

Addressing ICTs skill challenges in SMEs: insights from three country investigations

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Abstract

The rapid advancement in information and communication technologies (ICTs) has brought enormous business opportunities as well as challenges. One of these challenges is the demand for ICTs skills and expertise in adopting and implementing these emerging technologies. Coping with skills shortage poses a serious challenge across all European countries. Lack of ICTs skills and knowledge is more evident in small- and medium-sized enterprises (SMEs). As training is regarded as the most effective way of improving skills and enhancing knowledge, this paper attempts to address skills shortage at pan-European level by identifying SMEs' needs on ICTs training in the UK, Portugal and Poland. The investigation focuses on the most needed training areas, the required training levels and the preferred training delivery channels. The paper summarises findings from three-country investigations and highlights the implications of findings for the design and development of a Web-based training system for the use of ICTs in SMEs.

Introduction

SMEs play a pivotal role in sustaining employment and creating income and prosperity (Lange *et al.*, 2000). Within the UK, the percentage of the workforce employed by SMEs has risen from 58 per cent in 1979 to 67 per cent today (Lange *et al.*, 2000).

Governments around the world are placing increasing importance upon the success of small business entrepreneurs and providing increased resources to support this emphasis (Burgess, 2001). It has been widely recognised that small firms' survival and success is crucial to any nation's economic stability. However, the abilities and skills of employees will be crucial to the prosperity of SMEs (Clarke and Gibson-Sweet, 1998) as an acute skill shortage could hamper a company's ability to stay competitive and sustainable. To help SMEs to cope with the increasing demand on improving their skills for adopting e-commerce and e-business, training is often seen as the most effective way to fulfil this task. A pilot project supported by the European Commission's Leonardo da Vinci programme was set up to address training needs issues in information and communication technologies (ICTs) and to develop on-line training and support systems for SMEs. To provide the training in the most needed areas at the most appropriate levels, surveys, interviews and focus groups were conducted among five participating countries. Winch and McDonald (1999) argue that to facilitate SMEs to cope with changes, more innovative new approaches to SMEs skill development is needed. Therefore, the pilot project also aims to develop a Web-based training system as a

low cost, easy access and flexible training option to SMEs. The empirical studies reported in this paper provide valuable guidelines for the development of such an on-line training system.

This paper reports the survey findings on training needs identification in the UK, Portugal and Poland. It attempts to address the following questions:

- What are the most needed ICTs training areas in SMEs?
- At what level should the training be delivered?
- Do the managers in different European countries have different training needs?
- What are the major considerations for the development of a Web-based training system, which will be beneficial to SMEs in different countries?

UK, Portugal and Poland could be portrayed as being at three different levels on the use of ICTs, especially e-commerce adoption. According to Burton (1999), Scandinavia, Holland, Germany and the UK have emerged as the leaders in Web usage and e-commerce. Italy, Spain, Greece and Portugal are classified as "Europe's e-commerce also-rans". Eastern Europe is largely barren in terms of e-commerce. Cultural, political and economic factors would affect the adoption of e-commerce, but the intention for this research is to seek ways to improve the current ICTs adoption by providing effective training. It is hoped that involving countries at different levels of e-commerce adoption would provide useful insight into the training issues at the pan-European level, and help to develop more effective training systems for SMEs across Europe.



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The definition of SMEs varies in different countries. For the purposes of this research, a small and medium sized business is defined as having between 10 and 249 employees. This working definition is in line with the definition provided by European Commission (Department of Trade and Industry (DTI), 2000).

ICTs skill challenge for SMEs

The applications of ICTs have revolutionised the way that a business is conducted. E-commerce offers companies tremendous opportunities to improve their business performance in a new and innovative way. However, despite the widespread use of numerous electronic tools, SMEs are described as the slowest sector to embrace e-commerce (Mehling, 1998; Poon and Swatman, 1999). For many small businesses, e-commerce seems like a confusing nightmare. They are not able to react to the rapid changes brought about by this emerging technology, but on the other hand they are scared to be left behind and therefore eager to embrace the technology (Hobson, 2000). The fear of being left behind was also recognized by focus group discussions conducted by Mullins *et al.* (2000).

For example, in Poland, most Polish managers do not recognise the need to compete in the pursuit of modern technologies. The introduction of e-business solutions is, more often than not, enforced by external, typically foreign, partners. According to the *TRICTSME Report* (University of Economics, 2000), this might be attributed to:

- the lack of adequate technical infrastructure;
- insufficient awareness of the opportunities offered by the latest technology solutions;
- shortage of competent and experienced workforce;
- negative attitudes toward the Internet and the mass media; and
- the lack of specialised training.

The potential benefit of e-commerce and e-business in SMEs would only be realised by the capable managers who can deal with the emerging technology and implement the technologies wisely. Allison (1999) argues that a skilled and knowledgeable work force is closely linked with the successful implementation of technology. A highly skilled workforce is key to increased

competitiveness and sustainable growth (Lange *et al.*, 2000). However, skill shortage has been recognised as one of the challenges facing global e-commerce by Bingi and Khamalah (2000). The demand for highly knowledgeable and skilled managers and workforce places enormous pressure upon companies to improve or update their current knowledge and skills. This is particularly important in SMEs as compared with their larger counterparts, SMEs are normally portrayed as having a lack of appropriate skills and being in need of training (Gaskill *et al.*, 1993). Evidence collected in DTI's "Business in the information age" report suggests that about 50 per cent of SMEs agree or strongly agree that ICT skills shortage is one of the reasons for UK businesses not adopting or further developing e-commerce (DTI, 2000). Therefore, coping with rapid changes brought along by ICTs demands continual education and training.

Skills shortage and importance of training

A previous study by Cragg and King (1993) found that one of the strongest inhibiting factors for small firm information technology implementation was the lack of information system knowledge. More recent research on e-commerce adoption confirms the same finding. Research by Corbitt (2000) found that there was an obvious concern that electronic commerce was not fully understood and the "I do not know" response was the prevailing view on e-commerce understanding in companies studied. Considering the barriers for e-commerce adoption in SMEs, a number of studies have been conducted to address this issue and identified that lack of skills and knowledge is one of the barriers for the uptake and use of Internet and e-commerce. Research by DTI (1998; 1999), shows that most SME managers are not aware of the opportunities presented to them by advanced information technology, especially newly emerging e-commerce and Internet business. The surveys by DTI indicate that closely linked to awareness, understanding and acceptance of the information society is a distinct lack of skills, and the lack of skills is perceived to be the most significant barrier to uptake of ICTs. Research by Nath *et al.* (1998) reveals that training and a lack of skilled personnel are main impediments to implementation of the Internet and e-commerce. The survey by Ritter and

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Walker (1999) reveals that although everyone claimed to be moving towards Internet business, almost 45 per cent of respondents do not believe that their executives have the skills and knowledge necessary to make informed decisions regarding Internet business strategies. BMG Research's (1998) report on barriers to the use of the Internet finds that one in six owner/managers feel that they have a lack of understanding and knowledge. Half of the respondents (51 per cent) feel their understanding of the Internet is poor or very poor. More than one in three respondents (37 per cent) do not know where they would go for information about the Internet and its applications for business. Other surveys show similar results suggesting SME managers are willing to use these technologies, but they do not know where to start and suffer from a lack of guidance in using appropriate approaches for effective technology implementation (Auger and Gallagher, 1997; Duan and Kinman, 2000). Therefore, there is sufficient evidence from literature on skills and knowledge deficiency in SMEs which are and will continue to be a significant impediment to the uptake of new technology, and will increasingly disadvantage the competitiveness of SMEs. Thus, it is essential to address the issues of improving skills by effective training and support.

"Skills shortage and training: a forgotten dimension in new technology" is a concern raised by Foley and Watts (1994) nearly a decade ago, but the relationship between skills shortage and training in ICTs deserves even more attention presently. Skills and training issues were often forgotten or misjudged during the new technology appraisal process (Foley and Watts, 1994). Poon and Swatman (1998) find that research on the topic of the Internet and small business points to the importance of training and demonstrated benefits. Education and training can bridge the gap between development and successful implementation of new technology (Singh, 2000). The rate of change in ICTs means that the training of IT staff is a continual challenge (Dench, 1998). Training can be delivered by initial training and ongoing training (Dench, 1998). Ongoing training includes updating staff knowledge and improving existing skills. It is particularly essential to keep managers educated on what is going on in order to make informed decisions in today's competitive environment. Although training has been highly regarded as an effective tool for addressing skills shortage, small businesses are particularly reluctant to train (Elbadri, 2001). Robert's (1998) study of small businesses'

basic problems with computer technologies reveals that topping the list of problems is the lack of proper training and support.

In summary, extensive literature evidence has been gathered on SMEs' lack of ICTs skills and knowledge and the imperative needs for the provision of effective training and education, but little research has been devoted to address the actual training needs of SMEs in ICTs. Nor has any attempt been made to address this issue at a pan-European level. This paper seeks to remedy these deficiencies.

Research methods

This empirical study was conducted at the end of 1999 and beginning of 2000 (see Table I for a summary). Questionnaire surveys were adopted in the investigations. Although the primary objective of the survey is to identify the training needs, other relevant information also needs to be collected and examined. The questionnaire is designed to gather information in the following areas:

- company's current use of computers;
- current ICTs training provision and respondents' perceptions on the effectiveness and importance of training; and
- training needs identifications in terms of areas, levels and delivery channels.

UK survey

Survey questionnaires were sent to 950 UK SMEs in the manufacturing sector, as manufacturing SMEs were the initial target group of this European Commission funded project. The companies were chosen randomly from the FAME database. UK FAME (financial analysis made easy) is a CD-ROM based database containing detailed information on UK companies for research and marketing. A total of 87 responses have been received (9.2 per cent response rate) of which 81 are usable.

Poland survey

The translated questionnaires were distributed among 200 businesses. The Polish authors also obtained the assistance of the Katowice Chamber of Commerce and Industry that acted as an intermediary with SMEs in the Katowice area. A total of 30 usable questionnaires were collected which represent a 15 per cent response rate. The companies are predominantly from service sectors (73 per cent).

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Portuguese survey

Questionnaires were sent, by mail, to 552 small and medium enterprises with less than 250 workers, located in Portugal. They were selected from a list of Portuguese small and medium enterprises, ranked by IAPMEI (which is an association of the Portuguese SMEs) as "The best of Portuguese SMEs in 1998". A total of 69 usable responses were collected through the survey which represents a 12.5 per cent response rate. The majority of companies responded are from service sectors (73 per cent) and some are from manufacturing (14 per cent), construction (7 per cent) and communications/utilities (3 per cent).

Result analysis and discussions

Respondent profiles

Table II shows a brief profile of respondents and Table III presents the current situation on the use of computers. Table II shows that

all the companies surveyed in the UK and Portugal are SMEs, but some of the respondents in Poland are from companies with less than ten employees (14 per cent) and more than 250 employees (23 per cent). The majority of questionnaires were answered by managing directors (about 40 per cent) and managers in other functional areas (about 40 per cent).

The company's current use of computers

The levels of computer literacy among respondents are similar between the UK and Portugal which shows that majority of managers believe their computer skills are at intermediate level. Poland shows a slightly different pattern with a higher portion of novices (17 per cent) and expert (17 per cent) managers in computers. A cross-country comparison on this issue may not be very meaningful as the perceptions of computer literacy in each sample group could be different.

Regarding the use of computers, Table III clearly demonstrates that the majority of participating firms have computers with modem and CD-ROM drive, but it is notable that the percentage of computer usage in Polish firms is relatively low. However, the majority of employees do not use computers in their work in the UK and Portugal. Only 14 per cent of firms in the UK and 16 per cent in Portugal have more than three-quarters of its employees using computers. A total of 56 per cent of firms in the UK and 46 per cent in Portugal have less than a quarter of their employees using computers. Polish firms surveyed have a higher proportion of employees who use computers. This may relate to the industry sector differences. Regarding the functions supported by computers, many previous research findings reveal that computers in SMEs were predominantly used for operational level, rather than managerial level (Cragg and King, 1993; Duan and Kinman, 2000; Lai, 1994). The findings from this study illustrate that the use of computers is now being extended from lower level data processing and administrative functions to higher level business/management driven functions. Over 70 per cent of firms in the UK use computers to support their finance/accounting, sales, marketing, information management, purchasing and manufacture process control, over 78 per cent in Portugal for finance/accounting, sales, purchasing and human resource, and over 60 per cent in Poland for finance/accounting and sales. The least use of computers is training and human resources management in the UK, research

Table I

Summary of surveys conducted by participating countries

	Usable responses received out of the total sent out	Response rate (per cent)
Poland	30 (200)	15.0
Portugal	69 (552)	12.5
UK	87 (950)	9.2

Table II

Respondent profiles

	UK (per cent)	Portugal (per cent)	Poland (per cent)
Company size (number of employees)			
<10	0	0	14
10-19	2	7	17
20-49	20	38	13
50-99	29	32	13
100-249	49	23	20
>249	0	0	23
Job title			
MD/GM/owner	41	39	30
Finance/accounts manager	21	10	17
IT/IS manager	14	7	10
Marketing/sales manager	3	9	7
Production/operation manager	7	10	10
Administration clerk	1	6	20
Others	13	28	6
Computer literacy			
None	1	1	1
Novice	12	6	17
Intermediate	49	57	33
Extensive	32	25	30
Expert	5	9	17

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Table III
Use of computers

	UK (per cent)	Portugal (per cent)	Poland (per cent)
<i>Use of IT equipment</i>			
Computers/PCs/workstations	98	80	53
Computers/PCs with modem	99	94	53
Computers/PCs with CD ROM drive	93	81	67
Laptop/notebook computers	85	55	37
Palmtop computers (e.g. Psion organiser, Apple Newton)	30	6	27
Mobile phones, pagers, voicemail	99	83	60
<i>Proportion of employees using computers</i>			
Up to a quarter	56	46	20
Up to half	22	19	17
Up to three quarter	9	13	27
More than three quarter	14	16	33
Don't know	0	1	3
<i>Business functions supported by computers</i>			
Finance/accounting/performance management	96	97	67
Sales	91	86	63
Managing information	90	65	43
Purchasing/procurement	89	81	37
Marketing	74	57	50
Manufacture/process control	73	43	40
Research, development, design and production	69	35	33
Business and strategic planning	62	41	23
Customer service	62	55	53
Human resources/personnel	58	78	47
Training	49	38	23
<i>Do you think that your employees have sufficient understanding of challenges and business opportunities provided by ICTs?</i>			
No	21	14	7
Yes - some do	74	77	76
Yes - all do	5	6	17
<i>Do you think that your employees have sufficient understanding of ICTs available in your company to enable them maximise the competitive advantages that these technologies bring?</i>			
No	25	7	0
Yes - some do	68	81	87
Yes - all do	7	10	13

and development in Portugal, and training and strategic planning in Poland. Although SMEs in Poland also use computers to support their business functions, the percentages of companies involved are much lower than the UK and Portugal. This clearly indicates that although more Polish SMEs employees use computers for their work, computers are used less for supporting higher-level business functions, but more for simple routine operational functions. This situation is similar to that in the UK a few years ago. It is envisaged that the level of computer usage for more strategic oriented functions will change gradually along with the increased awareness, improved ICTs

knowledge and wider deployment of computers in Polish SMEs.

Employees' awareness of ICTs

The majority (about 75 per cent) (see Table III) of managers in the three countries think that only some of their employees have sufficient understanding of the challenges and business opportunities provided by ICTs. A total of 21 per cent of UK managers do not think that their employees have sufficient understanding of ICT challenges and opportunities, while only 7 per cent of Polish managers believe so. Similarly, the majority of managers in three countries think that only some of their employees have sufficient

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understanding of ICTs available in their companies to enable them maximise the competitive advantages that these technologies bring. A total of 25 per cent of UK managers think that their employees do not have sufficient understanding on this issue, yet none of the Polish managers believes so.

Current training provision

Table IV shows the results on current training provision in participating companies in three countries. In terms of training provision, 53 per cent per cent of firms in Poland, 36 per cent in the UK and 23 per cent in Portugal indicate that they never or rarely train their employees. Most of the companies provide training occasionally and less than 7 per cent provide training frequently in all three countries. Although the implementation of ICTs requires a high level of skills and extensive knowledge, training provision in SMEs is still limited.

In terms of training providers, it appears that most training is provided by experts within the companies, while other common training providers are IT training companies

and technology suppliers. UK firms appear to have more training by specialist consultants (31 per cent) than Portuguese (17 per cent) and Polish (13 per cent) firms. Government organizations play very limited or no role in providing ICTs training in all countries.

The assessment of the training the companies have already received is generally satisfactory although since the most common answer overall is "moderately satisfied" there is room for improvement.

The final question in Table IV attempts to identify the managers' perception of the importance of training in relation to the successful implementation of ICTs. It indicates that the majority of the respondents in the surveyed countries believe training is important with over 40 per cent of them thinking that it is essential. This evidence confirms literature assertions of the link between training and implementation effectiveness. It suggests a strong belief that training could play an essential role in the successful implementation of ICTs.

Training needs for ICTs

Literature studies reveal that a lack of skills and expertise is one of the factors affecting

Table IV
Current training provision

	UK (per cent)	Portugal (per cent)	Poland (per cent)
<i>Do you provide training for your employees on ICTs</i>			
No training	15	16	23
Rarely	21	7	30
Occasionally	37	58	30
Quite often	21	17	10
Frequently	6	0	7
<i>Providers of training</i>			
Experts within the company	57	42	42
IT training companies	56	29	42
Technology suppliers	47	33	58
Specialist consultant	31	17	13
Academic institutions	13	1	4
Government organisations	3	0	4
<i>Satisfaction with training received</i>			
Very dissatisfied	2	0	0
Dissatisfied	3	9	4
Moderately satisfied	46	46	58
Satisfied	48	25	29
Very satisfied	1	0	9
<i>Perceptions on the importance of training in relation to the successful implementation of ICTs</i>			
Essential	36	46	40
Very important	31	25	30
Quite important	31	28	30
Not very important	2	0	0
Not at all important	0	0	0

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the successful implementation of ICTs, including e-commerce, but no research so far has been devoted to investigate the needs of training in these areas. Tables V and VI provide some survey results, which help to identify the training needs among three countries.

Table V displays the detailed results of the identified training needs of ICTs, especially Internet, EDI and e-commerce. The majority of respondents indicate their needs in receiving training on e-commerce, Internet, EDI and business issues related to them. In the UK, the most needed areas are e-commerce (86 per cent), Internet (82 per cent), strategic and managerial issues on the use of ICTs (79 per cent), general knowledge of ICTs and their use in SMEs (77 per cent). The least needed areas highlighted are teleworking (40 per cent), video conferencing (46 per cent), mobile communications (51 per cent) and multimedia (53 per cent). In Portugal, the most needed areas are e-commerce (91 per cent), strategic and managerial issues on the use of ICTs (91 per cent) and business Web page writing (87 per cent). The relatively less important areas are

teleworking (77 per cent) and mobile communications (77 per cent), although demand is still high. In Poland, the most needed areas are: business Web page writing (81 per cent), the Internet (81 per cent) and multimedia (81 per cent). The relatively less important areas are: CD-ROM and electronic storage (51 per cent) and mobile communications (53 per cent).

It is no surprise that e-commerce is ranked as the top priority for training in the UK and Portugal, which may reflect the SMEs' strong willingness to embrace the technology. It seems that SMEs show lower interest in applying some of the advanced technologies, such as teleworking. According to UK Department of Trade and Industry's survey, SMEs are not yet convinced that the cost of adopting these technologies can be justified by the benefits (DTI, 1999). It is also interesting to see that Polish managers show more interest in training of technical aspect of ICTs while UK and Portuguese managers are more keen on strategic and managerial issues and the application of the technologies. It is also notable that in general, Portuguese and Polish managers

Table V

Identified training needs in different areas

Areas for ICTs training	Training needed		
	UK (per cent)	Poland (per cent)	Portugal (per cent)
General knowledge of ICTs and its use in SMEs	79	79	86
Strategic and managerial issues on the use of ICTs	77	75	91
E-commerce	86	75	94
EDI	67	74	87
Business Web page writing	70	81	88
Internet	82	81	93
Intranet and extranet	62	67	83
Multimedia	53	81	80
Networking	31	77	86
E-mail and fax	63	71	87
CD-ROM and electronic storage	61	51	78
Video-conference	46	59	78
Mobile communications	51	53	77
Teleworking	40	63	77

Table VI

E-commerce training and support needs

Current training and support needs for e-commerce	UK (per cent)	Poland (per cent)	Portugal (per cent)
Business strategies for successful e-commerce	43	50	62
Managing e-commerce operations	38	20	58
Electronic market analysis	35	27	35
Hardware/software	27	57	32
Security	23	30	54
Legal and tax implications	19	30	32
E-commerce and banking	14	20	25

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demonstrate greater interest than the UK managers in receiving training in all areas. Is this due to the UK's more advanced status in ICTs applications? Or is it due to more training already having been provided in UK SMEs as shown in Table IV? Although the survey was not designed to seek the relationship between the training needs and the level of ICTs applications, Burton (1999) does indicate that the UK is in more advanced use of ICTs. This may indirectly suggest the link between these two issues.

As the literature review suggests that the lack of e-commerce skill is more prominent in SMEs, the survey was designed to ask more detailed questions on e-commerce training needs. Table VI depicts the detailed results.

As the implementation of e-commerce will have a profound impact on the overall business process in a company, business issues should always come before the technical issues. Most importantly, "a clear strategy for an e-commerce solution is the key to the door of success" (Cunningham, 1998) as e-commerce takes more than the technology (Turban *et al.*, 2000). Therefore, companies need to treat e-commerce as a strategic business decision, not just a technology decision (Goldberg and Sifonis, 1998). This point is clearly reflected by the survey in the managers' needs for training. Table VI shows that the most demanded area for e-commerce training is "business strategies for successful e-commerce" (43 per cent in UK, 62 per cent in Portugal and 50 per cent in Poland), followed by "managing e-commerce operations" in UK (38 per cent) and Portugal (58 per cent). However, in Poland, the most demanded area is "hardware/software" (57 per cent), followed by e-business strategy (50 per cent). Managers from all three countries show a very low level of interest in training in "e-commerce and banking". It may be that SMEs envisage external purchase of these services rather than in-house developments.

Polish managers show less enthusiasm than those in other countries for business issues associated with e-commerce. This could be well explained by the *TRICTSME Report* (University of Economics, 2000) which points out that the vast majority of Polish senior managers are inclined to see the Internet as just another sophisticated medium for communication rather than a complete business solution or a new business area. For most managers, the experience of the Internet is limited to using e-mail and browsing the Web in search of potential buyers. This attitude has to be changed with better education and training and increased

maturity of strategic and commercial thinking.

Overall, it is evident that managers are aware that the appropriate e-commerce strategy and management is vital for any business and it should be considered as the most important area for training and support. These findings are also confirmed by a focus group analysis conducted by Mullins *et al.* (2000) which shows that strategic issues are very important for SMEs, but managers are not sure what strategy they should follow due to a lack of knowledge. It is not surprising to find that even if the right strategy has been implemented, managing e-commerce operations is also considered a vital area, which needs further support.

Training levels

In terms of training levels for those who have indicated the need for the training, Table VII indicates the general trend in that most of respondents would like to be trained at the beginner and intermediate level although the levels vary according to the training areas. For example, on average 46 per cent of training on business Web page writing is required at beginner level, 36 per cent at intermediate level and 18 per cent at advanced level, while 33 per cent of training on the strategic and managerial issues of ICTs is required at beginner level, 55 per cent at intermediate level and 13 per cent at the advanced level. The training on e-commerce is required at both higher beginner level (30 per cent) and advanced level (24 per cent). This may reflect the variability in different levels of e-commerce adoption among SMEs. The required low level of training seems to confirm other research findings on the lower awareness and knowledge of ICTs among SMEs.

Although the general pattern for the required level of training among the three countries is not dissimilar, it is notable that Polish companies require more advanced training in some areas, such as: e-commerce, Internet, Multimedia and teleworking. Would this suggest that Polish employees have higher skills in these areas? Or is this related to the Polish managers' attitudes toward ICTs as a tool rather than business enabler, discussed before. We believe the latter factor could contribute to this difference.

Training delivery methods

Training can be delivered through different channels. It would be interesting to see how managers would like to be trained. Table VIII shows that managers have different preferences in receiving training in ICTs.

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Table VII
Level of training required

Areas for ICTs training	Beginner (per cent)		Intermediate (per cent)		Advance (per cent)	
	UK	Poland	UK	Poland	UK	Poland
General knowledge of ICTs and its use in SMEs	16	27	61	46	23	16
Strategic and managerial issues on the use of ICTs	22	24	67	57	11	19
E-commerce	41	14	43	43	16	14
EDI	39	25	42	55	19	22
Business Web page writing	47	48	32	38	21	19
Internet	33	34	50	33	17	16
Intranet and extranet	44	33	44	50	12	19
Multimedia	46	34	36	33	18	11
Networking	36	35	45	35	19	26
E-mail and fax	12	33	53	38	35	30
CD-ROM and electronic storage	22	37	53	38	25	31
Video-conference	58	39	29	44	13	11
Mobile communications	31	47	42	35	27	32
Teleworking	38	21	38	58	14	14

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Table VIII
Training delivery methods

Preferred delivery methods for ICTs training	UK (per cent)	Poland (per cent)	Portugal (per cent)
On site training using external resources	42	43	70
Off site training by training organisations	31	47	26
On site training by internal expert	36	37	14
Computer-based self training delivered by CD-ROM	37	17	14
Computer-based self training materials downloaded through the Internet	15	20	9
Web-based self training delivered through the Internet	21	7	14

The most preferred way of receiving training in the UK and Portugal is "on site by external resources" and in Poland is "off site by training organisations". "Computer-based self training delivered by CD-ROM" comes as the second preferred training method in the UK, but as the least preferred in Portugal. Polish companies are less keen on receiving training with "Web-based self training delivered through the Internet". It is interesting to note that UK companies are more enthusiastic in using computer based training systems than the other two countries. This could also be related to the more advanced ICTs infrastructure and deployment in the UK than in less developed countries such as Poland where reliability of telecommunications will impede Web-based delivery.

In general, it appears that Web-based self-training through the Internet is less popular than some of the other methods. This is particularly true in Poland and Portugal. Considering the hurdles of slow Internet access speed, especially in developing countries, such as Poland, it is not surprising to see that managers would like to have off-line training with CD-ROM. However, it is anticipated that on-line training, particularly at the advanced level, will become more popular with the increase of the Internet bandwidth. Findings from this question provide a sound base for the authors in deciding how a computer-based self-training system should be developed and delivered.

Conclusions

The rapid advancement of information and communication technologies and its application by business seems to be accompanied by an increasingly widened gap between the required level of ICTs skills and knowledge and the actual level possessed by managers and employees. This is even more evident in SMEs as they are normally lacking resources to provide training for less skilled employees and to attract or retain highly

skilled workforces. As SMEs are eager to embrace e-commerce and e-business and attempt to turn the e-commerce opportunities into real business benefits, lack of skills and expertise become a major barrier for e-commerce adoption and successful implementation. This paper attempts to contribute to skill improvement by investigating ICTs training needs in three different countries and provide general guidelines for the design and development of a pan-European Web-based training system for the use of ICTs in SMEs.

In terms of ICTs training needs, the findings from this three-country study show high demand on training in various ICTs areas, ranging from e-commerce and its strategy development in the UK and Portugal and business Web page writing and the Internet in Poland. Managers in the UK and Portugal are more aware of the potential impact of ICTs in their overall business strategies, thus emphasising their need for understanding long-term issues and business and managerial aspects of e-commerce. However, since Polish managers tend to regard the Internet as another technology tool, they seem to focus on short-term issues and technical aspect of ICTs. Therefore, there is a need to raise managers' awareness on the importance of strategic issues in less developed countries, such as Poland, when designing the training system.

Findings on current training provision suggest that training is not provided regularly or with fully satisfactory effectiveness in most SMEs. When SMEs are involved in training, the majority of them are trained by experts within the company and it may therefore be interesting in future research to assess how up to date such experts are. Web- or CD-ROM based training systems, where such currency could be maintained, need to focus on beginning and intermediate levels, although there are some demands at advanced levels. All three countries seem to demonstrate a similar pattern on the level of training needed, but not the preferred ways of training delivery.

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The finding on the training delivery channels suggests that the CD-ROM based self-training system is much less favoured in Poland and Portugal, but is the second preferred method in the UK. Also an on-line training system will not be commonly accepted in Poland as only 7 per cent of companies would like to use it. Polish firms are more likely to accept an off-line self-training system provided on CD-ROM or downloaded through the Internet.

This three-country analysis sheds some light on differences in developed and developing countries represented in this study. It shows that UK SMEs provide more training than Portugal and Poland, but Polish managers are keener on taking training in ICTs. UK managers are more aware of the strategic implication of e-commerce and willing to receive more education on the related issues, but Polish managers treat the technology as a supporting tool, and thus are more enthusiastic on training from a technical point of view. Attempts to underpin the differences reveal some gaps which call for further investigations, including the need for comparative research on the e-commerce adoption and success in different European countries, comparative study on the managers' attitudes and perceptions on ICTs benefits and implications, and research to establish the relationships between training and ICTs success in SMEs in developed and developing countries.

The research has certain limitations due to its limited sample size and target groups. Therefore caution is needed when attempting to generalise the findings to different countries or to large organizations. Cross analysis with size and business sectors in different countries would further our knowledge and understanding on some issues addressed in the paper. Therefore further research can be suggested to conduct this analysis by developing appropriate research hypotheses with adequate sample size in each country.

The above findings have provided useful guidelines for the design and development of training system for SMEs at European level. Considering that SMEs managers normally lack available funds and have time restrictions, it is believed that the use of Web-based training systems would be a less expensive, more flexible and easy to access approach for improving their skills. However, this type of training system may not be very popular in less developed countries, due to the level of IT infrastructure to support Internet access, and alternative media are required. The findings

also provide valuable information to policy makers, SMEs training organisations, SME consultants, as well as academic researchers.

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