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# ICT, E-Business and Small and Medium Enterprises

OECD

## **ICT, E-BUSINESS AND SMEs**



**ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT**

## FOREWORD

This report was undertaken by the Working Party on the Information Economy (WPIE), and carried out in co-operation with the Working Party on SMEs and Entrepreneurship. It was prepared for the second OECD Conference of Ministers Responsible for SMEs held in Istanbul 3-5 June 2004 and hosted by the Turkish Ministry for Industry and Trade. The report sets out policy messages and recommendations from the work undertaken on this topic. These messages and recommendations provide material from which governments may draw in promoting innovative SMEs in the global economy.

Graham Vickery and Ken Sakai, Inho Lee and Hagbong Sim of the OECD's Directorate for Science, Technology and Policy prepared the report, with a contribution by Muriel Faverie, FORUM, Université Paris X, Nanterre, France. Preparation of the report received financial assistance from the French Government and from the United States Department of Commerce [*e-Business Facilitation Initiative at the OECD*]. It was initially issued under the code DSTI/IND/PME(2002)7/FINAL.

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## ICT, E-BUSINESS AND SMES

### EXECUTIVE SUMMARY

Information and communication technology (ICT) connectivity (PCs and Internet) is very widespread in businesses of all sizes. As is the case with all technologies, small businesses are slower than large ones to adopt new ICTs. Potential small business benefits and firm and sector-specific strategies drive the adoption and use of ICTs. Furthermore, sectors are increasingly global and dominated by large firms and the structure of their value chains and operations shape opportunities for small and medium size enterprises (SMEs). Principal reasons for non-adoption are lack of applicability and little incentive to change business models when returns are unclear. SMEs also face generic barriers to adoption including trust and transaction security and IPR concerns, and challenges in areas of management skills, technological capabilities, productivity and competitiveness. The issues for governments are to foster appropriate business environments for e-business and ICT uptake (*e.g.* to diffuse broadband, enhance competition), and target programmes to overcome market failures to the extent that they are needed in particular areas (*e.g.* skill formation, specialised information). Governments have a range of SME e-business and Internet use programmes. However commercial considerations and potential returns are the principal drivers of small business adoption and profitable use. The following points summarise the main policy directions derived from the analysis in the attached report.

#### **Business environment**

A healthy business environment is fundamental for firms to thrive and benefit from ICTs. This includes a transparent, open and competitive business framework, clear independent rule of law for all firms, easy set up and dissolution of businesses, transparent, simple and accessible corporate regulation, and equal and stable legal treatment for national and cross-border transactions.

#### **Network infrastructure**

Encourage rollout and use of quality infrastructure at affordable prices. Broadband connectivity is a key component in ICT development, adoption and use. It accelerates the contribution of ICTs to economic growth, facilitates innovation, and promotes efficiency, network effects and positive externalities. The development of broadband markets, efficient and innovative supply arrangements, and effective use of broadband services require policies that: promote effective competition and continued to stress liberalisation in infrastructure, network services and applications across different technological platforms; encourage investment in new technological infrastructure, content and applications; and technology neutrality among competing and developing technologies to encourage interoperability, innovation and expand choice. Public financial assistance to expand coverage for under-served groups and remote areas could complement private investment where appropriate, provided it does not pre-empt private sector initiative or inhibit competition.<sup>1</sup>

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1. OECD (2004), *Recommendation of the Council on Broadband Development*; OECD (2003) Statement by the OECD Committee for Information, Computer and Communications Policy, *Broadband driving growth: policy responses*, 3 October.

## **Trust infrastructure**

Get the regulatory infrastructure right for trust, security, privacy and consumer protection. Essential are a culture of security to enhance trust in the use of ICT, effective enforcement of privacy and consumer protection, and combating cyber-crime and spam. Strengthened cross-border co-operation between all stakeholders is necessary to reach these goals. Of particular relevance for small firms are low-cost on-line dispute resolution mechanisms among firms and between firms and consumers.<sup>2</sup>

## **Digital products and information services**

These are an increasingly significant part of economic activity and they offer important opportunities to small firms. Government and the private sector have key roles in facilitating content availability across all platforms and encouraging local development of new content, including content from public sources.

## **Skill upgrading**

Lack of ICT skills and business skills are widespread impediments to effective uptake once adoption decisions are made. Governments have major roles in providing basic ICT skills in compulsory schooling, and an important role in conjunction with education institutions, business, and individuals in providing the framework to encourage ICT skill formation at higher levels, in vocational training and in ongoing lifelong learning.

## **Intangible investments and assets**

Firms increasingly rely on intangible investments and assets (skills, organisation, software, networks) for competitiveness and growth. However common frameworks to identify, measure and report intangible investments and assets still need to be developed and be widely accepted. There is a significant role for governments in conjunction with business associations and accounting bodies to encourage business to develop and use systems which recognise and report intangibles in ways that can be reliably used by investors, valued by capital markets and guide better management practices.

## **Information**

Small firms may lack objective information regarding the benefits and costs of adoption of ICT. The private sector (*e.g.* business associations) and government have a role, and can provide information about service available and when necessary improve coordination of government information on the benefits of adoption and use of ICT, for example case studies and good-practice demonstrations to tackle market failures in information supply.

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<sup>2</sup> See in particular the following OECD guidelines and recommendations: OECD (2004), *Recommendation of the Council on Broadband Development*; OECD (2002), *Guidelines for Protecting Consumers from Fraudulent and Deceptive Commercial Practices Across Borders*; OECD (2002), *Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security*; OECD (1999), *Guidelines for Consumer Protection in the Context of Electronic Commerce*; OECD (1998), Ministerial Declarations on the Protection of Privacy in Global Networks, on Consumer Protection in the Context of Electronic Commerce and on Authentication for Electronic Commerce adopted in Ottawa in 1998 [C(98)177, Annexes 1 to 3]; OECD (1998), *OECD Cryptography Policy Guidelines* and the Report on Background and Issues of Cryptography Policy; OECD (1980), *OECD Guidelines on the Protection of Privacy and Trans-border Flows of Personal Data*.

## Government on-line

On-line provision of government information and services can increase the efficiency and coverage of public service delivery to small firms, and act as a model user and standard-setter for ICT adoption by small firms. As model users of broadband, government can demonstrate the potential of broadband-based services and content, provide demonstration and “pull-through” mechanism for small firms. Government demand aggregation to provide services can help spread new services more widely. Education, general government information and services, and provision of government services to businesses and citizens can all potentially benefit from the use of new high-speed infrastructure and services, and should be given priority in government strategies.

### Key Policy Recommendations

- **Move beyond policies for basic connectivity and ICT readiness to facilitate more widespread uptake and use of complex ICT applications and e-business uptake by small firms.** Target programmes where there are demonstrated market failures (e.g. R&D incentives, frameworks for standards, skill formation, information and demonstrations on best practice and benefits from adoption and use of ICT), taking into account that commercial considerations and returns drive business adoption of new technologies.
- **Encourage rollout of affordable quality broadband networks to underpin the competitiveness and growth of SMEs.** Continue to liberalise network infrastructure and promote broadband competition and liberalisation in network services and applications. Where the needs exist, and without pre-empting private initiative or inhibiting competition, complement private investment with public financial assistance to expand coverage for under-served groups and remote areas.
- **Strengthen the infrastructure for trust, security (including spam and viruses), privacy and consumer protection.** Intellectual property protection of ICT innovations and digital products is necessary to build the confidence among SMEs that is essential if such firms are to take full advantage of the potential of domestic and cross-border on-line activities.
- **Expand, in conjunction with business and consumer groups, SMEs’ use of low-cost on-line dispute resolution mechanisms.** Strengthen cross-border co-operation between stakeholders and the development of rules with cross-border application.
- **Develop and distribute digital content, including by expanding the commercial use of information about the public sector, education and health care.** E-government services to enterprises should be used as a tool to improve efficiency of government interactions and operations with SMEs.
- **Reduce ICT skill impediments to the growth of SMEs.** Strengthen government and private roles to improve basic ICT skills and developing frameworks to encourage higher level ICT and e-business skill formation (including marketing, organisational, security, trust and management skills in addition to ICT skills) in conjunction with education institutions, business and individuals.

## Competition

Governments and competition authorities need to be aware of the impacts of e-business networks on small firms. Business to business networks are restructuring value-chains with potentially very large lock-in effects and impacts on small firms. The centralising effects of e-business networks potentially drain resources from rural, remote and lagging regions and sectors, and could also reinforce clustering around the richest industrial and urban areas, and increase the economic and social disparities between urban and rural populations. In developing countries, governments could pay particular attentions to multi-user solutions to provide access to network infrastructure, which could also be used as a tool by governments to reach infrastructure access objectives.

## **Intellectual property**

Balanced regulation and use of IPRs are important for small firms. Particularly important for innovative small firms are satisfactory protection of ICT innovations and digital content products, and mitigating the cost of obtaining, maintaining and enforcing intellectual property rights. On the small firm using side the rapid growth of software and business method patenting can increase small business costs and the likelihood of infringement. Regulatory frameworks that balance the interests of suppliers and users are needed to protect and manage intellectual property and digital rights without disadvantaging innovative e-business and content distribution models.



## **ICT, E-BUSINESS AND SMES**

### **INTRODUCTION**

Information and communication technology (ICT) and e-business applications provide many benefits across a wide range of intra- and inter-firm business processes and transactions. ICT applications improve information and knowledge management inside the firm and can reduce transaction costs and increase the speed and reliability of transactions for both business-to-business (B2B) and business-to-consumer (B2C) transactions. In addition, they are effective tools for improving external communications and quality of services for established and new customers.

Despite these advantages, rapid growth in businesses' purchases and sales over the Internet has yet to materialise. E-commerce is increasing but still accounts for a relatively small share of total commerce. Broad definitions of e-commerce (including established EDI as well as Internet transactions) suggest that in 2000 total on-line transactions were generally 10% or less of total business sector sales and are mainly business-to-business, and business-to-consumer sales are even lower, generally less than 2% of the total retail transactions. On-line transactions are mainly B2B and domestic, rather than B2C or cross-border. The situation is similar for small and medium-sized enterprises (SMEs), although they lag behind larger firms in Internet transactions.

For small firms to adopt e-business and e-commerce strategies and tools, benefits must outweigh investment and maintenance costs. Commercial considerations and potential returns drive adoption. Beyond a certain level of connectivity (PC, Internet access, on-line information or marketing), not all SMEs will necessarily "catch up" with large firms, simply because e-commerce may not bring large benefits and SMEs will stay with traditional business processes. Other barriers have been seen to be the availability of ICT competencies within the firm, and availability and cost of appropriate interoperable small-firm systems, network infrastructure and Internet-related support services. Lack of reliable trust and redress systems and cross-country legal and regulatory differences also impede cross-border transactions.

Policies that will affect the adoption and use of e-business strategies include those designed to expand and improve the quality of network infrastructure and legal and regulatory environment, foster technological diffusion and create a favourable business environment. Beyond these general framework policies, specific policies for SMEs have focused on ICT and e-business awareness programmes, business consultation services and employee and management training to enhance ICT and managerial skills.

Policies have shifted over time as firms and economies have moved from concentrating on e-readiness and connectivity, to diffusion and use, and are moving towards mature e-business strategies which blend broad policies for the business environment with policies for particular areas such as IPRs and competition. Policy has moved beyond a narrow concept of e-commerce (on-line transactions) to a wider view of e-business integration of internal and external processes, based on technology neutrality. Policy initiatives in some cases aim at facilitating SME participation in product and sector value chains and providing them with information to assess the opportunities and costs of e-business. However there is no one-size-fits all approach to policy and the policy mix and priorities will depend on national circumstances (leading or lagging countries) and sectoral distribution of economic activity, as well as size factors.

## I. BENEFITS AND USE BY SMALL BUSINESSES

SMEs<sup>3</sup> have gradually recognised the positive impact that ICTs, such as computer terminals, e-mail and the Internet and their applications can have on their business.<sup>4</sup> In advanced OECD countries, most small firms, including micro-enterprises with fewer than ten employees, now have at least one computer terminal, usually with Internet access. Many types of business software can improve information and knowledge management within the firm, leading to more efficient business processes and better firm performance. Communication via e-mail and the Internet can help to improve external communication, in either B2C or B2B contexts, and may reduce transaction costs, increase transaction speed and reliability, and extract maximum value from each transaction in the value chain.

### Benefits of ICT and Internet use

ICT and e-commerce offer benefits for a wide range of business processes. At firm level, ICT and its applications can make communication within the firm faster and make the management of the firm's resources more efficient. Seamless transfer of information through shared electronic files and networked computers increases the efficiency of business processes such as documentation, data processing and other back-office functions (*e.g.* organising incoming orders and preparing invoices). Increasingly sophisticated ICT applications such as KMS (Knowledge Management System) and ERP (Enterprise Resource Planning) allow firms to store, share and use their acquired knowledge and know-how. For example, customer databases with a history of client-specific correspondence help managers and employees to respond more effectively to customers. A company-wide electronic data source aims to disseminate employees' professional experience, for example tips for winning a contract, from which others in the firm can learn (Box 1).

At inter-firm level, the Internet and e-commerce have great potential for reducing transaction costs and increasing the speed and reliability of transactions. They can also reduce inefficiencies resulting from lack of co-ordination between firms in the value chain. Internet-based B2B interaction and real-time communication can reduce information asymmetries between buyers and suppliers and build closer relationships among trading partners (Moodley, 2002). In fact, adopters of e-commerce tend to reduce transaction costs, increase transaction speed and reliability, and extract maximum value from transactions in their value chains (OECD, 2002a).

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3. In this document, small and medium-sized enterprises (SMEs) are firms with fewer than 250 employees unless otherwise indicated. Micro firms are usually those with fewer than ten employees.

4. In this document, unless otherwise indicated, the terms "electronic commerce" or "Internet commerce" are used according to the OECD's narrow definition: the sale or purchase of goods or services conducted over the Internet, with the goods and services ordered over the Internet, and payment and ultimate delivery of the goods or services either on line or off line. The OECD's broad definition includes transactions conducted over computer-mediated networks, such as the Internet, EDI (electronic data interchange), Minitel and interactive telephone systems.

In the B2C context, the Internet and e-commerce can be effective tools for better communication. A corporate Web site that provides information on products, services or technologies can enhance the quality of a firm's services to customers and attract new customers. By collecting information on customers' needs, it can be used for product development or innovation. A home page with a direct link to the corporate e-mail account provides an easy-to-access contact point. For those in different time zones, 24-hour availability of the contact is especially attractive. Eurostat's E-commerce Pilot Survey shows that SMEs' motives for Internet commerce include reaching new/more customers, geographic expansion of market and improvement of service quality.

#### **Box 1. ICT use for better internal communications and customer management**

In SMEs, there is often insufficient sharing of business information between managers and employees and among employees in part because the personnel's daily routine tends to be extremely busy. To improve a firm's responsiveness to customers, client feedback and information on employees' professional experience, such as know-how for winning a contract, can be electronically stored and thus available to be shared within the company. Some SMEs have exploited ICT effectively to improve internal communications and have improved their reputation through swift responses to customers' complaints and an ability to capture clients' (hidden) needs (METI, 2001).

A Japanese company with 40 employees, which previously recorded sales representatives' field experience in written reports, has developed a marketing database, which allows every sales person to access general information about customers and previous correspondence concerning their complaints. Another firm with 40 employees, has established a company-wide intranet with an on-line BBS (bulletin board system) which all employees can access and in which customers' claims and inquiries are categorised and updated daily.

These companies' intranet and electronically integrated customer database not only provide the latest client-related information, which better equips managers and employees for responding to customer inquiries, but also make business processes and knowledge accumulation more efficient. All personnel can share valuable business knowledge and experience, once entered into the office computer, simultaneously. This is very different from paper records, which can normally only be consulted by one person at a time and must be photocopied for wider circulation.

Such benefits can be greater for SMEs than for larger firms. Internet and e-commerce enable SMEs that remain in local and regional markets because of a lack of information and marketing capability to gain access to new customers and to expand their markets geographically. Internet technology makes it possible to transmit order information seamlessly between different systems. It can therefore provide small players with an opportunity to join and compete in a wide variety of supply chains, including those previously inaccessible because of the use of costly closed EDI networks (electronic data interchange). Through their Web site, SMEs can attract potential investors and persons seeking employment from abroad by providing information on their technologies and financial positions (e.g. balance sheets). Some small firms with leading-edge technologies and/or unique products and an on-line presence have received substantial capital from larger firms (Sakai, 2002). Moreover, the Internet can convey the ideas of knowledge-based small businesses. Extensive use of ICT can allow micro-enterprises with ideas and technologies to remain small and profitable, and some micro-enterprises have generated substantial global sales by exploiting their intellectual property over the Internet.

## **ICT adoption and firm performance**

Despite the potential benefits of ICT and e-commerce, there is debate about whether and how their adoption improves firm performance. Use of and investment in ICT requires complementary investments in skills, organisation and innovation and investment and change entails risks and costs as well as bringing potential benefits. While many studies point to the possibility of market expansion as a major benefit for SMEs, larger businesses can also expand into areas in which SMEs dominated. Moreover, it is not easy for SMEs to implement and operate an on-line business, as this involves complementary costs for training and organisational changes as well as direct costs of investing in hardware and software solutions.

While many studies provide evidence of the positive effects of ICT adoption on firm performance, others have shown no relation between computer use and firm performance.<sup>5</sup> A study of Canadian manufacturing establishments (plants) with ten or more employees (excluding food processing establishments) drawn from Statistics Canada's Business Register, shows that those with high productivity growth are more likely to be using greater numbers of advanced ICTs (Baldwin, 2002). Between 1988 and 1997, advanced technology users grew more in terms of both productivity and profitability than non-ICT users, especially when they used communication technologies, including company-wide and/or inter-company computer networks.

Recent OECD analysis shows the impacts of ICTs and e-business strategies on firm performance are positive overall, but that ICTs are not a panacea in themselves. The OECD's Electronic Commerce Business Impacts Project (EBIP) studied a set of 220 early successful adopters of e-business strategies in a range of established sectors in eleven different countries. This study showed the positive impacts of e-commerce on their turnover and profitability and to a lesser extent on employment, most notably when e-commerce is part of larger business strategies of firms (OECD, 2002a). Further work by researchers in 13 OECD countries based on large scale statistical surveys provides evidence that the use of ICT can contribute to improved firm performance, in terms of increased market share, expanded product range, customised products and better response to client demand. Moreover, it indicates that ICT may help reduce inefficiency in the use of capital and labour, *e.g.* by reducing inventories, and that the more customers or firms are connected to the network, the greater the benefits (spillover effects). However, the analysis shows that complementary investments in skills, organisational change and innovation are key to making ICT work, and that the use of ICT affects firm performance primarily when accompanied by other changes and investments and that without these, the economic impact of ICT may be limited.

## **Use of ICT and Internet among SMEs**

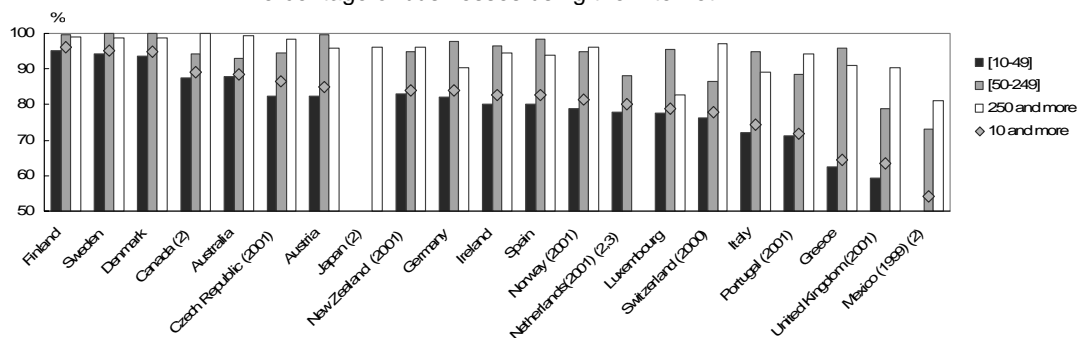
The use of ICT by SMEs is increasingly common according to survey for OECD countries. A Eurostat survey on e-commerce shows that nine out of ten SMEs were equipped with computers at the end of 2000/early 2001. Internet access is also commonplace among SMEs. While Internet penetration is generally higher in larger enterprises, the gap between larger firms and SMEs is narrowing. In most OECD countries, Internet penetration rates for medium-sized firms (50-249 employees) are the same and sometimes higher than for larger firms (more than 250 employees), with penetration rates of over 80%, although there are exceptions. Small firms (10-49 employees) have a slightly lower penetration rate, between 60% and 90% (Figure 1). Even in micro-enterprises, the penetration rate is nearly 60% in most countries and in Denmark 85% have Internet access.

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<sup>5</sup>. A study based on the 1998 US Survey of Small Business Finances (SSBF), which covers firms with fewer than 500 employees, suggests that firm performance, as measured by profit or sales, is not associated with computer use (Bitler, 2001).

Differences in Internet access in the 21 countries for which data are available seem to be greater for smaller enterprises. The Nordic countries have a more homogeneous distribution across firms of different sizes, while in countries with lower Internet penetration (Portugal, Greece, Mexico) there are larger dispersions across firms in different size classes (OECD, 2002c).

Figure 1. Internet penetration by size class, 2001 or latest available year  
Percentage of businesses using the Internet



Note 1. In European countries, only enterprises in the business sector, but excluding NACE activity E (electricity, gas and water supply), NACE activity F (construction) and NACE activity J (financial intermediation), are included. The source for these data is the Eurostat Community Survey on enterprise use of ICT. In Australia, all employing businesses are included, with the exception of businesses in general government, agriculture, forestry and fishing, government administration and defence, education, private households employing staff and religious organisations. Canada includes the industrial sector. Japan excludes agriculture, forestry, fisheries and mining. New Zealand excludes electricity, gas and water supply, and only includes enterprises with NZD 30 000 or more in turnover. Switzerland includes the industry, construction and service sectors.

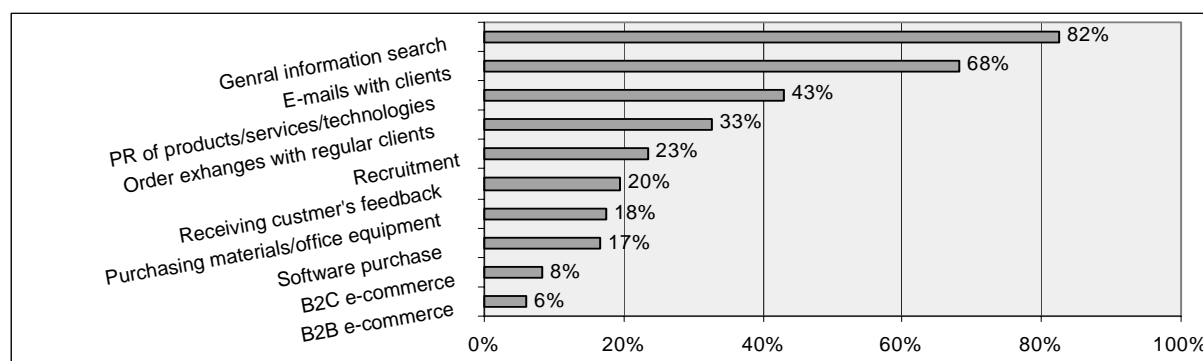
Note 2. For Canada, 50-299 employees instead of 50-249 and 300 or more instead of 250 or more. For Japan, businesses with 100 or more employees. For the Netherlands, 50-199 employees instead of 50-249. For Switzerland, 5-49 employees instead of 10-49 and 5 or more employees instead of 10 or more. For Mexico, Businesses with 21 or more employees, 21-100 employees instead of 10-49, 101-250 instead of 50-249, 151-1000 instead of 250 or more.

Note 3. Internet and other computer-mediated networks.

Source: OECD, ICT database and Eurostat, Community Survey on ICT usage in enterprises 2002, May 2003.

Data available from surveys in some countries indicate that SMEs use the Internet (and e-mail) for better external communications and as a means of obtaining business information. In Japan, the most common use of the Internet is general information searches (Figure 2). Other uses include communication via e-mail, providing information about a company's products, services and technologies via the corporate Web site, order exchanges with regular customers, recruitment and receiving customer feedback. Some SMEs purchase some standard materials, office equipment and software over the Internet, but only a small share conduct B2C and B2B Internet e-commerce for non-standard products. A study of 484 SMEs with fewer than 250 employees in Lanarkshire (Scotland) shows a similar pattern of Internet use. Around 60% of the firms with the Internet use it to learn about competitors, customers or suppliers. Other major uses include providing product information (56%), setting up a Web page (54%), purchasing goods/services (53%) and building customer connections (48%) (Scally *et al.*, 2001).

**Figure 2. Internet use by SMEs in Japan, 2001**



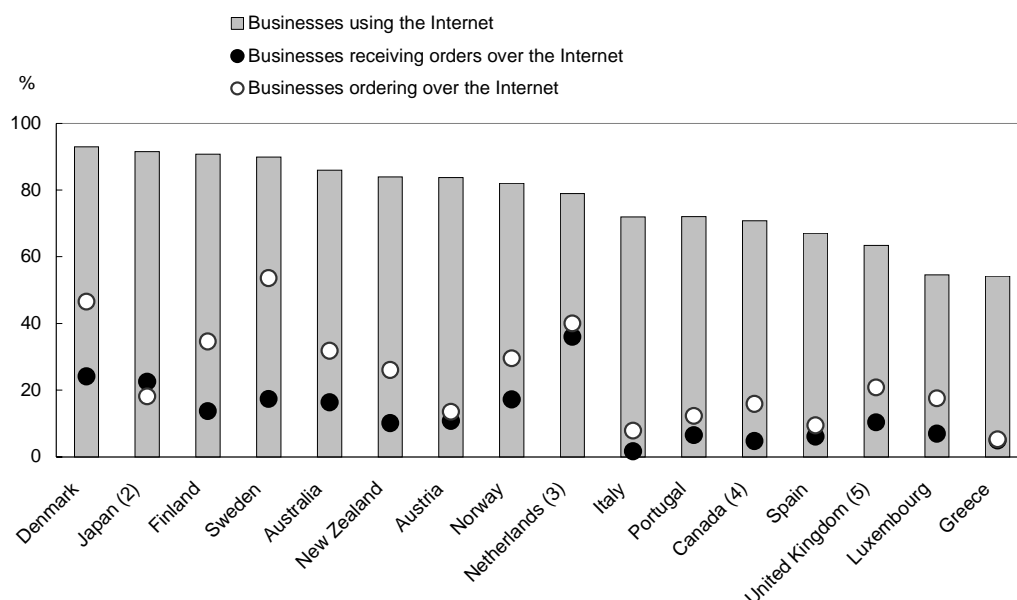
*Note:* Percentage of responses of 1 700 SMEs with 300 or fewer employees using the Internet as of August 2001.  
*Source:* Central Co-operative Bank for Commerce and Industry (Shoko Chukin Bank of Japan) (2001).

### **Adoption of Internet e-commerce by SMEs**

Computers and access to the Internet have become common in most OECD countries, but sales and purchases over the Internet have yet to take off. While available data suggest that electronic commerce is growing, it still accounts for a relatively small proportion of economic activity for firms of all sizes. Taking a wide definition of electronic commerce to cover transactions over computer-mediated networks (including traditional EDI) and inter-firm transactions, e-commerce sales were 13.3% of total business sector sales in Sweden and 7.9% in Finland. Excluding the financial sector they were 10% in Norway, and 6% in the United Kingdom and Denmark. For retail sales (B2C) shares were much lower, around 1.4% in the United Kingdom, 1.2% in the United States. Shares for SMEs are probably lower than these shares for the whole economy (see OECD 2002b and 2002c). Purchasing over the Internet is more common than selling. For 16 countries for which both Internet purchasing and Internet sales data are available, only one in eight on average reported making Internet sales. Twice as many businesses on average use the Internet for purchases as for sales (Figure 3), with between 63% and 93% of businesses reported using the Internet, except in Greece and Luxembourg (OECD, 2002c).

**Figure 3. Businesses using the Internet for purchasing and selling, 2001<sup>1</sup>**

Percentage of businesses with ten or more employees



*Note:* The results of the Eurostat survey are based on a selection of industries that changes slightly across countries. The main sectors covered are manufacturing, wholesale and retail trade, hotels and restaurants, transport, storage and communications, financial intermediation, real estate, renting and business activities. The surveys of Denmark, Italy, Finland and Norway do not cover financial intermediation; those of Denmark, the Netherlands, Finland, the United Kingdom and Norway also cover construction; Denmark and Norway also survey personal services.

1. Beginning of 2001 for Internet use; purchases and sales refer to 2000, for Canada, purchases and sales refer to 2001; for Denmark and Norway, Internet use refers to 2002 and purchases and sales refer to 2001.

2. All businesses with 50 and more employees.

3. Use, orders received and placed refer to Internet and other computer-mediated networks.

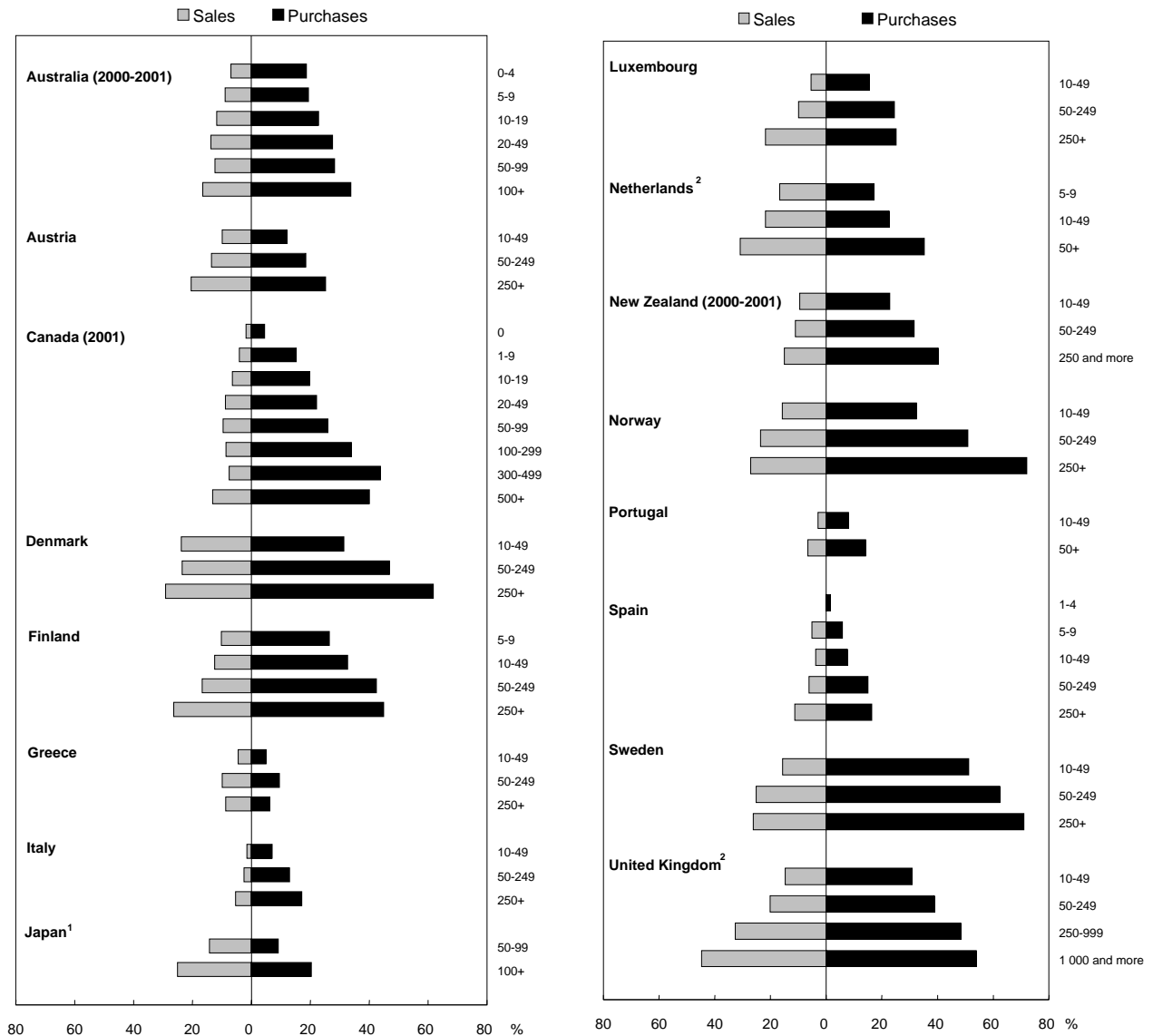
4. All businesses.

5. Orders received and placed over the Internet and other computer-mediated networks.

*Source:* OECD, ICT database, August 2002; Eurostat, *E-commerce Pilot Survey 2001*.

The situation is similar for SMEs, but they lag behind larger firms. The gap between SMEs and larger firms is greater for Internet purchases than for Internet sales. In Norway, for instance, more than 70% of firms with 250 or more employees reported on-line purchases, as compared to about 30% of small firms (10-49 employees) and 50% of medium-sized firms (50-249 employees). In other OECD countries, Internet purchasing seems to be sensitive to firm size, with the largest firms having the highest percentages of purchases. However, the propensity to sell over the Internet seems less sensitive to firm size. The difference between large firms and SMEs is less than 10%, except in the United Kingdom. In Australia, Denmark and Sweden, smaller businesses that use the Internet appear to have roughly same propensity to sell over the Internet as larger ones (Figure 4).

**Figure 4. Internet purchases and sales by size class, 2000**  
Percentage of businesses in each size class



1. All businesses with 50 or more employees.

2. Orders received or placed over the Internet and other computer-mediated networks.

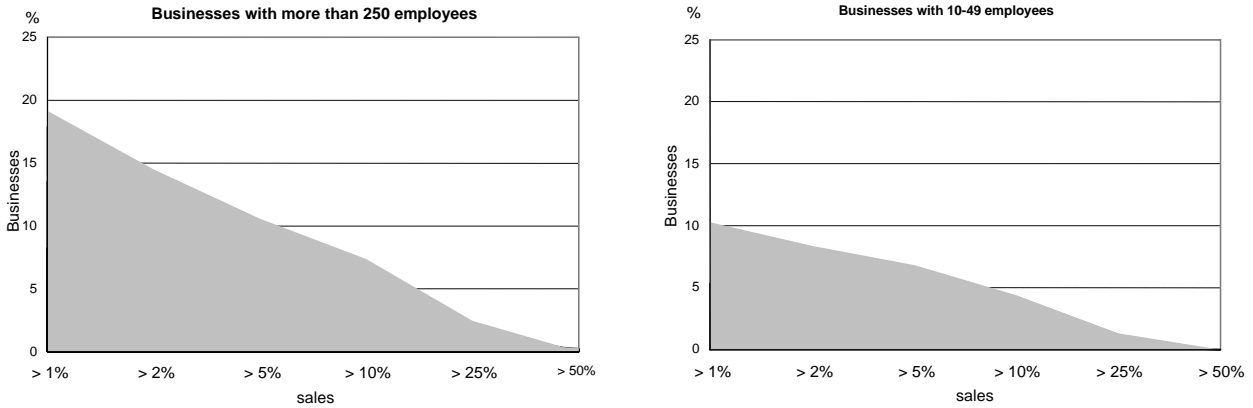
Source: OECD, ICT database, August 2002; Eurostat, *E-Commerce Pilot Survey 2001*.

In terms of volume, Internet sales by SMEs are far below those of larger firms. In the case of larger businesses in European countries (Figure 5), a maximum of 10.6% of businesses (in Sweden) had more than 5% of sales originating on the Internet in 2000, and a maximum of 1.2% of businesses (in Denmark) had Internet sales whose value was more than 50% of overall sales. However, for smaller businesses, Internet sales are lower relatively, with around 11% of businesses having a share of Internet sales greater than 1%, compared to over 19% in the case of larger firms (in Sweden) (OECD 2002c).



**Figure 5. Distribution of e-commerce sales in European countries, 2000**

Percentage of businesses for any given country whose sales over the Internet as a share of total sales are greater than 1%, 2%, 5%, 10%, 25% or 50% in larger and smaller businesses



Source: OECD, based on Eurostat, E-commerce Pilot Survey 2001.

There have been some indications that the number of businesses selling on line is declining and e-commerce is being concentrated in fewer, larger businesses. In Australia, over the period July 1999-June 2001, selling over the Internet by micro-enterprises with 5-9 employees declined from 16% to 13% and by firms with 10-49 employees from 21% to 18%, while the number of firms with 50-249 employees selling on line rose from 17% to 20%. In Norway, only 12% of micro-enterprises with 5-9 employees engaged in on-line sales in 2001, down from 21% in 1999, while 28% of firms with 50-249 employees and one-third of firms with 250 or more employees had on-line sales in 2001, and shares for larger firms are increasing (OECD, 2002c).

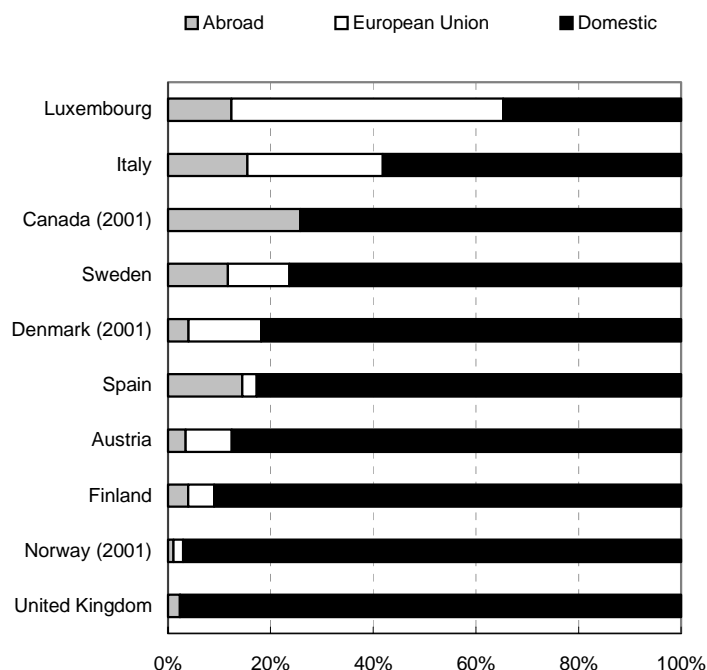
Most Internet e-commerce transactions are domestic rather than cross-border transactions (Figure 6). The Eurostat's E-commerce Pilot Survey indicates that European companies mainly sell over the Internet to locations within Europe. In Austria, Denmark and Finland, exports to Europe represent between 55% and 63% of total exports of goods. The share of international Internet sales is particularly small in the United Kingdom, at only 0.05% of total sales in the sectors surveyed.

**Box 2. Multi-users benefits in low-income areas: the E-Choupal experience in India**

ITC is one of India's leading private companies, with annual revenues of USD 2 billion. Its International Business Division was created in 1990 as an agricultural trading company; it now generates USD 150 million in revenues annually. The company has initiated a project called "E-Choupal" that places computers with Internet access in rural farming villages. The computer, typically housed in the farmer's house, is linked to the Internet via phone lines or, increasingly by a VSAT connection. It serves an average of 600 farmers in 10 surrounding villages within about a five kilometres radius. Each E-Choupal costs between USD 3 000 and USD 6 000 to set up and about USD 100 per year to maintain. Using the system costs farmers nothing, but the host farmer, called a Sanchalak, incurs some operating costs and is obliged to serve the entire community; the Sanchalak benefits from increased prestige and a commission paid for all E-Choupal transactions. The farmers can use the computer to assess daily closing prices on local markets, as well as to track global price trends or find information about new farming techniques. They could also use the E-Choupal to order seed, fertilizer, and other products such as consumer goods from ITC or its partners, at prices lower than those available from village traders; the sanchalak typically aggregates the village demand for these products and transmits the order to an ITC representative. Farmers benefit from more accurate weighing, faster processing time, and prompt payment, and from access to a wide range of information, including accurate market price knowledge, and market trends, which help them decide when, and at what price to sell. In mid-2003, e-Choupal services reached more than 1 million farmers in nearly 11,000 villages. Most of those farmers are illiterate, and the Sanchalak serves also as scribe. The E-Choupal serves as both a social gathering place for exchange of information (choupal means gathering place in Hindi) and an e-commerce hub. What began as an effort to re-engineer the procurement process for soy, tobacco, wheat, shrimp, and other cropping systems in rural India has also created a highly profitable distribution and product design channel for rural India.

*Source:* E-Choupal case study in Muriel Faverie (2004), E-Business and SMEs in seven non-OECD countries: South Africa, Brazil, Chile, China, India, Russia and Singapore.

**Figure 6. Share of Internet sales in domestic and international markets, 2000 or latest available year**



Source: OECD, ICT database, August 2002; Eurostat, E-commerce Pilot Survey 2001.

### **Towards e-business integration**

Some businesses, mainly early adopters of e-commerce, are entering the next stage of ICT use, e-business. They have begun to engage in increasingly sophisticated uses of ICT, involving business process reengineering and more complex technology. In such firms, B2C and B2B e-commerce are components of an overall e-business strategy. External relations with customers as well as internal processes are being linked. Marketing and sales, logistics and delivery, after-sales service, supply chain management and other business functions are integrated in an overall e-business strategy.

Most SMEs appear still to be at a stage where establishing a Web site or adopting e-commerce is the main issue. Successful integration of external and internal business processes in e-business necessitates organisational and management changes which may entail proportionally greater costs and risks for SMEs. In addition, smaller firms may have fewer incentives to integrate their business processes than larger firms, which have more complex business processes and resources to harmonise and co-ordinate. It may therefore take more time and resources for SMEs to adopt e-business strategies. However, in the near future, B2C and B2B electronic commerce will have to become components of SMEs' overall e-business strategy and "normal" business processes that are supported by ICTs and carried out on electronic networks.

In relation to assisting SMEs to integrate e-business into their entire business process, there could also be more emphasis on integrating e-government into the business process. For example in Australia, government compliance activities tend to be undertaken separately to other 'back office' business processes. The Business Entry Point (BEP) is currently implementing mechanisms that more closely integrate e-government activities into the day-to-day activities associated with running a business. E-business will have greater appeal to SMEs if their B2B, B2C and B2G activities can be more closely integrated. Making use of e-government initiatives as an incentive for SMEs to go online is crucial but again, these need to be seamless and integrated into business activities more generally.

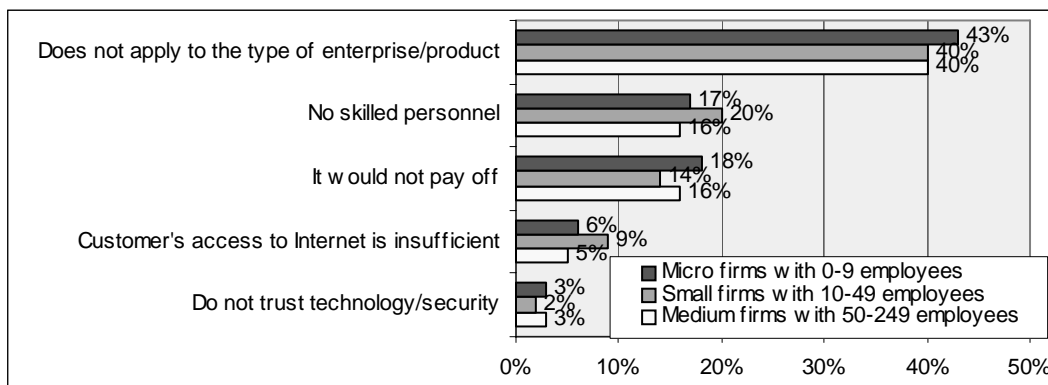
## II. BARRIERS TO USE

There is a wide range of reasons why SMEs do not make more active use of the Internet and e-business. Reasons vary widely among sectors and countries and are most commonly related to lack of applicability to the business, preferences for established business models, and the kinds of electronic transactions SMEs are involved in or wish to introduce (B2B or B2C). Common barriers include: unsuitability for the type of business; enabling factors (availability of ICT skills, qualified personnel, network infrastructure); cost factors (costs of ICT equipment and networks, software and re-organisation, and ongoing costs); and security and trust factors (security and reliability of e-commerce systems, uncertainty of payment methods, legal frameworks).

### Unsuitability for business

The leading reason given by businesses for not engaging e-commerce is that it is not suited to the nature of their business (OECD, 2002b). A recent survey of SMEs with fewer than 250 employees in 19 European countries shows that around 40% do not use the Internet for selling because they consider that Internet e-commerce does not suit their type of business and/or products (Figure 7). Other reasons for not conducting on-line sales include lack of personnel with appropriate ICT skills, concerns over unbalanced costs and benefits, insufficient customer access to Internet and technology concerns, such as on-line security. In Canada, among businesses that did not buy or sell over the Internet, 56% believed that their goods or services did not lend themselves to Internet transactions.

Figure 7. SMEs in Europe: Reasons for not using the Internet for selling, 2001



Note: Percentage of 1 427 firms with fewer than 250 employees not using the Internet in 19 countries (15 EU member states plus Iceland, Liechtenstein, Norway and Switzerland).

Source: European Commission (2002a).

In sectors such as construction and among some small retailers, the view that Internet e-commerce is unsuitable for their business is relatively strong. A study of 20 small construction contractors in Australia with 2-45 employees suggests that small firms in this industry have been not only

slow but even reluctant to implement ICT for e-commerce (Love *et al.*, 2001). The most common ICT application used by these firms is automation of communications and none had conducted B2B or B2C e-commerce. Some SMEs in transport services also consider that the Internet does not suit their industry. A firm with 90 employees and an emphasis on personal contact with clients decided not to adopt the Internet after a three-month trial of a Web site (Mehrtens *et al.*, 2001). During the trial, the company received few inquiries regarding possible e-mailing of an order. Very few of its regular customers had used the Internet, and some preferred receiving confirmation of their order via fax or telephone.

These concerns are genuine and come from the practical judgement of SMEs on the benefits e-business will bring. SMEs will not take advantage of e-business unless the benefits justify establishing and maintaining the e-commerce system. In this sense, these concerns can be justifiable reason for not engaging in e-business rather than barrier to use.

However, SMEs may have more difficulties, compared to larger firms, in finding an e-business case applicable to them because of the lack of the time, information and knowledge. They may wish to retain their current business model and avoid the risks associated with new investments and new business models. Strong links with customers and suppliers along the value chain as well as the lack of competition in the related market may also discourage businesses from introducing new business models which would threaten existing transactions channels.

#### **Enabling factors: internal ICT and managerial knowledge**

SMEs generally lack the human technological resources needed for ICT and e-commerce, because they focus on day-to-day operations and lack the time to understand the benefits of new technologies. Even when they are aware of the potential benefits of adopting e-commerce, they require know-how or qualified personnel. The firms that adopt Internet and e-commerce are likely to have within the firm someone who has a reasonable amount of knowledge of the specific technology and/or technology in general. A study of small ICT companies with 3-80 employees suggests that the Internet was adopted by firms with personnel who understand the technology (Mehrtens *et al.*, 2001). Interestingly, the study found that these were not necessarily ICT professionals, but simply people interested in technology (Box 3).

If firms can access affordable outside ICT services, lack of ICT expertise within the firm is not necessarily an obstacle to the decision to adopt Internet e-commerce. However, internal technological capabilities still matter because adoption of e-commerce cannot succeed without an understanding of the e-commerce business model. Without internal technological capabilities, dependence on ICT support services for system maintenance can be dangerous because firms that conduct e-commerce have to live with the risk of computer viruses and other system failures. If ICT support services, especially in an emergency, are needed to minimise the loss from a system malfunction, the e-commerce system of the firm may be vulnerable if they are not immediately available. The existence of local ICT services is an important issue, especially for small offices in remote areas or emerging economies, where ICT services are generally scarce and costly.

### **Box 3. A magnet manufacturer's e-commerce success**

Ni-roku is a Japanese magnet manufacturer with 12 employees, which was established in 1940. In September 1997, an employee created the company's Web site ([www.26magnet.co.jp](http://www.26magnet.co.jp)). By 2000, annual e-commerce sales of magnet products via the site had already reached more than USD 700 000, and the site has remained operational and generating revenue through 2004, although they still do not accept customers outside of Japan.

In 1996 a company employee bought a personal computer at his own expense to use the Internet. He convinced the manager to launch the company's Web site, although he was not confident that it would generate revenue that might counterbalance the decline in the company's off-line sales. He consulted a small ICT service firm, which helped the company to create the Web page and took training to enable him to update it.

To increase the number of visits to the site, the company used both an on-line campaign and off-line advertising. A free magnet offer campaign on the Web site combined with an on-line questionnaire to (potential) customers lured 1 000 visitors to the site during the peak early month. An advertisement in *Nikkan Kogyo*, an industry newspaper, also attracted the attention of many business readers. In response to requests from businesses as well as individual buyers, an on-line product catalogue was later added to the site. After the local newspaper covered the company's e-commerce growth, other small firms in the region were encouraged to engage in Internet e-commerce.

SMEs may also lack managerial understanding and skills for e-business. Successful integration of e-business requires many firms to restructure their business processes, to change organisational structures and to redefine their core competence and positions in the value chains. So, e-business tools cannot be successfully introduced and implemented without the visionary power and strategic decisions about how to apply ICT technologies for their business processes. However, SMEs lag behind larger firms in terms of internal managerial capabilities, usually having no CIO (Chief Information Officer) who can plan and implement e-business strategies for them. The professional advice of IT and e-business consultants can help them, but SMEs may not easily have access to them because of relatively high cost.

### **Cost of developing and maintaining e-business systems**

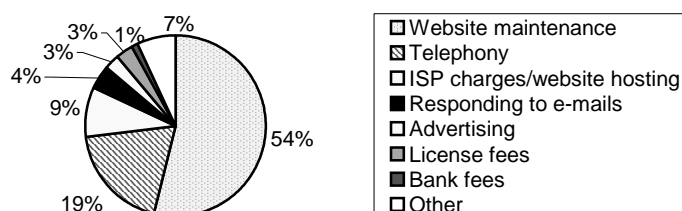
Most SMEs will not adopt e-commerce if the benefits do not outweigh the costs of developing and maintaining the system. The issue is costs relative to benefits expected, not cost itself. Nevertheless, SMEs are generally concerned about the costs of establishing and maintaining e-commerce since they generally suffer from budget constraints and are less sure of the expected returns on the investment.

Some SMEs cannot afford to adopt sophisticated ICT solutions (*e.g.* a Web site with a secure environment for credit card transactions). Some small businesses, especially micro-enterprises with 1-9 employees or the self-employed, may adopt a simple Web site without any e-commerce function if the cost of basic Internet use is well within their marketing budget. For example, in the United States, typical Internet charges – USD 10-35 a year for a domain name (*i.e.* Web site address) and USD 10-100 a month for Web site hosting, are low compared to traditional advertising in printed media (Bricklin, 2002).

E-commerce maintenance and upgrades can be very costly, especially when firms prefer a highly sophisticated virtual shop. The Australian study indicates that Web site maintenance is the most costly element of ongoing costs, ranging from AUD 800 to AUD 103 000 (Figure 8). Other elements include telephony, Internet service provider (ISP) charges and Web site hosting. Web site maintenance and

upgrades may increase over time as the volume of on-line transactions grows, and this may raise costs and generate excessive workload in terms of staff time. In fact, some small shop owners, especially those that outsource Web page design and updating, have found it difficult to contain site development costs which are more or less beyond the firm's control (Ernst & Young, 2001).

**Figure 8. Ongoing e-commerce costs for SMEs in Australia, 2000**



Note: Percentage of total investment in Internet e-commerce. N = 34.

Source: Ernst & Young (2001).

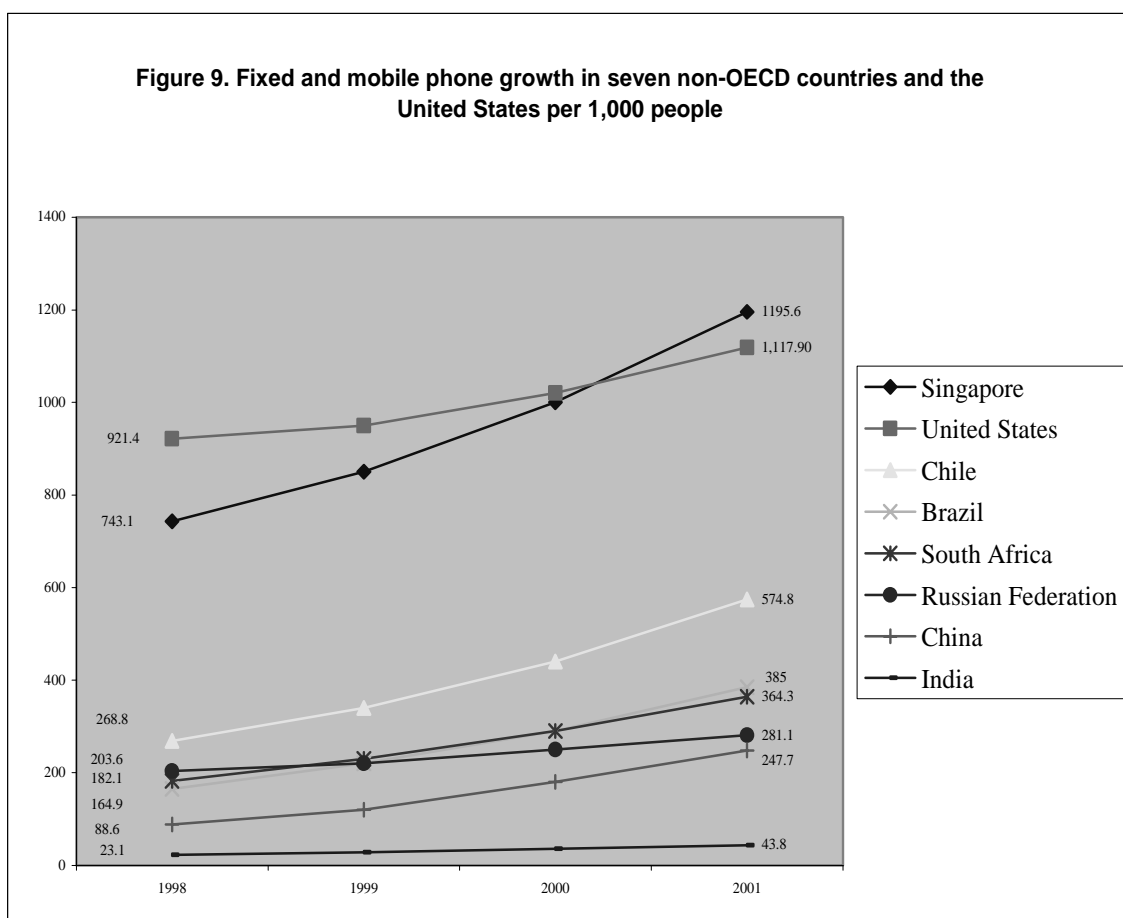
Logistics services, *e.g.* package collection and delivery, also matter. While they can be subcontracted to private delivery services, some may charge higher rates to small businesses because of their location and/or small volume (Phillips, 2002). This is a real concern for small businesses, especially those in remote districts where private package collection/delivery services may not be available at reasonable cost. Items such as software, music and books can be delivered over the Internet, but the volume of such on-line delivery is still very small. In 2000, for example, book publishers in the United States derived 90% of their revenue from printed materials, while on-line materials only accounted for 6.4%. In addition, digital delivery may not be feasible or desired by the individual or business customer with a slow Internet connection and small download capacity rather than a high-speed (broadband) connection.

For the SME leaders in e-commerce, narrow cost factors are likely to become less important. They are more concerned about how to increase their profits by using e-commerce than about costs of adoption. They are concerned, however, about the complementary, invisible costs related to the management and organisational changes required for adopting new e-business strategies.

### **Network infrastructure issues: access and interoperability**

The availability of a wide range of Internet connections and other communication services, preferably at competitive prices, is very important in that it allows small businesses to choose different and appropriate services according to their specific needs and (initial) expectations from on-line activities.

Fixed telecommunication networks are likely to continue to serve as the primary means of Internet access for many SMEs because of their relatively lower cost. The basic telecommunication infrastructure is in place in many OECD countries, although the development of reliable fixed communication networks is an important policy area for e-commerce readiness, especially in the emerging economies (Box 4). Most OECD countries have a similar number of fixed telecommunication access lines, *i.e.* traditional copper lines and ISDN lines, per 100 inhabitants (OECD, 2003b). The telecommunications infrastructure is also growing rapidly in non-OECD countries, but there are very wide differences among non-OECD countries as shown in Figure 9, with for example Singapore at the level of OECD countries and India at a much lower level in general despite areas of very advanced use of telecommunications to support its very rapidly growing and globally competitive IT and ICT-enabled services industry.



Source: World Bank (2003).

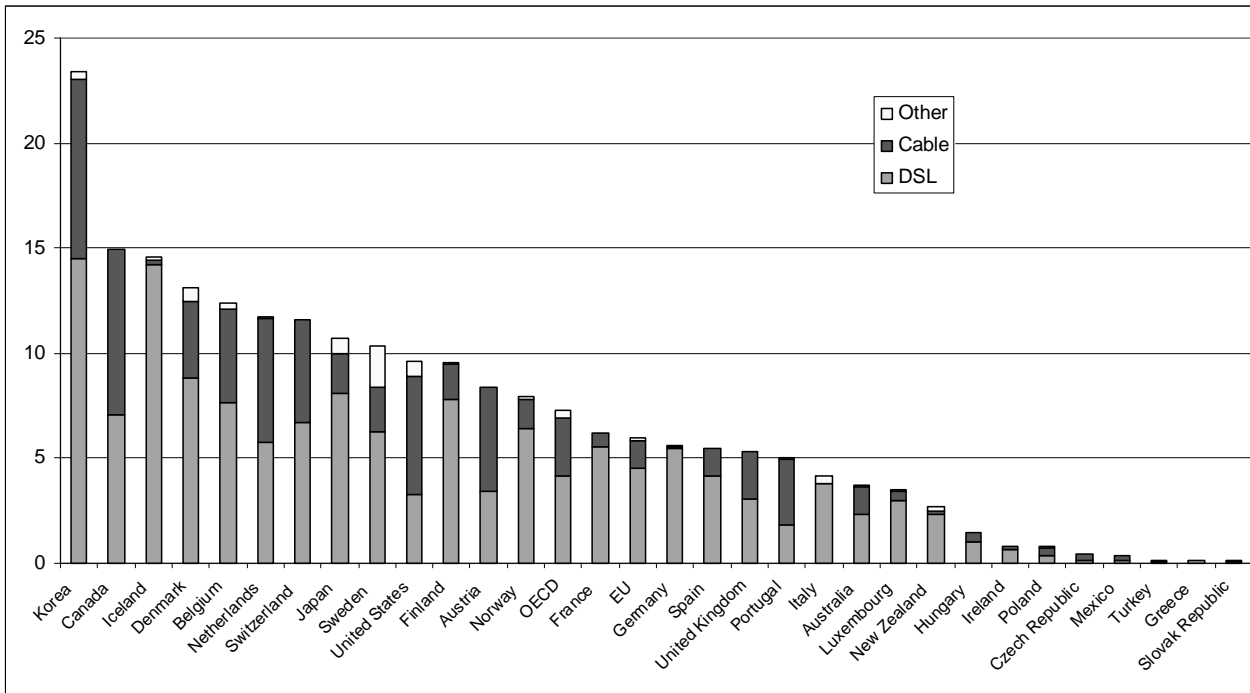
Availability of broadband connections<sup>6</sup> may affect SMEs' decisions to adopt e-commerce. Broadband faster speeds improve the overall on-line experience for both individuals and businesses, encouraging them to explore more applications and spend more time on line (OECD, 2001b). Slow Internet connections and data transfer have in fact discouraged some SMEs from adopting Internet: a majority of SMEs with 10-249 employees in Austria, Greece, Italy, Luxembourg, Spain, Portugal and the United Kingdom indicated excessively slow or unstable data communication as a major hindrance to Internet use (Eurostat, 2002).

Broadband penetration rates have accelerated rapidly in most OECD countries recently although it is very uneven across countries (Figure 10). The use of broadband by SMEs is also increasing rapidly. In 2001/2002 the highest percentage of small firms using broadband (xDSL) connections was 18% in Finland. For medium-sized firms, the percentage ranged between 5% and about 30%, much lower than those of large firms (Figure 11).

<sup>6</sup>. Broadband refers to the amount of capacity (or speed of data transfer) provided on a telecommunications network via high-speed Internet access. See OECD (2004) recommendation of the Council on Broadband Development.

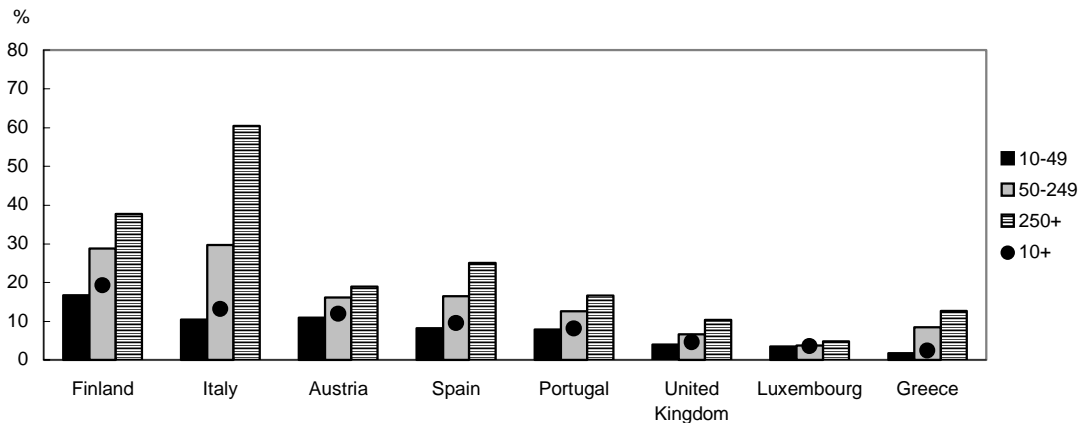


Figure 10. Broadband subscribers per 100 inhabitants, June 2003



Source: OECD, 2004.

Figure 11. Business use of the Internet via broadband connection (xDSL) by firm size, 2001  
Percentage of businesses with ten or more employees using the Internet



Source: OECD, ICT database and Eurostat, E-Commerce Pilot Survey 2001, August 2002.

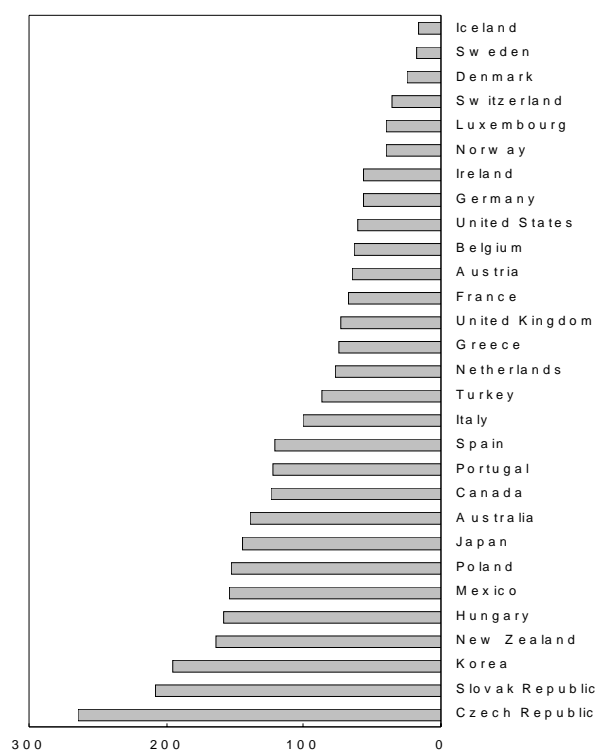
Increased competition in the telecommunications industry has been driving down access costs. For example, prices of leased lines, which provide the infrastructure for B2B e-commerce, have fallen significantly in recent years, following widespread liberalisation in the communications sector in Europe (Figure 12). However, large price differences remain. The Nordic countries have the lowest charges, at

about one-quarter the OECD average. Elsewhere, the least expensive countries are Switzerland, Luxembourg, Ireland, Germany and the United States. At the other end of the spectrum, the Czech and Slovak Republics have charges that are at least twice the OECD average (OECD, 2002c).

Internet access prices are a key determinant of Internet and e-commerce use by individuals and businesses (Figure 13). Countries with lower access costs typically have a greater number of Internet hosts, and electronic commerce has developed rapidly in countries with unmetered (flat-rate) access (OECD, 2001a). Unmetered access was available from the leading telecommunication carrier in 12 OECD countries by the beginning of 2001 and has increased the amount of time users spend on line. A leading ISP in the United Kingdom reported that average usage per subscriber doubled to 22 hours a month following the introduction of a flat rate in 2000. AOL in the United States, where flat rates have been available for a longer period, reported more on-line time per subscriber, around 40 hours a month.

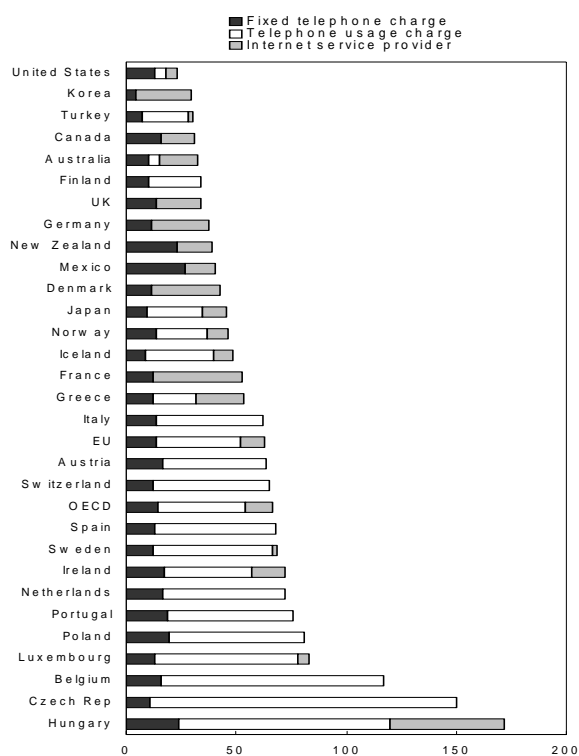
**Figure 12. Price of leased lines in the OECD area, May 2002**

Charges for a basket of national leased lines of 2 megabits per second, OECD average = 100



**Figure 13. Price of 40 hours of Internet use at peak times, August 2001, in PPP dollars**

OECD Internet access basket for 40 hours at peak times using discounted PSTN rates<sup>1</sup>



1. In some countries ISP and PSTN usage charges are bundled and included in the ISP charge. Source: OECD, Telecommunications Database, June 2002.

#### **Box 4. Network infrastructure in developing economies**

For most developing economies the highest priority is to put in place the network infrastructure and a competitive environment and regulatory framework that support affordable Internet access (Tigre and O'Connor, 2002).

Developing countries with widespread access to telecommunications and network services (*i.e.* 40 mainlines or more per 100 people) are rare. Some smaller countries, such as those in the Caribbean, Hong Kong, China, Chinese Taipei and Singapore, and more developed regions within large countries have reached this stage or will soon do so. Market mechanisms alone do not suffice to ensure widespread individual access to the network, since much of the population lacks the income required to have telephone services. For low-income and rural populations, universal access programmes are needed to make adequate telecommunications available in areas where telecommunication operators cannot otherwise be expected to provide network access. In Brazil, for example, telecommunication operators are required to contribute 1% of total revenues to a fund aimed at providing services to those excluded from the market.

For Internet access, cultural, demographic and regulatory factors are also influential. China led Thailand in terms of teledensity in 2002, 16 and 11 mainlines per 100 population but Thailand led in early Internet use with almost double the users (almost 8) per 100 inhabitants in 2002, even if China has subsequently made very impressive advances. In the same year, Iran led both countries with 19 mainlines but less than five Internet users per 100, presumably for cultural and political reasons.

Internet access charges relative to income also matter. Monthly Internet access charges may be 70% of per capita GDP in countries like Mozambique and Ethiopia. In countries like Mexico and Brazil, they are 8-10%, but inequalities in income distribution means the Internet is not affordable for a large proportion of the population. In 2002, 8% of the population in Brazil were Internet users and almost 10% in Mexico, very much lower than Europe and the US (ITU data, 2004).

As use of e-commerce increases, barriers related to network infrastructure seem to be higher for SMEs than large firms. Challenges include how to ensure interoperability with a range of different e-commerce systems and how to improve ICT management and organisational skills. The EBIP study of adopting firms (see below) shows that SMEs are somewhat less confident about technologies than larger firms and less sure how to adapt to different and competing e-commerce systems (OECD, 2002a).

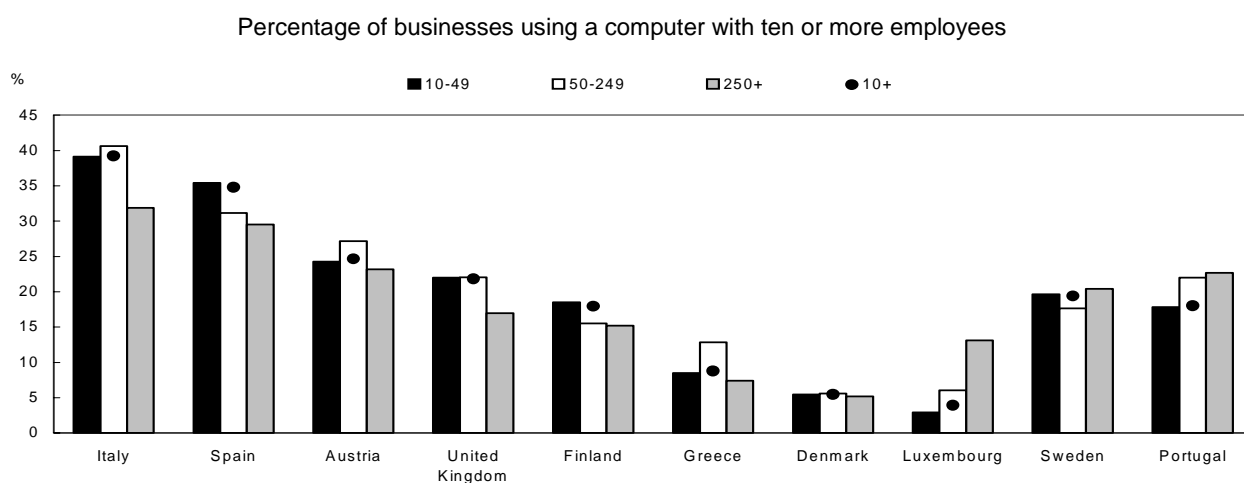
#### **Building security and trust**

Lesser known SMEs are at a clear disadvantage in terms of buyer confidence compared with large multinationals with highly recognisable brand names. On-line clients view recognition of a brand or company name as an indicator of a firm's credibility just as they do off line. Inability to verify the on-line seller's credentials ranks high among reasons for reluctance to buy on line (OECD, 2002d).

A professional Web site can help to improve a firm's image for large-scale B2B transactions. A study of 12 Canadian high-technology SMEs, most with fewer than 90 employees, showed that these firms considered a Web site as a means to improve credibility, but the major target audience was potential clients and investors, not individual customers. Some placed detailed corporate information on the site to illustrate their technology and financial base (Tiessen *et al.*, 2001). For contracts involving large transactions, as in B2B commerce, a firm needs to be confident about its client's credibility, and a simple Web site is unlikely to convince new buyers and suppliers to begin to conduct business with most SMEs.

Moreover, consumers who use credit cards for on-line transactions are highly concerned about security, protection of credit-related information and secure system firewalls. As more on-line clients demand secure transaction environments, SMEs are likely to face increasing costs for system protection and security measures (Phillips, 2002). Statistical surveys show that security issues (viruses, hackers) are among the most important perceived barriers to Internet use by businesses (B2B and B2C), although large firms perceived these barriers as more important than small ones presumably because they were more likely to be transacting and have a larger share of transactions over the Internet (OECD, 2002c). Barriers to Internet commerce for businesses included payment uncertainties and contract, delivery and guarantee uncertainties, with very wide variations in perceived barriers across countries, and unsuitability the major barrier. Payment uncertainties were relatively important in Italy, Spain, Austria, the United Kingdom, and Portugal, and affecting smaller firms more in Spain, the United Kingdom and Finland (Figure 14).

**Figure 14. Small and large businesses facing barriers to Internet payments, 2000**



Source: Eurostat, E-commerce Pilot Survey 2001.

Firms in non-OECD countries face rather similar barriers to adoption as in OECD countries, but they also face particular barriers where the infrastructure and business environment is not well-developed, and these barriers will take precedence particularly for SMEs. On the other hand for SMEs in countries where the infrastructure is better-established and a favourable business environment is well-established, concerns are similar to those in OECD countries, for example privacy and legal issues (see Table 1). Concerns about privacy and legal protection for Internet purchases are the two first obstacles pointed out in the CRITO global survey (2 139 firms in 10 countries) and are important in Singapore, Brazil and China. Those obstacles seem particularly important for large firms in Singapore (61.5 and 63.5%) that already use e-commerce and e-business in supply chains and markets. Overall, SMEs are more sensitive to local environmental obstacles than large firms (costs of Internet access, business laws, prevalence of credit card use in the country, taxation of Internet sales), while large firms are more sensitive to international strategy and organisation effects.

**Table 1. Barriers to e-business use in three non-OECD countries: Singapore, Brazil and China**

Significant obstacle*	Singapore			Brazil			China			Global
	SME	Large	Total	SME	Large	Total	SME	Large	Total	
Need for face to face interaction	38.7	31.5	38.3	32.6	30.2	32.5	31.0	28.3	30.6	33.8
Concern about privacy of data or security issues	47.4	61.1	48.1	48.4	55.1	48.6	45.4	44.7	45.3	44.2
Customers do not use the technology	26.9	27.4	26.9	48.5	20.0	47.6	33.6	27.8	32.6	31.4
Finding staff with e-commerce expertise	20	20.3	20.0	34.3	32.2	34.2	21.9	9.2	19.7	26.5
Prevalence of credit card use in the country	24.6	14.2	24.1	22.9	33.8	23.2	32.1	20.5	30.2	20.3
Costs of implementing an e-commerce site	46.8	18.9	45.3	33.4	39.3	33.6	27.3	35.4	28.6	33.6
Making needed organizational changes	38.8	27.7	38.2	32.6	41.1	32.9	22.2	23.1	22.4	23.9
Level of ability to use the Internet as part of business strategy	21.5	27.0	21.8	22.3	24.8	22.4	31.8	27.9	31.1	24.8
Cost of Internet access	34.1	25.8	33.6	20.7	8.9	20.4	22.6	18.7	21.9	15.1
Business laws do not support e-commerce	34.9	32.2	34.8	31.9	22.2	31.6	40.8	40.4	40.8	24.2
Taxation of Internet sales	28.5	23.6	28.3	27.1	17.6	26.8	19.9	15.6	19.1	16.5
Inadequate legal protection for Internet purchases	42.6	63.5	43.6	41.6	34.4	41.4	55.7	49.1	54.5	34.1

Source: CRITO, Gopal E-Commerce Survey, 2002, quoted in Wong Poh-Kam and Ho Yuen-Ping (2004); Paulo Bastos Tigre (2003); Zixiang A. Tan and Wu Ouyang (2004).

Notes: The CRITO survey covers 2,139 large and small firms in 10 countries (Brazil, China, Denmark, France, Germany, Japan, Mexico, Singapore, Taiwan and the United States). The limited sample size and the inherent biases introduced by the methodology (a questionnaire by telephone) mean that only the most advanced firms were included in low-income countries. In China these are drawn only from four major economically advanced cities: Beijing, Shanghai, Guangzhou and Chengdu. SMEs are those with 25-250 employees, large are those with more than 250 employees. The survey sample sizes are: Singapore 105 establishments classified as SME and 97 as large firms; Brazil, 98 SMEs and 102 large firms; China 102 SMEs and 102 large firms.

### **Legal uncertainties**

Most Internet e-commerce transactions are domestic rather than cross-border. Although there may be other reasons, such as the use of a common currency, differences in legal and regulatory environments are one of the most important. Legal uncertainties and conflicting regulatory environments for cross-border transactions, especially B2C, may affect SMEs particularly strongly. There is neither a harmonised legal framework with rules pertaining to the determination of jurisdiction and applicable law nor mechanisms that ensure the cross-border enforcement of legal rulings. Small businesses can risk being sued in multiple jurisdictions under a number of inconsistent laws. More generally, the lack of a satisfactory redress mechanism in the event of a dispute may strongly discourage both B2B and B2C on-line transactions (OECD, 2002d). Unlike large firms, which can afford to maintain a legal department, the cost of keeping abreast of developments in the target market's legislation and regulations and the cost of tackling the complex legal issues involved in cross-border transactions may be too high for many small businesses. There are, of course, out-of-court dispute resolution mechanisms, such as arbitration, but this

involves costs of at least thousands of US dollars and may not be well suited to small transactions involving SMEs.

Eurostat figures clearly show that legal uncertainties constitute, at least in some countries, a significant barrier to the adoption of e-commerce by SMEs. Legal uncertainty concerning contracts, terms of delivery and guarantees was mentioned as an important barrier to e-commerce purchases by 40% of SMEs in Spain, 37% in Italy, 24% in the United Kingdom and 20% in Austria. It also discourages e-commerce sales (Eurostat, 2002). In another European Commission survey, a small percentage of small firms with 10-49 employees indicated national differences in consumer protection as the most important reason for not using the Internet (European Commission, 2002a).

The fear of being left with no satisfactory recourse against a transaction counterpart has been remarkably persistent among Internet users. In the United States, 60% of Internet users indicate difficulties in obtaining satisfactory redress as a reason for reluctance to buy on line (OECD, 2002d). Most B2C transactions are relatively small (*e.g.* less than USD 100) and hardly justify costly legal procedures or even other (self) efforts, such as insisting on contract fulfilment through available means of communication (*e.g.* phone, fax, letters) especially when dealing with a foreign counterpart.

### **E-business adoption challenges: lessons from EBIP**

Barriers to the adoption of e-commerce are also changing over time and may vary along the adoption ladder. For some SMEs sophisticated in the use of e-commerce, the barriers mentioned above may be unimportant. But they may face other challenges as they change their management and organisational structures and restructure business processes to make better use of the Internet and the potential of e-business.

The OECD's EBIP (Electronic commerce Business Impacts Project) study undertook in-depth interviews with 217 firms that were early adopters of Internet and e-business strategies (OECD, 2002a). This cross-country, cross-sector study showed that firms view competence factors (*e.g.* management attitudes, skill levels, training) as the most positive factors for them to successfully adopt e-business strategies and these factors were mostly favourable for them. Technology factors (*e.g.* how to ensure interoperability with different e-commerce systems, network reliability and flexibility) were also highly favourable for them and were of less concern than competence factors. Cost factors (cost of reaching customers, cost of engaging in e-commerce, telecommunication costs) were also seen as largely positive for adopting firms when compared with benefits from e-commerce and e-business. On the other hand confidence factors (*e.g.* brand image, transaction security, legal structures, IPR issues) were of lower concern on average but were more often seen as being negative, particularly in areas such as protection of IPRs and general legal structures.

The EBIP set of early adopting firms showed interesting differences between small and large firms (small defined as less than 250 employees). Small firms were less positive about confidence factors in general than large ones. In particular, they were less positive and more negative about legal structures supporting their on-line activities and were considerably more negative than large firms about intellectual property protection. On the other hand, in the confidence area, large firms were more negative about transaction security (they are also more likely to be transacting on-line than small firms), and were more negative about the pull-through effects of government on-line efforts. The other major difference was in the technology area, where small firms were more negative about available technologies and less positive about having to choose among competing transaction systems, but overall were considerably less concerned (either positively or negatively) than large ones about network issues and conflicting systems. This suggests that successful small firms are able to master technological challenges internally, but are less sure of commercial exploitation and the wider business environment.

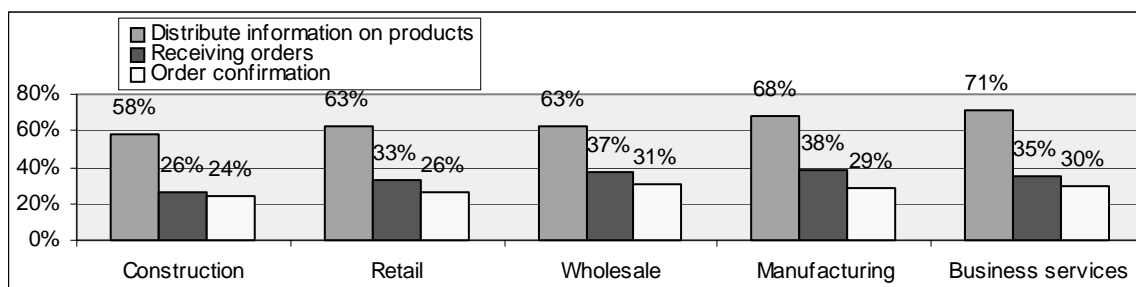
In other areas small and large firms had similar concerns, except that small firms generally had less well-formed opinions about factors affecting their Internet efforts, either positively or negatively. Interestingly enough, this group of early adopters was not particularly concerned about general cost factors. For example they were positive about costs of engagement (investment costs) in e-commerce and highly positive about their strategies reducing costs to reach customers, with small engaged firms being almost as positive as large ones (OECD, 2002a).

### III. ICT AND E-BUSINESS USE BY SECTOR

Application and use of ICTs and e-business strategies vary widely across sectors. The following section examines tourism, retail, textiles, and automobiles to illustrate sectoral differences in e-business and Internet strategies. Internet e-commerce can enable businesses to reach a wider and possibly more targeted range of customers either locally or globally, either in B2B transactions (automobiles, textiles) or B2C transactions (textiles, tourism, parts of retail and finance *e.g.* banking, insurance, on-line brokerage). When firms perceive a higher level of market opportunities, they commit more resources to ICTs and e-business where this is appropriate.

Cross-sector surveys show that there are some differences in the use of the Internet by SMEs across different sectors. In Europe, only around a third of SMEs receive orders over the Internet. Their most common use of the Internet is for distribution of product/service information (Figure 15). A slightly higher percentage of firms in manufacturing, wholesale and business services receive orders over the Web than those in retail and construction. Some SMEs send order confirmations via the Internet, although it is not clear how many of these orders were received over the Web rather than through other means, such as fax or telephone.

**Figure 15. SMEs in Europe: commercial activities using the Internet, 2001**



Source: European Commission (2002a).

Note: Percentage of responses of firms with fewer than 250 employees using the Internet in 19 countries (15 EU member states plus Iceland, Liechtenstein, Norway and Switzerland). The number of respondents is as follows: construction: 863; retail: 816 firms; wholesale: 842; manufacturing: 1 098; and business services: 910.

#### Tourism

In tourism, an area dominated by SMEs in OECD countries, some small tour operators, hotels and inns, restaurants and travel agencies have been active in fostering cross-border Internet e-commerce. The Internet allows travellers direct access to travel recommendations, reviews and local tourism information, many of which was previously only distributed through the physical offices of (large) travel agencies. Small players with a Web page can now attract those preferring personalised (and possibly less expensive) services. Some small travel agencies, making the most of ICT, take advantage of direct on-line sales of (discounted) airline tickets and travel packages, while others, both small on-line and off-line agencies, have shifted towards selling leisure products entailing higher commissions, such as cruise packages. Since the Internet and many travel-related sites allow on-line customers to compare the price of



air tickets and other travel services, small firms offering best/better prices can win price-sensitive travellers.

The volume of Internet e-commerce in tourism, has grown very rapidly, but still largely involves ticketing for passenger transportation and accommodation. The Internet is mainly used for travel-related information and promotion. In the United States, where on-line travel sales grew rapidly from USD 400 million in 1997 to USD 22.7 billion in 2002, they still only represented 10% of total travel sales in 2002 (Forrester, 2002). The impact of on-line direct sales on small players in the sector could be substantial: a quarter of travel agencies are quite small, with annual sales of less than USD 1 million, and an average of six employees per agency. On the other hand, the number of potential customers, some of whom may prefer a smaller agency's prices and services, is not small: in the United States, over 64 million people used the Internet for travel planning, little changed from 2002 due to the slower growth of "wired" households, but over 42 million people (30 percent of the adult population) used the Internet to book travel online, up 8 percent from 2002, and the number of online bookers doing *all* of their travel booking online continues to grow (Travel Industry Association of America, 2004).

Tourism products have high information content, usually including local content such as history, nature and indigenous arts. They are also intangible in nature and cannot be tried before purchase (*e.g.* air tickets, hotel rooms, car rentals, restaurant meals). These characteristics make tourism products very well suited for purchase over the Internet. In addition, most travel products, like air travel and hotel rooms, are perishable and last-minute on-line sales provide a new distribution channel and can represent an important last-minute solution for customers. Transaction costs over the Internet can be significantly lower than those of traditional distribution channels.

However, use of Internet commerce in the tourism sector is likely to concentrate on B2C rather than B2B transactions, as incompatibility between systems (*e.g.* central/computer reservation systems) and the dominance of relatively small agents and suppliers with less ICT capability may impede efficient electronic transactions along the supply chain for B2B transactions (Department of Industry, Tourism and Resources, Australia, 2002).

## **Retail**

Use of Internet commerce among SMEs in the retail industry is lower than in business services and manufacturing. The problem of confidence building seems to be critical because customers may prefer not to make a purchase at a small on-line shop without knowing about its product/service quality and reputation. Several studies suggest that even the most price-sensitive Internet consumers respond very strongly to well-known, heavily branded (large) retailers, such as amazon.com. An early study of Internet brand establishment analysing 20 000 on-line consumers who compared and purchased books from 33 on-line bookshops found that most did not choose the lowest price offer and that the shop's name/brand was an important determinant of their choice (Smith and Brynjolfsson, 2001). Expectations of a higher level of services from better-known retailers, such as swift and reliable delivery of the purchased items, make some consumers willing to pay a premium even for a standardised product, such as a book. The retailer's brand is considered as a proxy for the credibility of the shop.

A strategy for small on-line retailers would be to handle niche products and/or personalised services, which customers may not receive from larger shops. Some small on-line book retailers have been successful by distinguishing themselves from others through specialisation in particular kinds of (professional) titles, which are not available in ordinary bookstores. Others have attracted customers worldwide by offering both specialised products and customised services (Box 5).

## Textiles

Textile products, along with music and video, books and magazines and software, are among the leading consumer products sold over the Internet (OECD, 2002c). Projections for on-line apparel sales in 2003 ranged from 2-8% of sales, however, and physical stores remain the principal sales channel for the foreseeable future. Large retailers see B2C e-commerce as a complementary channel that provides more options to consumers. Consumers may check a printed catalogue before placing an order over the company's Web site and if the shipped item is not satisfactory, they can return it to the nearest physical store. Such multiple channel retailing may not be feasible for many small shops. In fact, the small size of B2C e-commerce generally does not justify a small retailer's investment.

In the form of EDI linkages, B2B e-commerce has long existed between major retail chains and large apparel manufacturers. Again, small suppliers and shops have not necessarily been enthusiastic about the adoption of costly EDI or the Internet. Some small textile producers consider that a Web site which gives access to their collection is harmful because it allows competitors to copy their products.

One firm in southern Italy run by two family members imports raw materials and exports finished products. It avoids putting its product information on a Web site for this reason. It uses the Internet to receive orders and to send digital images of products only to known clients (which then sell to other buyers). Another textile producer with 300 employees does not use the Web for buying and selling because the company is worried about decreasing their competitive advantage by making information available to competitors (Scupola, 2002). Other textile companies, partly because it is relatively easy to copy products, do not want to lose control over their designs and other business information by putting them on line.

### **Box 5. An on-line retailer with a personal touch**

West Country Violins, with three employees in East Devon (United Kingdom), is run by a husband and wife, Brian and Felicity Ward-Smith, who purchase, restore and sell French, German or Italian violins from the 18<sup>th</sup>, 19<sup>th</sup> and early 20<sup>th</sup> centuries. The company was started in 1997 to supply local students with inexpensive but professional violins, but this market was soon saturated. Brian decided to use the Internet to reach much a wider market without radically increasing his overhead costs. After selling a couple of violins via an on-line auction, the couple started developing the company's e-commerce site themselves.

The Web site ([www.westcountryviolins.com](http://www.westcountryviolins.com)) shows high-quality, detailed photos of each instrument, allowing the on-line customer to examine the listed violins. It also has sound clips with the recorded sound of each violin, which the customer can listen to through a desktop computer. The price of the instruments ranges from GBP 295 to GBP 7 000. The package is delivered by Parcel Force International, part of the UK Postal Service, with full insurance and a refund guarantee (minus shipping costs and bank/credit card charges) if the shipped instrument does not meet customer requirements.

In the 12 months to April 2001, the company's turnover doubled to GBP 120 000, and it has continued to prosper. The site has attracted customers not only in the United Kingdom and Ireland but also throughout the world Australia; Canada; Germany; Japan; Korea; Hong Kong; China; and the United States.

Above and beyond the simple but practical on-line catalogue, the personal touch the couple tries to maintain is a key to the company's success. They consider violins to have a personal relation to the owner. They reply to every question regarding the items for sale and general care of the instruments and pay attention to a customer's individual requirements and requests. The Web site now includes a customer feedback page that carries comments by customers who have bought an instrument through the site. Some customers, impressed by the presentation of the instrument on the site, visit the physical shop. The Web site can also be found through Violink, a popular violin-related site among individuals, dealers and others interested in the instrument.

Source: UK E-Commerce Awards (<http://www.ecommerce-awards.co.uk/>) and the company Web site (<http://www.westcountryviolins.com>).

Small retailers may not be comfortable with a live link to stock levels because such information instantly reveals how (well) the shop sells the supplied products. Although direct access to stock data is technically feasible and can help to minimise inventories and improve production planning at each level of the supply chain, some retailers do not provide their suppliers with electronic access to such data. They continue to order over the phone or via fax (Moodley, 2002). B2B on-line marketplaces and auction sites have also not been attractive to many SMEs in the sector particularly in the light of most of these markets proving to be unstable and short-lived.

## **Automobiles**

In the automobile industry, B2B transactions via EDI have a 30-year history. Many first-tier suppliers in Europe, Japan and the United States have established real-time connections with large car manufacturers to respond to the latter's requests for design/production processes reflecting their changing demands and specifications for just-in-time parts delivery. Most suppliers, even large ones, see EDI (and its recent Internet forms) as a strategic necessity for not losing business with car producers (*i.e.* their customers) and customer push has been a major factor in the adoption of EDI by the sector (Iskandar *et al.*, 2001). Many smaller suppliers, especially those in second or lesser tiers, have not implemented EDI because the system, which may differ depending on the trading partners, has been costly to install and because they see asymmetric benefits in favour of large manufacturers. Eliminating the clerical errors associated with re-entry of order information and reduced lead-time contributes to lower inventory costs, and these benefits of EDI are considered to be largely in favour of their customers.

To realise larger benefits by streamlining business information and materials flows, as well as to achieve greater participation by smaller suppliers, EDI systems in advanced OECD countries have attempted to integrate different communication networks into a single Internet network. This should allow high quality, high speed and security measures to protect the transmission of confidential data and other critical messages. The Internet-based EDI, ANX (Automotive Network Exchange) was started in 1994 and operated in the United States from 1998-2002 and was aimed at EDI integration involving ENX (Europe), JNX (Japan), AANX (Australia) and KNX (Korea) (Department of Industry, Tourism and Resources, Australia, 2002). Subsequently, individual parts of the system have survived, but the idea of a global integrated system has not been achieved, in part due to problems in designing a global business model for these exchanges and in part due to difficulties attracting small suppliers.

## **Summary**

The adoption and use of Internet and e-business strategies depend on sector characteristics. The products of services like tourism, which are intangible in nature and have a high information content, are well-suited for purchase over the Internet. In addition, in sectors such as tourism and parts of retail and finance, where firms perceive a higher level of market opportunities, they tend to commit more resources to e-commerce. In sectors such as textiles and automobiles, where the relationship between firms along supply chains is very close, on-line transaction systems are seen as a strategic necessity for streamlining B2B transactions.

Barriers to Internet commerce also vary among sectors. In tourism, incompatibility of systems and the dominance of relatively small agents with less capability impedes efficient Internet transactions along the supply chain, especially for B2B transactions. In the retail sector, the problem of confidence building seems more crucial. In manufacturing sectors, such as textiles and automobiles, established closed EDI systems with high installation costs structure the use of electronic commerce by SMEs.

## IV. POLICY IMPLICATIONS

SMEs have been slower than larger firms to adopt Internet and e-business strategies despite the potential benefits. All OECD countries have introduced programmes to speed SME e-business and Internet development. However, the recent features of e-business and Internet use will also structure policy. First and foremost, most e-commerce is B2B rather than B2C, which means government policy needs to focus on value chain participation. Next, most Internet e-commerce transactions are domestic rather than cross-border. Finally, use varies widely among sectors, and these structural differences need to be taken into consideration.

Barriers to uptake vary depending on transactions (B2B or B2C), sectors and countries. They also change over time and vary along the e-commerce adoption ladder. Barriers such as lack of technological capabilities and ability to identify business opportunities are greater for SMEs than larger firms. In many countries business and sector organisations are particularly important intermediaries for the diffusion of e-business strategies, awareness raising and consultation services, and management education and training.

Governments have used many policies to encourage the diffusion of e-business and Internet use, from fostering technological diffusion to creating a favourable business environment with fair and predictable rules. These are drawn from both general enterprise policy and from ICT policies. The overall policy framework is no different for SMEs than for larger firms except for some areas such as competition where there are differences in impacts between small and large firms. In addition, the policy agenda has also been evolving, with the focus shifting from connectivity and building simple web presence, to more integrated use of ICT within the business and along the value chain as firms move from readiness to adoption to reaping benefits from the adoption of ICTs and e-business. Policy is increasingly based on market-based technology-neutral approaches to the diffusion of ICTs and e-business strategies.

### **General approaches**

Commercial considerations and potential returns drive firms to adopt new strategies and change existing ones. Not all SMEs will “catch up” with large firms beyond a certain level of connectivity (PC, Internet access, on-line marketing). Firms will stay with traditional business processes if Internet commerce is unsuitable for their business, or if expected benefits are outweighed by costs.

SMEs are heterogeneous, undertaking a wide range of activities in different positions along sector and product value chains. Some are as sophisticated users of the Internet and e-business as larger firms, while others make no use at all. Although policy differentiation and targeting is required to allow for such differences, governments cannot tailor policy to meet the requirements of individual small firms. However they can focus on policy principles and delivery mechanisms that take diversity into account and maximise effectiveness. Above all, governments can attempt to identify and target smaller enterprises that are potential or low-level users that could further benefit from more extensive use.

Third, most e-commerce takes place between businesses. The largest benefits for the Internet-using firms may derive from generating internal process efficiencies and participating in value-added networks, whereas in many countries, the initial policy focus has been on encouraging small firms to set up a Web site and reach out for on-line final consumers, and policy is increasingly moving towards market-based approaches.

## **General framework policies for SMEs**

### ***Network infrastructure***

Network infrastructure must be in place. The availability of a wide range of high quality Internet and communication services at competitive prices is particularly important, as this allows firms to choose services appropriate to their needs. In particular, broadband, characterised by high-speed, “always-on” connection and two-way capability, allows faster access and delivery of existing on-line services and new applications and services such as streaming audio and video over the Internet with much higher quality. In this context, an additional focus on the wireless network infrastructure and the rapid growth of WiFi are also important.

The price and availability of broadband access depends to a large extent on competition in the infrastructure market and will in turn play an important part in take-up by SMEs. Policies to open up incumbent local access networks to competition (*e.g.* unbundling local loops and line sharing) create incentives for new investment in broadband access and drive faster deployment of broadband services (OECD, 2001c). From 1997 to 2001, 26 OECD countries introduced or decided to introduce unbundling. Unmetered pricing is also important for wider use of broadband. High-speed services are advantageous when priced on a flat-rate monthly basis and service is “always on” (OECD, 2001b).

Governments should also ensure open and competitive telecommunication markets so that SMEs can choose among various technologies and services for high-speed Internet access. While some large firms use directly connected leased circuits for broadband applications, smaller enterprises are likely to prefer technologies using a traditional telephone line, such as DSL, as these generally represent the initial opportunity for SMEs to obtain affordable higher speed Internet connections (OECD, 2001b). In developing countries, multi-user services can be a very important tool for increasing coverage and use of advanced services and could be supported where universal service is difficult to attain (see E-Choupal example in Box 2).

### ***Assessing benefits relative to costs***

SMEs will adopt e-commerce when benefits justify establishing and maintaining the e-commerce system. Firms need to make realistic assessments of e-commerce/e-business opportunities, benefits and costs. Policy measures that, for example, encourage business associations or other groups to provide awareness-raising and consultation services can be beneficial. Such initiatives can also encourage SMEs to develop niche products and personalised services not provided by larger firms. On the cost side, open source software has been proposed as an economically viable solution for establishing and upgrading ICT systems. It can enhance system interoperability and make it easier to introduce new applications. It can also have the potential to develop applications specifically for SMEs, which can be cost-saving for them.

Financing may be an issue even after identifying beneficial e-commerce/e-business opportunities. Many commercial factors inhibit small business debt financing including high transaction costs for small loans, lack of sufficient collateral and high risk in innovative start-ups and micro-enterprises. To the extent that this is an issue, it may be important to minimise discriminatory behaviour to improve small firms access to financial resources. Most OECD countries have also implemented direct and indirect financial supports for small businesses, some through financial institutions partly supported by the government. Such schemes can be effective, especially when consultation services are provided to help develop business strategies based on realistic assessments of benefits and costs.

### *Security, confidence building and the legal framework*

Business and consumer confidence in the security and trustworthiness of on-line transactions is essential to the development of e-commerce. It largely hinges on assuring both businesses and consumers that their use of on-line services is secure, reliable and verifiable. Businesses need a legal framework that is predictable and practical for domestic and cross-border transactions. Creating the appropriate level of confidence in e-commerce requires a mixture of trustworthy technologies and regulatory and self-regulatory arrangements.

High levels of concern about on-line security, changes in technologies and the overall on-line environment are reflected in the 2002 OECD “Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security”, a revision of the 1992 “OECD Guidelines on Security of Information Systems”. Regarding authentication for e-commerce, the 1998 OECD Ottawa Declaration on Authentication for E-commerce gave favourable consideration to the 1996 Model Law on Electronic Commerce adopted by the United Nations Commission on International Trade Law (UNCITRAL). As a result, most OECD countries have taken into account the model law when amending or introducing such legislation.

Many studies indicate that confidence building and legal issues concerning contracts, terms of delivery and guarantees constitute a significant barrier to adoption by SMEs, particularly for cross-border transactions. In B2B transactions problems are reduced because of the limited number of suppliers or customers, but cross-border transactions with new and unknown partners still present challenges. If there are not satisfactory mechanisms for the resolution of disputes, SMEs may not wish to engage, because the costs of complex legal problems may be too high in cross-border transactions in particular.

Access to affordable and effective redress mechanisms, such as on-line alternative dispute resolution (ADR), contributes to building trust among businesses and consumers. From the SME point of view, ADR advantages include speed, economy, flexibility and neutrality. It is also more effective for smaller cross-border transactions because the small size of claims does not justify expensive resolution court procedures. On-line dispute resolution (ODR) may also be an attractive solution for SMEs and customers because it provides an easy-to-access redress procedure and may also save travel costs, which are a large part of costs associated with any dispute resolution process. It must also be clearly recognised that the private sector is also making considerable progress in developing ADR/ODR programs. Any further work on ADR/ODR in the SME context would need to be undertaken in close coordination with the ongoing work programme of the Consumer Policy Committee on ADR issues, and take into account initiatives in other international organisations and the private sector.

Many OECD and non-OECD countries have introduced or have planned legislation to establish legal frameworks for consumer protection, and regional and international co-operation is being extended because legal issues are more likely to arise for cross-border transactions between countries with different regulatory environments. The 1999 “Guidelines for Consumer Protection in the Context of Electronic Commerce” have been widely disseminated and taken into account in reviewing, adopting and adapting laws to ensure sufficient consumer protection in the on-line environment. The guidelines also complement other government and private initiatives to develop B2C codes of conduct and trustmarks for on-line businesses. These have been followed with OECD “Guidelines for Protecting Consumers from Fraudulent and Deceptive Commercial Practices Across Borders” (OECD 2002f). APEC has also an electronic steering group to ensure coordination of e-commerce activities, including delivery of recommended guidelines for on-line consumer protection.

## ***Competition issues***

Ensuring competition and entry opportunities for other market players, particularly smaller ones, is an ongoing policy priority. The open architecture of the Internet does not necessarily result in more open markets, because e-commerce among businesses is usually initiated by dominant companies in value chains. E-business and Internet strategies appear to be reinforcing market structures and the role of these companies. The EBIP study indicates that large companies with the most bargaining power in the supply chain tend to lead the establishment of B2B e-commerce, while other firms, including small ones, react to such initiatives (OECD, 2002a).

While Internet commerce provides SMEs with opportunities to participate in new supply chains and markets, they may compete and conflict with established channels and established market structures. There may be explicit or implicit pressures from leading firms to maintain existing channel structures and networks or to refrain from participating in new channels.

Competition authorities need to monitor possible anti-competitive behaviour as the electronic marketplace evolves. Technological factors also come into play. In some sectors, SMEs need to adopt specific e-business practices to become part of supply chains (*e.g.* automobile manufacturing). This highlights the importance of technology neutrality and interoperability (open platforms) as policy principles to encourage a level playing field in terms of market structure. Open source software has been proposed as one means of reducing anti-competitive pressures. It may be easier for small firms to have relationships with larger firms at lower cost if open source fosters wider compatibility between different applications and operating systems and lowers the cost of ICT adoption.

Most competition authorities in OECD countries, independently or in co-operation with others in different jurisdictions, have examined how on-line markets, both B2B and B2C, may facilitate collusion and the exercise of buyer/supplier power and whether traditional antitrust tools are sufficient to address these issues. There has been a policy focus on small players that may be in a weaker position in relation to larger dominant suppliers and customers that could exercise anti-competitive pressures and lock-in..

## ***E-government***

E-government, the provision of government services on line, has high priority in many OECD countries. Such on-line activities offer benefits for governments, including greater efficiency and transparency and expanded provision of information and services (OECD, 2002b). Examples include the provision of government services on-line, the simplification of administrative tasks such as value-added tax administration and business tax lodgement and collection. These on-line activities can also have significant effects on small businesses as they need to ensure access to government services and obligatory requirements and interoperability with these services, affecting their choice of systems and software. Technology neutrality and the interoperability of a variety of network infrastructures and software is essential when initiating e-government projects.

In addition, e-government activities have demonstration effects for SMEs by providing them with models for service delivery and by spreading awareness of the potential for on-line delivery and interaction. They expand infrastructure provision and use (*e.g.* broadband) and contribute to promoting trust and security in on-line transactions, for example by introducing and demonstrating authentication and digital signature systems.

E-procurement, whose main purpose is to rationalise government expenditure, can also provide SMEs with new incentives to adopt Internet and e-commerce in order to enter new markets. Governments establish new e-market models through e-procurement initiatives and SMEs may benefit from more transparent and more competitive market conditions.

### **Specific policies for SMEs**

Governments have implemented various e-business and Internet programmes focused on SMEs. Three new directions are emerging in such policies. These are in addition to initiatives that aim at facilitating the participation of SMEs in e-business value chains rather than simply encouraging them to adopt e-commerce. First, the policy focus needs to shift to the wider concept of e-business (which includes a range of internal and external activities). These encompass R&D, planning, marketing and sales, invoicing, supply chain management, inventory, logistics and delivery, after-sales services, and other crucial business functions such as knowledge management, and finance. Second is a greater accent on tools that emphasise commercial imperatives, and focus on self-assessment of opportunities, benefits and costs of e-business. Third is a need to co-ordinate and organise such policies with wider business framework policies to enhance their effectiveness.

Although businesses are still positive about e-business as an enabler to improving efficiency, reducing costs, the business case has to be made. However, many SMEs probably lack the time, knowledge and skills to effectively make that case. How to overcome this issue in realistic ways has been another challenge for governments.

### ***Awareness raising and business consultation***

Awareness-raising activities have been helpful in diffusing initial information about ICTs and e-commerce, and have been a major policy focus. In addition to a government portal covering a wide range of e-business issues with links to related support services, seminars and workshops that demonstrate possible integration of ICTs and e-commerce into SMEs' processes are common (Table 2). Government programmes have included business case studies, introducing successful business practices of small ICT/e-commerce adopters. Case studies can provide practical business pointers to managers and employees. Prize and award programmes may give high visibility and publicity to the best users but may have little impact on non-adopters if the lessons are not widely shared. Various policies aim at overcoming these handicaps, for example the e-Business Guide developed by Australia's National Office of the Information Economy is a comprehensive on-line resource that is aimed at business people who want a quick and easy explanation of e-business; what it is, its benefits and what is needed to get started.



**Table 2. Examples of ICT/e-commerce awareness raising programmes for SMEs**

Country	Programme	Description
Australia	AUSE.NET	An industry-led, not for profit, national initiative to foster awareness of e-commerce among SMEs. A series of three-hour face-to-face workshops help SMEs understand the “why” of e-commerce and its importance to their business. The Web site includes guidance on how to buy a computer, get connected and set up a Web site and reports on ICT and e-commerce.
Austria	Let's e-Biz	The on-line information source established by the Ministry of Economics and the Chamber of Commerce covers all aspects of e-business. The annual prize is an award for the best e-business and multimedia products.
Canada	Ebiz.enable	A comprehensive on-line resource that enables evaluation of a business' current readiness, next steps, offers access to experts and encourages implementation of e-business strategies. The SME E-business Information Toolkit provides step-by-step guidance. Industry Canada works closely with the E-business Opportunities Roundtable, a private sector initiative, on a series of regional events to help SMEs understand and act on the e-business imperative.
Finland	EASKEL	The goal includes increasing SME management competence in e-business strategy development. Private consultants analyse participants' companies and develop an action plan for them. Each company is allowed 2-5 consultation days and the government covers 85% of consultant fees.
Ireland	PRISM initiative	Using the positive experiences of local SMEs as a catalyst for further e-business adoption, the Chamber of Commerce helps SMEs to respond to e-business challenges through e-business capacity building. E-business strategy training courses will be provided to over 2 000 SMEs by mid-2002.
Luxembourg	APSI/CRP-HT Guide	A guide to promote e-business for SMEs produced by the Association of Professionals of ICT (APSI) and Public Research Institute Henri Tudor (CRP-HT). The Chamber of Commerce, the Federation of Luxembourg Industrials (FEDIL), etc., are ensuring wide distribution of the guide.
Netherlands	Netherlands Go Digital	Supports trade organisations in the development of an ICT strategy to stimulate their members' Internet and e-commerce adoption. National branches and 250 consultants help SMEs and entrepreneurs prepare and implement their ICT action plan. Sector-specific SME organisations are also supported.
Sweden	SVEA	Aims at raising the awareness of the commercial possibilities of e-commerce and how e-business can be used in different parts of the business process. It includes seminars, case studies and access to ICT solution providers.
United Kingdom	UK Online for Business	It encourages and helps UK businesses to improve their business performance through the effective use of ICTs, based upon partnership between government and industry. The programme consists of a coherent framework of activity designed to raise awareness of the potential benefits of e-business and provides advice and support in adopting and using ICTs through a national network of over 70 centres.

*Note:* Description of each programme is partial. Some programmes include a training aspect.

*Source:* OECD (2002b), European Commission (2002b), the AUSE.NET site ([www.ause.net](http://www.ause.net)) and ebiz.enable site ([www.strategis.ic.gc.ca/sc\\_indps/ebiz/engdoc/homepage.php](http://www.strategis.ic.gc.ca/sc_indps/ebiz/engdoc/homepage.php)).

However, these programmes need to be carefully designed to enhance their effectiveness. In the first place, they should help SMEs self-assess the costs and risks as well as opportunities related to e-business. For example, case studies should be selected to support the potential business case with a clearer picture of costs and benefits. In addition, they should help SMEs recognise the importance of strategic and managerial skills as well as ICT skills. For example, in the case of the ‘Austrian State Award for Multimedia and e-business’, the focus of this award is strategic and business related, therefore the selected winner can be considered as best practice example for all the other companies.

Awareness programmes should be also tailored to targeted firms' situations in terms of market, industry and location. More importantly, they should have the flexibility to meet the changing and different needs of SMEs over time. Some European countries incorporated a feedback mechanism for this purpose into their awareness programmes. For example, SVEA, the Swedish awareness-raising programme, used its local networking partners to feed potential changes into the system. Business organisations and small business networks have a crucial role to play, since they are closer to day-to-day operations of small firms and offer major sectoral expertise and examples of changes in good practice.

Some government programmes have included one-to-one consultation and support services to develop a customised e-business strategy. Free consultation, including (limited) access to private services, has been available in some countries, while some governments have covered part of charges. In the United Kingdom, e-business advisers have provided small firms with free advice and assistance on the effective use of ICT in 70 centres across 12 regions designated for the UK Online for Business programme. In Finland, the eASKEL programme covers 85% of direct consultant fees for SMEs participating in management training that allows two to five expert consulting days to develop an e-business action plan.

### ***Training***

Competence factors including internal ICT knowledge and e-business management capabilities are crucial for successful adoption, and training programmes for SMEs are among major policy targets. In many cases, ICT skills have been addressed in a broader context of education and training, and initiatives for reducing the digital divide (OECD, 2002b, see Table 3).

Most governments provide ICT training or training support. Some governments provide training free of charge, most of which focuses on basic ICT use. Financial support to cover part of training expenses has also been common. Training is increasingly provided over the Internet and, in some cases, in conjunction with ICT and e-commerce awareness and business consultation services. This reflects the recognition of the importance for small business managers and employees of ICT applications and required skills. The UK Online for Business initiative is an example of such a programme, combining on-line information and consultation services with off-line business support services. The Learndirect programme offers both on-line access to ICT training and off-line consultation with trained staff at local Learndirect centres.

Government training programmes, however, might fail to effectively respond where SMEs' demands for ICT skills are dramatically changing and more specialised. Commercial training services may be more sensitive to businesses' changing and specific needs and government training programmes need to cooperate fully with commercially available services. Governments may also need to encourage a favourable business environment for provision of private ICT training services at a reasonable cost.

Business management capabilities are becoming a new category of generic competency in the context of overall management of business processes, rather than ICT technologies alone. Training programmes therefore need to be more focused on managerial understanding and skills for e-business, such as how to effectively integrate e-business processes into existing business models and strategies to change organisational structures.

**Table 3. Examples of ICT/e-commerce training programmes for SMEs**

Country	Programme	Description
Belgium	Forem	Forem and the Institute of Continuous Training for Traders and SMEs offer training courses on the Internet. Forem's Web site provides a meeting place for businesses (e.g. job vacancy advertising), a list of training programmes and aids for training.
Canada	Student Connection Programme	It hires and trains university and college students as student business advisors to provide customised Internet and e-commerce training to SMEs. Since its start in 1996, more than 3 000 students have been hired and more than 64 000 business people have been trained.
Greece	Go Online	The project of the Ministry of Development aims to introduce 50 000 SMEs to the digital economy. One focus is to provide training to a large number of SMEs during the period 2000-03.
Spain		A programme is designed for micro-enterprises (fewer than 20 employees) in small towns with a special emphasis on training in the use of the Internet, e-mail and new management techniques.
Turkey	KOSGEB	KOSGEB, with more than 40 service centres and 25 Internet cafés across the country, contributes to building computer and Internet literacy in SMEs.
United Kingdom	Learndirect	SMEs are a priority group for the on-line service. Each course, looking at a specific business issue, allows SME managers and employees to tailor their learning according to their immediate needs. Service users can contact the trained staff in local Learndirect centre for consultation.
United States	Business Information Centres etc.	At a state level, various training services are available. Business Information Centres and Small Business Development Centres provide free or low-cost up-to-date training. The Service Corps of Retired Executives (SCORE), consisting of retired business people, offers training as well as free business consultation.

Source: OECD (2002b), UK Learndirect Web site ([www.learndirect-business.co.uk](http://www.learndirect-business.co.uk)) and US SBA's Web site ([www.sba.gov](http://www.sba.gov)).

### ***International co-operation***

E-commerce policies are also increasing co-ordination and co-operation between countries and at multinational level. ICT and e-commerce uptake by SMEs has been a priority of various international bodies, including the European Union and APEC (Asia-Pacific Economic Cooperation). The EU covers a wide range of e-business environment, Internet and ICT use issues. *eEurope 2005, Helping SMEs to go digital*, includes initiatives in most areas of policy concern, including health, education and government. APEC's focus areas are similar to those of the OECD, with emphasis on the leading role of the business sector. The 2000 APEC Wide Action Plan covered SME-specific policy issues, such as e-commerce awareness raising, information provision and technical assistance, ICT education and training, and general framework policies including access to infrastructure, a seamless legal/regulatory environment, on-line security, authentication and consumer protection.

## Summary

General business framework and ICT policies have an important role in enhancing the conditions for small businesses to adopt and exploit e-business and Internet strategies. In addition, specific policies have been common in areas seen to be crucial for initial uptake (*e.g.* awareness, managerial and ICT skills). The overall policy approaches are to:

- Shift to a wider view of e-business integration of internal and external processes. Policies have shifted over time as firms and economies have moved from concentrating on e-readiness, connectivity and awareness, to diffusion and use, and are moving towards mature e-business strategies which blend broad policies for the business environment with policies for particular areas such as IPRs and competition.
- Focus on facilitating SME participation in B2B product and sector value chains, including technology neutrality and interoperability among different systems.
- Encourage business and sector associations to provide tools to assess e-commerce/e-business opportunities, benefits and costs, and the development of niche products and services. Reduce discriminatory access to finance, and improve information regarding financing opportunities. These issues may be of particular importance in developing non-OECD countries.
- Training programmes for SME managers and employees focusing on both technical and managerial skills need to be provided in cooperation with business and sector organisations, training institution and commercial training services.
- Continue to ensure open, competitive telecommunication markets that offer a range of interoperable technological options and network services (particularly broadband) of appropriate quality and price. This is a crucial factor in developing non-OECD countries.
- Address security, trust and confidence through broad policy frameworks, regulatory and self-regulatory tools, trustworthy technologies and affordable redress mechanisms. Affordable redress mechanisms are being addressed in OECD work on alternative dispute resolution/on-line dispute resolution.
- Monitor anti-competitive behaviour as e-business becomes more widespread, electronic marketplaces evolve and potential market power increases.
- Use e-government initiatives to provide incentives for SMEs to go on line by simplifying administrative procedures, reducing costs and allowing them to enter new markets (*e.g.* e-procurement).
- Continue to address human resource issues as a priority. Training programmes for SME managers and employees are increasingly focused on both technical (ICT) and managerial (“e-business”) skills designed to improve abilities to benefit from e-business strategies.
- Expand collection and analysis of increasingly available statistics on e-business and e-commerce to monitor progress and improve cross-country analysis.

However there is no one-size-fits all approach to policy and the policy mix and priorities will depend on national circumstances (leading or lagging countries) and sectoral distribution of economic activity, as well as size factors.

## REFERENCES

- Baldwin, J.R. and D. Sabourin (2002), "Impact of the Adoption of Advanced ICTs on Firm Performance in the Canadian Manufacturing Sector", STI Working Papers 2002/1, OECD, Paris (available at [www.oecd.org/sti/](http://www.oecd.org/sti/)).
- Bitler, M. P. (2001), "Small Businesses and Computers: Adoption and Performance", preliminary draft, October.
- Bricklin, D. (2001), "What's Been Successful in B2C" (available at <http://www.bricklin.com/b2csuccess.htm>).
- Bricklin, D. (2002), "Small Business and Web Sites" (available at <http://www.bricklin.com/smallbusiness.htm>).
- Central Cooperative Bank for Commerce and Industry (Shoko Chukin Bank Of Japan) (2001), *2001 Survey on Internet Use by SMEs*, Tokyo, November.
- Council of the European Union (2000), *eEurope 2002 Action Plan*, June (available at [http://europa.eu.int/information\\_society/eeurope/index\\_en.htm](http://europa.eu.int/information_society/eeurope/index_en.htm)).
- Department of Industry, Tourism and Resources (ITR), Australia (2002), *The Internet's Impact on Global Supply Chains: the Opportunities and Challenges for Australian Industry*, March (available at <http://www.itr.gov.au>).
- Ernst & Young (commissioned by the National Office for the Information Economy (NOIE) of Australia) (2001), *Advancing with E-Commerce*, (available at <http://www.noie.gov.au>).
- European Commission (2002a), *The 2001 ENSR Survey on SMEs: the Seventh Observatory of European SMEs*, DG Enterprise, Brussels.
- European Commission (2002b), *Benchmarking National and Regional E-Business Policies: Benchmarking Report*, DG Enterprise, Brussels.
- Eurostat (2002), *The European Community Survey on E-Commerce*.
- Faverie, M. (2004), "E-Business and SMEs in seven non-OECD countries: South Africa, Brazil, Chile, China, India, Russia and Singapore, report prepared for OECD.
- Gertner, R.H. and R.S. Stillman (2001), "Vertical Integration and Internet Strategies in the Apparel Industry", *The Journal of Industrial Economics*, December, pp. 417-440.
- Heartland Information Research, Inc (2001), "E-Commerce's Impact on the Travel Agency Industry", research submitted to Office of Advocacy, U.S. Small Business Administration, October.

- Iskandar, B.Y., S. Kurokawa and L.J. Leblanc (2001), "Business-to-Business Electronic Commerce From First- and Second-Tire Automotive Suppliers' Perspectives: a Preliminary Analysis for Hypotheses Generation", *Technovation*, Vol. 21, pp. 719-731.
- Japan Automobile Manufacturers Association (JAMA) (2000), "JNX: Japanese automotive Network eXchange", *JAMAGAZINE*, March (in Japanese).
- Langdon, S. (2001), "The Influence of Information Technology on the Growth of the Microbusiness", paper presented at the 24<sup>th</sup> ISBA National Small Firms Policy and Research Conference.
- Love, P.E.D., Z. Irani *et al.* (2001), "An Empirical Analysis of the Barriers to Implementing E-Commerce in Small-Medium Sized Construction Contractors in the State of Victoria, Australia", *Construction Innovation*, Vol. 1, pp. 31-41.
- Mehrtens, J., P. B. Cragg and A. M. Mills (2001), "A Model of Internet Adoption by SMEs", *Information & Management*, Vol.39, pp.165-176.
- Ministry of Economy, Trade and Industry of Japan (METI) (2001), *White Paper on Small and Medium Enterprises in Japan*, SME Agency of Japan (available at <http://www.chusho.meti.go.jp/hakusyo/h13/download/2001eibunzennbun.pdf>).
- Moodley, S. (2002), "E-Business in the South African Apparel Sector: a Utopian Vision of Efficiency?", *The Developing Economics*, March, pp. 67-100.
- OECD (2001a), *Science, Technology and Industry Outlook: Drivers of Growth: Information Technology, Innovation and Entrepreneurship*, OECD, Paris.
- OECD (2001b), "Broadband Infrastructure Deployment: the Role of Government Assistance", OECD, Paris.
- OECD (2001c), "The Development of Broadband Access in OECD Countries", DSTI/ICCP/TISP(2001)2/FINAL, OECD, Paris (available at <http://www.oecd.org>).
- OECD (2002a), "The Impacts of Electronic Commerce on Business: Summary", DSTI/ICCP/IE(2002)5/FINAL, OECD, Paris.
- OECD (2002b), *Information Technology Outlook 2002*, OECD, Paris.
- OECD (2002c), *Measuring the Information Economy*, OECD, Paris.
- OECD (2002d), "Alternative Dispute Resolution (ADR) online mechanisms for SME cross-border disputes: progress report", DSTI/IND/PME(2002)7/ANN/FINAL, OECD, Paris.
- OECD (2002e), "Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security", OECD, Paris.
- OECD (2002f), "Guidelines for Protecting Consumers from Fraudulent and Deceptive Commercial Practices Across Borders", OECD, Paris.
- OECD (2003a), "Broadband driving growth: policy responses", DSTI/ICCP(2003)13/FINAL, OECD, Paris.

- OECD (2003b), *OECD Communications Outlook*, Paris.
- OECD (2004), “Recommendation of the Council on Broadband Development”, C(2003)259/FINAL, OECD, Paris.
- Phillips, B.D. (2002), “Home-Based Firms, E-Commerce, and High-Technology Small Firms: Are They Related?”, *Economic Development Quarterly*, Vol. 16. No. 1, February.
- Sakai, K. (2002), “Global Industrial Restructuring: Implications for Small Firms”, STI Working Papers 2002/4, OECD, Paris (available at <http://www.oecd.org/sti/working-papers>).
- Scally, T., M. Stansfield and K. Grant (2001), “An Investigation into the Use of the Internet and E-Business among SMEs in Lanarkshire”, *Computing and Information Systems*, Vol. 8, pp. 58-66.
- Scupola, A. (2002), “Adoption Issues of Business-to-Business Internet Commerce in European SMEs”, in *Proceedings of the 35<sup>th</sup> Hawaii International Conference on System Sciences 2002* (available at <http://www.hicss.hawaii.edu/diglib.htm>).
- Smith, M. D. and E. Brynjolfsson (2001), “Consumer Decision-Making at an Internet Shopbot: Brand Still Matters”, *The Journal of Industrial Economics*, December, pp. 541-558.
- Statistics Canada (2001), *The 2000 Survey of Electronic Commerce and Technology*.
- Statistics Canada (2002), *The 2001 Survey of Electronic Commerce and Technology*.
- Tigre, P.B. and D. O’Connor (2002), “Policies and Institutions for E-commerce Readiness: What Can Developing Countries Learn From OECD Experience?” Technical Papers No.189, Development Centre, OECD, Paris (available at <http://www.oecd.org/dev/technics>).
- Tigre, P.B. (2003), “E-commerce Readiness and Diffusion: the Case of Brazil”, GEC Project, CRITO, Irvine University, [www.crito.uci.edu](http://www.crito.uci.edu).
- Wong, P.-K. and Y.-P. Ho (2004), “E-Commerce in Singapore: Impetus and Impact of Globalization”, GEC Project, CRITO, Irvine University, [www.crito.uci.edu](http://www.crito.uci.edu).
- World Bank (2003), World Development Indicators Database, August 2003.
- Zixiang, A.T. and O. Wu (2004), “Diffusion and Impacts of the Internet and E-Commerce in China”, GEC Project, CRITO, Irvine University, [www.crito.uci.edu](http://www.crito.uci.edu).