, K. and Ellis-Chadwick, F. (2000) *Internet Marketing: Strategy, Implementation and Practice*, London: Financial Times/Prentice Hall.

Daniel, E., Wilson, H. and Myers, A. (2002) "Adoption of e-commerce by SMEs in the UK", *International Small Business Journal*, Vol. 20, No. 3, pp. 253–270.

European Union (1996) *European Commission Recommendation*, Official Journal 107, 30 April.

Fisher, A.G.B. (1939) "Production, Primary, Secondary, and Tertiary", *Economic Record*, Vol. 15, No. 28, pp. 24–38.

Forfás (1999) *E-Commerce the Policy Requirements*, Dublin: Government Publications.

Hopper, M. (1990) "Rattling SABRE: New Ways to Compete on Information", *Harvard Business Review*, Vol. 68, No. 3, pp.118–25.

Information Society Commission (1999) *Internet Access and Usage within Irish Business: Research into Business Attitudes towards Information and Communication Technologies*, Information Society Commission, Dublin.

Johnston, H.R. and Vitale, M. (1988) "Creating Competitive Advantage with Interorganisational Systems", *MIS Quarterly*, Vol. 12, No. 2, pp. 153–66.

Knol, W.H.C. and Stroken, J.H.M. (2001) "The Diffusion and Adoption of Information Technology in Small- and Medium-Sized Enterprises through IT Scenarios", *Technology Analysis and Strategic Management*, Vol. 13, No. 2, pp. 227–46.

National Competitiveness Council and Forfás (2000) *Statement on Telecommunications, E-Business and the Information Society 2000*, Dublin: Forfás.

NGM Market Research (2001) *South-East Information Society Strategy: Benchmark ICT Survey of South-East Business and Organisations*, MGM, Waterford.

Palvia, P., Means, D.B. Jr and Jackson, W.M. (1994) "Determinants of Computing in Very Small Business", *Information and Management*, Vol. 27, No. 3, pp. 161–75.

Patton, M.Q. (1990) *Qualitative Evaluation and Research Methods* (2nd edn), Newbury Park: Sage.

Poon, S. and Swatman, P.M.C. (1997) "Small Business Use of the Internet: Findings from Australian Case Studies", *International Marketing Review*, Vol. 14, Nos 4/5, pp. 385–402.

Poon, S. and Swatman, P.M.C. (1999) "An Exploratory Study of Small Business Internet Commerce Issues", *Information and Management*, Vol. 35, No. 1, pp. 9–18.

Sekaran, U. (1997) Research Methods for Business (2nd edn), New York: Wiley.

Sillince, J.A.A., Macdonald, S., Lefang, B. and Frost, B. (1998) "Email Adoption, Diffusion, Use and Impact within Small Firms: A Survey of UK Companies", *International Journal of Information Management*, Vol. 18, No. 4, pp. 231–42.

Thong, J.Y.L. and Yap, C.S. (1995) "CEO Characteristics, Organisational Characteristics and Information Technology Adoption in Small Businesses", *Omega*, Vol. 23, No. 4, pp. 429–43.

Venkatraman, N. (1994) "IT-Enabled Business Transformation: From Automation to Business Scope Redefinition", *Sloan Management Review*, Vol. 35, winter, pp. 73–87.