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ICTs for development: the case of B2B e-commerce

Report

ICTs for Development - The Case of B2B e-commerce

by

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Investing in ICTs for Development [1]

A substantial amount of attention is being given to investing in ICTs in order to give more people access to applications that will enable access to digital information resources and potentially lead to changes in business processes and gains in productivity. The spread of the Internet has given rise to renewed expectations that there will be good opportunities for firms in poorer countries to reap the advantages of global networking.

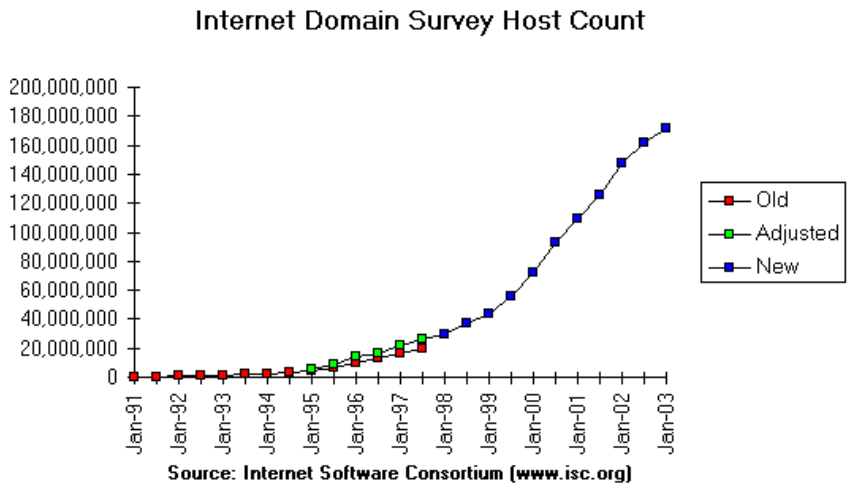
Figure 1 shows the rate of increase in the numbers of top level Internet Domain Name hosts from 1991 to 2003. By January 2003 there were estimated to be a total of 171,638,297 top level hosts. The growth since 1996 in the numbers of registered hosts that enable access to the Internet has been enormous.

Figure 2 shows the distribution of these hosts. The results of the January 2003 survey of Domain Name Hosts show that hosts assigned country names in the industrialised world account for 26.2% of the total of 171,638,297 top level hosts. Hosts assigned developing country names account for only 2.4% of these names and the Central and Eastern European Countries (CEEC) account for only 1.4% of these names.

Figure 2 also shows that the number of hosts in the Business/Commercial (aero, biz, com) and Organisation (net, pro, org, name, int, coop, aq) categories account for a substantial share of the total hosts. Hosts opting to register under the domain names of .info, .edu, or .museum, that is, the Educational or Informational categories account for only 4.4% of the total.

Figure 1: Internet Domain Survey Host Count, 1991-2003

[1] Section on 'Investing in ICTs for Development' prepared by R. Mansell, London School of Economics and Political Science originally for UNESCO. Remaining sections based on background documentation prepared for Humphrey, J., Mansell, R., Paré, D., and Schmitz, H. (2003) *The Reality of E-commerce with Developing Countries*, a report prepared for the Department for International Development's Globalisation & Poverty Programme jointly by the London School of Economics and the Institute of Development Studies, Sussex, London/Falmer, March available at: www.gapresearch.org/production/ecommerce.html. An earlier draft of this material was prepared principally by Dr. Daniel Paré, LSE.



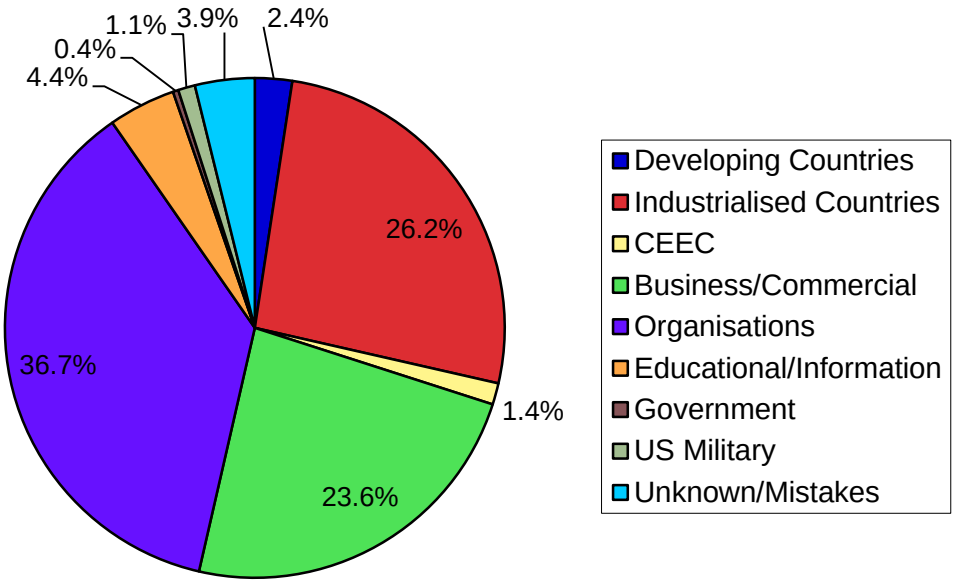
Source: Internet Software Consortium, http://www.isc.org/ds/ accessed 15 February 2003.

These data show the overwhelming predominance of industrialised countries. There is a 'digital divide' between the wealthy and poor countries and, although not indicated by these data, within countries and regions.

The majority of the content of the World Wide Web is produced in the English language. This creates a barrier for many potential users. Figure 3 shows changes in the propensity of Web users to choose to surf the Web using one of the languages supported by the Google search engine. Between March 2001 and January 2003, although English continued to be the predominant search language, there was a slight increase in the use of non-English search languages.

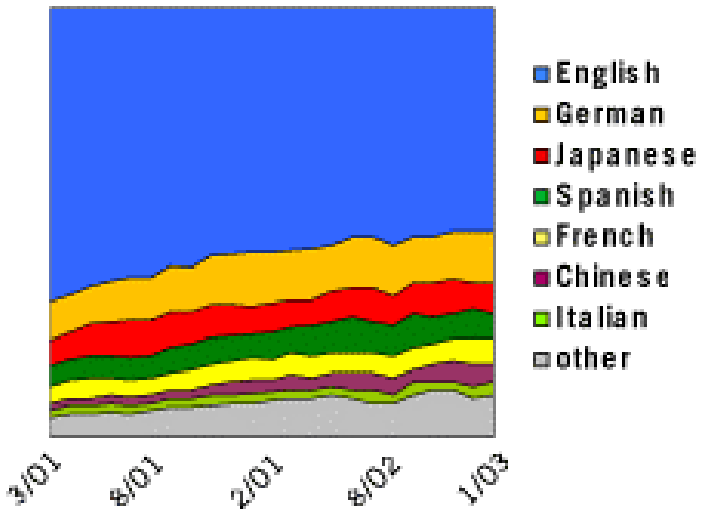
Obtaining access to the Internet may lead to substantial cost-savings for users as a result of their use of email or information that is mounted on the web. However, as the *1999 UN Human Development Report* noted, it should not be assumed that the presence of a network and computers means that ICTs are accessible for all users or that their use will automatically lead to gains in productivity. Institutional norms and practices can create barriers to access and efficient use even when the Internet and other ICT applications are technically available. In addition, the prices paid by businesses and many citizens for Internet access are prohibitively high in poor countries (see Table 1). The cost of personal computers also can represent more than a year's salary for people in many developing countries.

Figure 2: Top Level Internet Domain Name Hosts by Category, January 2003



Note: For the Internet Domain Name Survey methodology which counts the number of IP addresses that have been assigned a name, see sources. Total Top Level Hosts = 171, 638, 297. Business = aero, biz, com; Organisations = net, pro, org, name, int, coop, aq; Educational = info, edu, museum; Government = gov; Unknown= unknown, arpa.
Source: http://ixos.turkuamk.fi/users/S058S01/PikkiS/factsoftheintern.htm accessed 15 February 2003; http://www.isc.org/ds/WWW-200301/dist-byname.html data for January 2003.

Figure 3: Languages Used to Access Google - March 2001 - January 2003



Source: Google, http://www.google.com/press/zeitgeist.html ,accessed 15 February 2003.

Table 1 Monthly Internet Access Prices in Selected OECD and African Countries

OECD	USD	% of GDP per Capita	Africa	USD	% of GDP per Capita
Mexico	94	14.8	Uganda	92	107.0
Turkey	65	12.8	Guinea	65	45.3
Japan	50	2.6	Sierra Leone	50	118.0
Finland	33	2.2	Ethiopia	32	76.8
US	29	1.2	Mozambique	29	69.6
Australia	24	1.5	Senegal	24	17.6

Note: Comparisons need to be interpreted with caution due to data reliability problems and variations over time.
Source: Commonwealth Working Group on Electronic Commerce (2000), p. 41.

The 'digital divide' means there is a substantial risk that those without access to the Internet or other forms of technologies are being marginalized and excluded from society. Access to networks and digital information does need to be extended to reduce these 'digital divides'.

The extension of global telecommunication networks appears to offer producer firms in developing countries new mechanisms that will enable them to compete on a more equal basis in world markets. The new technologies enable cost reductions in infrastructure and service development. The application of ICTs can enable firms in developing countries to sell their products and services more easily in external markets. Some analysts argue that there is the potential for 'leap-frogging' generations of ICTs.

The optimistic view of the potential for ICTs and B2B e-commerce, in particular, to open up global markets to developing and transitional economy firms depends on the idea that the major obstacle to the efficient exploitation of new markets is the cost of making products known to potential buyers in industrialised countries. Particularly relevant for developing countries is the fact that the transfer of information over the Internet operates largely irrespective of physical location and the basic hardware and software is widely available and relatively cheap. Therefore, Internet-based B2B e-commerce appears to offer particular advantages for developing and transitional economies.

For developing country firms, the capacity to benefit from the diffusion of ICTs and from the implementation of B2B e-commerce requires both a reduction in the technological divides and improved institutional arrangements to support increased international trade. Most studies of the potential of ICTs for developing countries and emerging market economies focus on the indigenous constraints that firms located in these countries must contend with. However, the interactions between connectivity, access, network security, capability/skills, market structures and firm governance as well as regulatory environments influence whether firms can participate effectively and efficiently in the global economy.

Underpinning discussions about the potential for the Internet to support gains in productivity is the notion that the use of the Internet's applications will lead to significant decreases in transaction costs associated with trade across organizational and

geographical boundaries. The adoption of ICTs is expected to facilitate closer integration of the value-added chain, allowing firms to reduce the costs associated with selecting suppliers, negotiating and fulfilling contracts. This reduction in the costs of coordination is expected to encourage firms to expand the number of transactions they conduct across both organizational and geographical boundaries.

This view overlooks the importance of organizational procedures and processes as well as the dynamics involved in trading. It illustrates a tendency among some analysts to discuss ICTs and 'the Internet' as simple appliances rather than as complex means of networking. Failure to consider the processes and practices that underpin ICT use can lead to overestimates of the potential savings and to underestimates of the costs that firms in both developing countries may experience from participating in global trading networks.

Other studies offer evidence that challenges assertions about the potential for the use of ICTs to increase the scope for inter-organizational networking and international trade. In some cases, B2B e-commerce can reduce the costs of making firms known to each another. But many implementations of Internet applications do not offer packages of services such as payment and settlement mechanisms, insurance, logistic systems, inspection, certification of quality, and customs clearance. Without low cost access to such services, developing country firms may find it prohibitively expensive to exploit new external markets.

An analysis of Internet-based B2B e-commerce in two sectors: garments and horticulture (Humphrey et al. 2003) examined B2B e-marketplaces in each sector that are accessible via the Internet. Table 2 and Table 3 summarise the types of services available at these web sites based on research for the Humphrey et al. study.

Table 2: Product and Trading Partner Information in Horticulture

Type of e-marketplaces (N=77)	**Product Specification Information**		**Product Quality Assurance Mechanisms**					**Buyer/Seller Assurance**			
	User Decides	No Info about terms	Product Photos[A]	Samples Offered[A]	Lab Reports[A]	Facilities Inspection[A, C]	Certification Mentioned?	Registration Required	Participant Screening	Credit Rating Info[F]	Buyer/Seller Reputation Statements[G]
Trade Leads (N=43)	42	1	18	1	1	4	2[B]	29	9	5	3
Request For Quotes (N=10)	6	4	3	0	1	3	5[D]	10	8	2	1
Auction (N=8)	3	5	4	0	0	0	2[E]	6	3	0	1
e-Retail (N=7)	0	7	4	0	0	0	1[H]	6	1	0	0
Direct Buyer / Seller Link (N=7)	6	1	6	0	0	1	0	7	3	0	0
Unknown (N=2)	0	2	0	0	0	0	0	1	1	0	0
Total	**57** ***(74%)***	**20** ***(26%)***	**35** ***(45%)***	**1** ***(1%)***	**2** ***(3%)***	**8** ***(10%)***	**10** ***(13%)***	**59** ***(77%)***	**25** ***(32%)***	**7** ***(9%)***	**5** ***(6%)***

[A] The data indicate only the number of e-marketplaces where specific mention is made of user access to quality assurance mechanisms.
[B] For one of these 'certification' relates to a specific type of service. The provider helps firms obtain registration, quarantine certificates, and permits and licenses that the Chinese government requires for the selling of foreign agricultural products in China.
[C] Trading partner facilities inspection only available by contacting a third party linked to B2B e-hub.
[D] For two of these, 'mention of certification' is related to selling agri-chemicals.
[E] 'Certification' is related to the selling of agri-chemicals.
[F] Member credit rating information only available by contacting third party linked to B2B e-hub (i.e. Dun and Bradstreet).
[G] Provider offers a service whereby after a negotiation and/or transaction, parties may rate each other.
[H] Terms and Conditions stipulate that Product Specification Sheet and Product Material Safety Data available for Chemicals Sold.

Table 3: Product and Partner Information in Garments

Type of e-marketplace (N=107)	Product Specification Information		Product Quality Assurance Mechanisms					Buyer/Seller Assurance			
	User Decides	No Info about terms	Product Photos[A]	Samples Offered[A]	Lab Reports[A]	Facilities Inspection[A,C]	Certification Mentioned?	Registration Required	Participant Screening	Credit Rating Info[F]	Buyer/Seller Reputation Statements[G]
Trade Leads (N=39)	35	4	14	4	2	13	1[B]	34	25	6	3
Request For Quotes (N=18)	16	2	7	7	4	8	0	17	11	6	2
Auction (N=20)	17	3	8	3	1	12	0	19	15	8	2
e-Retail (N=3)	0	3	2	1[D]	1[D]	1	0	3	3	1	0
Direct Buyer / Seller Link (N=24)	22	2	20	3	2	7	1[E]	23	13	3	0
Unknown	0	3	3	0	1	0	0	3	3	0	0
Total	**90** ***(84%)***	**17** ***(16%)***	**54** ***(50%)***	**18** ***(17%)***	**11** ***(10%)***	**41** ***(38%)***	**2** ***(2%)***	**99** ***(93%)***	**70** ***(65%)***	**24** ***(22%)***	**7** ***(7%)***

[A] The data indicate only the number of e-marketplaces where specific mention is made of user access to quality assurance mechanisms.
[B] Registration application form asks potential registrants if they are ISO certified and date certified and certification body.
[C] Trading partner facilities inspection only available by contacting third party.
[D] Users in this type of 'closed' exchange do not know the identity of their counterparts.
[E] Manufacturers can register with provider for assessment confirming that the firm complies with the apparel commerce code of professionality.
[F] Member credit rating information only available by contacting third party.
[G] Provider offers a service whereby after a negotiation and/or transaction, parties may rate each other.

The ability of buyers to obtain product samples and/or lab reports about the horticulture products they may wish to purchase is extremely limited. Table 3 suggests that such services may be somewhat more accessible for buyers in the garments sector. However, for both sectors, when facilities inspection services and information about product certification were accessible, this almost always was depended on firms users contacting third parties such as Société Générale de Surveillance (SGS).

A central aspect of the information component of preparing to buy or sell a product is the product and partner information to which a firm has access before to deciding whether or not to place an order with another firm. These factors directly influence the coordination of trade and motivation costs associated with negotiating and fulfilling a contract. The extremely limited amount of that users immediately have at their disposal before entering into an exchange within Internet-based e-marketplaces suggests that they are unlikely to have a major impact on the trading prospects of most firms in developing countries.

Given the potential technological, economic, and legal risks at stake, the providers of the B2B e-marketplaces seem to have little incentive to facilitate the provision of affordable services that support trade. Users of e-marketplaces generally must decide on: i) the settlement mechanisms that are used; and ii) whether to employ third parties to make assessments about the creditability and legitimacy of trading partners, and iii) how to arrange for delivery of the product once a sale has been agreed.

Humphrey et al. (2003) also examined the B2B e-commerce experiences of firms in the horticulture and garments sectors in Bangladesh, Kenya, and South Africa. This empirical research drew upon interviews with 74 enterprises. An additional 37 key informant interviews with industry experts, business associations, e-commerce solution providers, and government officials were conducted across the three countries. The enterprise interviews were conducted with individuals in senior management positions. These individuals were well-placed to comment on the scale and impact of ICT use to support B2B e-commerce. Of the 47 respondents from garment firms, slightly more than half were linked to enterprises employing in excess of 1000 people. More than two-thirds of the respondents from the horticulture firms were linked to enterprises with more 1000 employees including casual labourers.

The Garments Sector in Bangladesh, Kenya and South Africa: B2B E-commerce

The majority of firms in the garments sector were global contract manufacturers making finished products according to the specifications of foreign buyers. The buyers define the products produced by the suppliers and specify the processes and standards to be used. In some instances, the suppliers also stipulate the sources of fabrics and trim needed produce the final product. Only one firm, based in South Africa, was adding higher-order services such as styling and design to its garments which it supplied to small independents and boutiques in the UK.

Although global buyers are increasing their expectations about the range of services and characteristics that potential supplier firms should have, all the respondents in this sector indicated that implementing ICTs for conducting B2B e-commerce was not yet a condition of international trade within their supply chains. With the exception of one

respondent from Kenya, all reported that they had experienced no direct pressure from their buyers to make greater use of ICTs. However, respondents from three Bangladeshi and two South African firms noted that they had received informal requests to participate in private e-marketplaces that some of their buyers were planning to implement. Respondents commented that:

> 'The lack of e-commerce capabilities does not have an adverse effect on the winning of contracts in the export market';
> 'There is no pressure from the buyers and brokers to adopt e-commerce systems'; and
> 'Ironically, this company was prepared to make greater use of IT related solutions, but our UK-based customers weren't'.

The motivations for adopting ICTs that may be used to conduct B2B e-commerce were generally twofold. The first was the belief that the implementation of these technologies would facilitate and enhance the growth, development, and the learning potential of the firm over the long term. The second was the perceived need to 'go with the trend' and to keep up with what other firms are doing. The main pressures that the respondents reported they were experiencing from buyers concerned price reductions and technical issues such as higher fabric and garment performance.

More than half of the firms in this sector did not have a company web-site. Company listings in online directories were relied upon only to a very limited degree. Although none of the Kenya firms had company web sites, approximately 57% of the South African firms and 57% of the Bangladesh firms did have web sites. These platforms were mainly static rather than interactive, offering few capabilities beyond email links. They tended to be used as a marketing tool to demonstrate to prospective customers the company's production capabilities and to provide both product (excluding price related information) and contact details. Despite the fact that all of the firms with web sites were receiving product inquiries, none had succeeded in generating sales solely from the information available on their sites. Only one respondent from a South African firm indicated that his firm was constructing a B2B transaction-based web site. One Bangladesh firm was examining the possibility of creating such a site.

All the respondents reported that their firms used computers and had connections to the Internet. In order to connect to the Internet the firms were either using analogue-based modems or an ISDN connection (see Table 4). Only three of the firms – all based in Bangladesh – reported using high-speed Internet connections.

Table 4: Type of Internet Connection

	Frequency	**%**
Analogue	30	63
Integrated Services Digital Network (ISDN)	14	29
Symmetric Digital Subscriber Line (SDSL)	2	4
Cable	2	4
Total	**47**	**100**

Only a third of the respondents noted that their firms had installed an Intranet (see Table 5). Of this group, 88% were South African firms. None of the Kenyan firms had an Intranet. When these networks were in place they typically were used to enable

staff to read company information and allow staff access to databases. None of the firms had developed and implemented an extranet. The prospects for developing an external business network by providing clients and commercial partners with limited, firewall-managed access to the enterprise's internal network were not very good. However, four South African, two Kenyan, and one Bangladesh firm mentioned that their enterprises were accessing the extranets of their buyers.

Table 5: Adoption of Internet Technologies

	Frequency	%
Public Internet	47	100
Intranet	16	34
Extranet	7	15

Note: Percentage column adds to more than 100% because of multiple responses.

Despite remaining heavily dependent upon the telephone and fax, email was seen as a means of significantly reducing the costs of communication (see Table 6).

Table 6: Use of Email

To maintain contact with buyers/supplier:	**Frequency**	**%**
Always	33	70
Frequently	14	30
Seldom	0	0
Never	0	0
Total	**47**	**100%**
To place or accept product orders:		
Always	24	51
Frequently	20	43
Seldom	0	0
Never	2	4
No response	1	2
Total	**47**	**100**

The majority of respondents (79 %) indicated that their firms had never used the web to purchase or sell any of its products internationally (Table 7). Two South African firm reported that they had used the Internet to link into the e-procurement systems of large US retailers in order to bid for contracts.

Table 7: Use of Internet to Buy or Sell Products and/or Services Internationally

	Frequency	%
Have used the Internet to buy or sell (including email)	9	19
Have not used the Internet to buy or sell	37	79
No response	1	2
Total	**47**	**100**

The evidence suggests that among the garments firms in Bangladesh, Kenya, and South Africa, ICTs were being used for B2B e-commerce to enable messaging and marketing and for processes relating to preparing for transactions and support with existing customers and suppliers.

The Horticulture Sector in Kenya and South Africa: B2B E-commerce

In the horticulture sector a combination of product innovation, a need for reliable delivery of consistent-quality products and increasing concerns about pesticide residues, environmental impact and labour standards, have lead to the development of very tightly co-ordinated supply chains within the industry. A key characteristic of contemporary horticulture supply chains is that large retailers do not source horticulture products without conducting extensive audits of the suppliers' premises and systems (quality, management, traceability, etc.), and the product itself often is customised in accordance with the retailer's requirements. The majority of firms in the horticulture sample were members of tightly consolidated and/or integrated agribusiness value chains.

All the Kenyan and South African respondents noted that their firms had not experienced any direct pressure from their buyers to make greater use of ICTs to support e-commerce. There was a consensus among the firms that ICTs and B2B e-commerce need to prove their worth. The motives for adopting ICTs for B2B e-commerce were threefold. First, these technologies and, in particular, email, were seen as effective means of reducing communication costs. In addition to cost savings, respondents from the Kenyan firms stressed that email offers companies an effective means of circumventing the unreliability of Kenya's telephony infrastructure. Third, the adoption and implementation of basic ICTs such as email and Internet access were perceived as reflecting the need for firms to keep up with what other firms are doing.

The majority – 81% – of the horticulture respondents reported that they did not have a company web-site. Only 13% of the Kenyan respondents reported that their firms had a company web-site, with an additional 13% claiming that they were in the midst of developing a company web-site. Interestingly, 27% of the Kenyan respondents noted that when dealing with potentially new buyers they often looked to see if the company had a web site as this was seen as offering a degree of credibility. Within the South African segment, 25% of the respondents indicated that their firms had a company web site. As in the garments sector, all of these sites were 'static', offering few interactive capabilities beyond email links. Although all the respondents with web sites reported that their firms had received varying numbers of inquiries, none had succeeded in generating sales solely from the information available on these sites.

All reported that their firms used computers and had connections to the Internet. In order to connect to the Internet the firms predominantly were using analogue modems or an ISDN connection (see Table 8). Given the slow connection speeds and high costs of telephone services, three Kenyan firms reported that if the need to use the Web arose, they would use the services of a local cyber-cafe to minimise access costs.

Table 8: Type of Internet Connection

	Frequency	%
Analogue	14	52
Integrated Services Digital Network (ISDN)	9	33
Symmetric Digital Subscriber Line (SDSL)	2	7
Cable	1[†]	4
No Response	1	4
Total	**27**	**100**

Only a small number of firms, one in South Africa and one in Kenya, had implemented an Intranet (see Table 9). These were used to enable staff to read company information and to allow staff access to databases. None of the firms had developed and implemented an extranet.

Table 9: Adoption of Internet Technologies

	Frequency	%
Public Internet	27	100
Intranet	2	7
Extranet	0	0

Note: Percentage column adds to more than 100% because of multiple responses.

The horticulture firms reported that the most frequently used Internet application was email (see Table 10).

Table 10: Use of Email

To maintain contact with buyers/supplier:	**Frequency**	**%**
Always	12	45
Frequently	13	48
Seldom	2	7
Never	0	0
Total	**27**	**100**
To place or accept product orders:		
Always	11	41
Frequently	5	18
Seldom	7	26
Never	3	11
No response	1	4
Total	**27**	**100**

The horticulture industry in South Africa is based on a consignment system whereas in Kenya it is based on a contract system. In a consignment system, volumes that are to be delivered to buyers are negotiated and fixed before the growing season begins. The supply agreements, or contracts, constitute a product order and set out the variety, volume and quality of product to be delivered as well as the exporters' payment schedules and commission structures. These agreements tend to be bulky and are normally negotiated and signed in person. Therefore, more than 60% of the South African firms' respondents reported that they did not use email to accept orders from buyers.

In Kenya the way in which firms were communicating with their suppliers/growers was much the same as in South Africa but for different reasons. Telecommunication penetration in rural Kenya is extremely low despite the growth of the mobile communications market. Slightly more than half of the Kenyan firms reported using cellular phones and text messaging to maintain regular contact with their contract farmers or with company representatives.

In terms of accepting orders from buyers, Kenyan firms were more intensive ICT users than their South African counterparts. All the respondents indicated that their

firms 'frequently' or 'always' accepted orders via email from their buyers. In Kenya international buyers place weekly orders for products throughout the growing season. International buyers frequently fax and email their orders simultaneously. When email orders are received from a new customer, the order always is followed-up by a telephone call to the buyer to confirm the order.

Given the way the horticulture industry in South Africa and Kenya operates, the web was not being used to support many transactions (see Table 11). Some 92% of firms 'seldom' or 'never' use the Web to accept orders from foreign buyers. And, 96% 'seldom' or 'never' use the web to place orders with international suppliers.

Table 11: Use of the World Wide Web

To accept orders from international business customers:	**Frequency**	**%**
Always	0	0
Frequently	1	4
Seldom	1	4
Never	24	88
No Response	1	4
Total	**27**	**100**
To place orders with international suppliers		
Always	0	0
Frequently	0	0
Seldom	1	4
Never	25	92
No Response	1	4
Total	**27**	**100**

The Web was not being used very much as a market intelligence mechanism or as a means of finding new customers or new supply sources and only a small percentage of the firms were exploiting the information seeking potential of the Web. 29% of firms indicated that they 'frequently' or 'always' used it to obtain information about their product markets.

In the case of the horticulture sector firms, about one-third had used the Internet to buy and sell products internationally (see Table 12).

Table 12: Use of Internet to Buy or Sell Products and/or Services Internationally

	Frequency	**%**
Have used the Internet to buy or sell (including email)	8	30
Have not used the Internet to buy or sell	18	66
No response	1	4
Total	**47**	**100**

Among horticulture firms in South Africa and Kenya, ICTs are being used to support B2B e-commerce to enable messaging and to a lesser extent for marketing. Only two interviewees, one based in Kenya and one in South Africa, claimed that having access to the Internet and the Web had played a role in increasing the number of international buyers and suppliers with which the firm traded its core products. The primary benefit

of accessing the Internet was the increased ability to communicate quickly with existing and/or potentially new clients.

Conclusion

Governments in developing countries need to be aware of the fact that different types of ICT use create different challenges. The potential for investment in ICTs to lead to productivity gains certainly exists for firms in developing country and emerging market economy markets as it does in the industrialised countries.

However, as is the case in the industrialised countries, that potential cannot be exploited without giving detailed attention to sector specific characteristics of the market structures, supply chains, and the resources available to firms to support their businesses. In poor countries these characteristics must be expected to differ from those in the wealthier countries. This means that the impact of investments in ICTs must be examined empirically in the poorer countries to determine what applications are in place, how they are being used, and with what consequences for firms.

ICTs and their applications remain a costly investment for most firms because of the need to achieve far more than simply connectivity to global networks. ICT applications must be embedded within organisations in a way that does not yield substantially increased costs of coordination both within the firm and between buyers and sellers in the supply chain. Much more systematic evidence on the experience of the use of ICTs and various implementations of B2B e-commerce is needed for firms in developing countries and emerging market economies before conclusions can be drawn about the relationship between ICT investment and productivity at the firm level in these countries.

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