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ICTs for Development: What Prospects and Problems?

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Abstract

Investing in information and communication technology applications in developing countries is receiving considerable attention in policy debates. This paper reviews evidence of the digital divides that continue to exist, and then critically examines some of the optimistic views about the potential benefits of investment in information and communication technologies. Experiences of firms in several developing countries as they begin to consider and implement business-to-business electronic commerce provide a basis for the analysis. The evidence indicates that, while information and communication technology applications are playing a role in supporting the trading activities of firms in developing countries, there are many reasons for the absence of a wholesale shift from conventional trading practices to new forms of electronic commerce – and that these reasons are unlikely to change simply as a result of increased investment in the technologies.

Introduction

Substantial attention is being given to investing in information and communication technologies (ICTs) in developing countries in order to give more people access to applications that have the potential to enhance their use of digital information resources. In the business sector, improved access to the Internet is expected to lead to changes in business processes, and to gains in productivity for firms – and especially for those firms seeking a stronger presence in international markets. This paper provides some insight into why the potential of ICT applications to support business-to-business (B2B) electronic (e-) commerce and Internet based e-marketplaces may not bring substantial benefits – at least not initially – to firms based in developing countries.

The first main section reviews the uneven experience of investing in ICTs – in this case the Internet – in the wealthier and poorer countries of the world. The data provide evidence of the "digital divides" that continue to be present and that create a substantial number of difficulties for those seeking to access new technologies and applications in many parts of the developing countries.

The second section provides a brief discussion of the arguments that are often presented in support of the observation that the introduction of B2B e-commerce will reduce barriers to international trade for firms in developing countries. These observations are contrasted with the suggestion, based on empirical evidence, that many initiatives to use the Internet as a platform for e-marketplace developments do not necessarily provide a foundation for improved access. This is because the costs of services required for participation in external markets are not always reduced – and in some cases may even increase.

The third section provides selected empirical evidence of the reality of B2B e-commerce implementation in three developing countries and two sectors of the economy. This suggests that while ICT applications are indeed playing a role in supporting the trading activities of firms in developing countries, there are many reasons for the absence of a wholesale shift from conventional trading practices to new forms of e-commerce.

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The aggregate data presented in section three are elaborated in the subsequent section by presenting several case examples of the actual experiences of firms. In these cases the relationships between the firms' business prospects in general and their adoption of B2B e-commerce are emphasised. The motivations for, and types of, e-commerce being developed are enormously varied; they rarely conform to the singular visions presented by many advocates of the benefits of ICT investment.

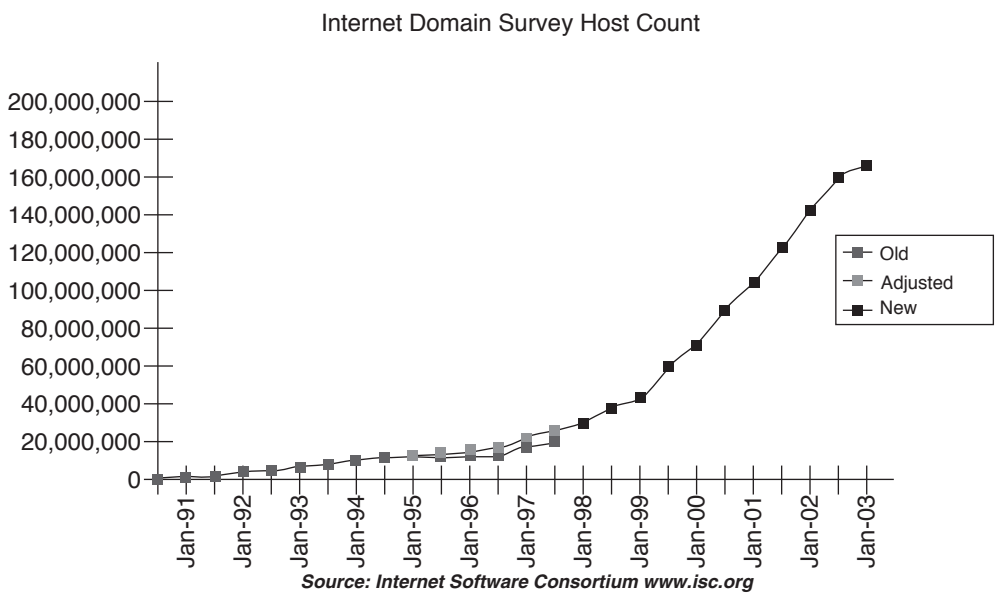
The paper concludes with some observations about the need for continuing empirical research on the actual experiences of firms and on the factors that give rise to both positive and negative experiences of Internet connectivity in support of developing country firms that seek to trade on international markets.

Investing in ICTs for development

The spread of connectivity to the Internet is giving rise to renewed expectations that there will be good opportunities for firms in poorer countries to reap the benefits of global networking. However, barriers to connectivity continue to be substantial as indicated both by aggregate statistics on the spread of the Internet and on the costs of access.

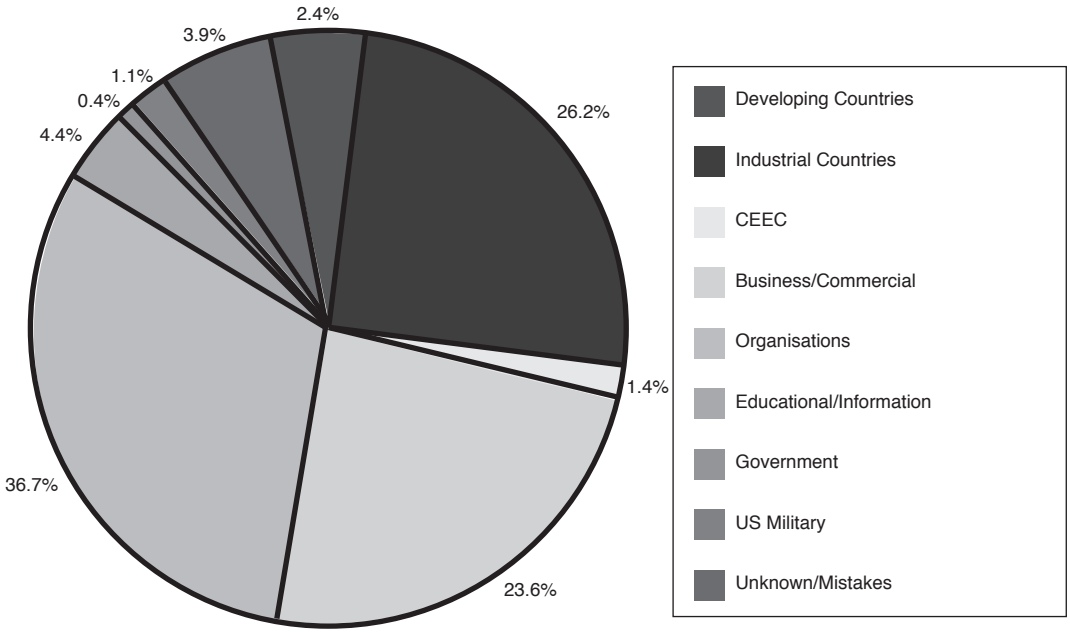
Figure 1.1 shows the rate of increase in the numbers of top level Internet domain name hosts from 1991 to 2003. By January 2003 there was an estimated total of 171,638,297 top level hosts. Growth since 1996 in the numbers of registered hosts that enable access to the Internet has been enormous. However, Figure 1.2 shows the unequal 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 accounted for 26.2% of the total of 171,638,297 top level hosts. Hosts assigned developing country names accounted for only 2.4% of these names and the Central and Eastern European Countries (CEEC) contributed only 1.4% of these names.

Figure 1.1: Internet domain survey host count, 1991-2003



Source: Internet Software Consortium, http://www.isc.org/ds/, accessed on 16 October 2004.

Figure 1.2: Top level Internet domain name hosts by category, January 2003



Source: Internet Software Consortium, http://www.isc.org/ds/, accessed on 16 October 2004.

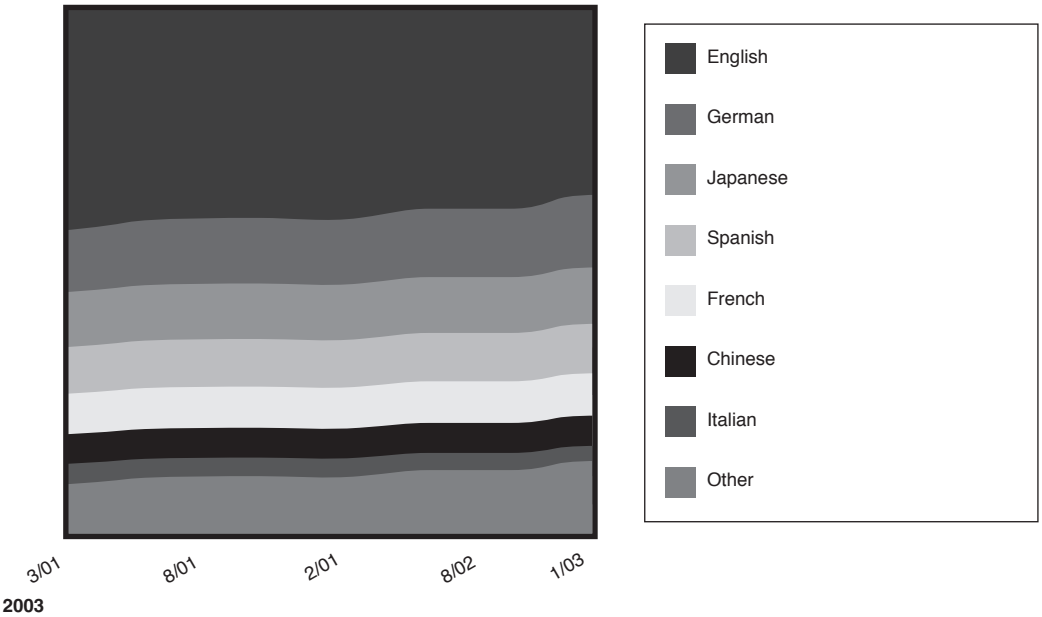
Note: *For more about the Internet domain name survey methodology, which counts the number of Internet Protocol addresses that have been assigned a name, see source.*

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.

Figure 1.2 also shows that the number of hosts in the Business/Commercial (.aero, .biz, .com) and Organisation (.net, .pro, .org, .name, .int, .coop, .aq) categories accounted 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, accounted for only 4.4% of the total. These data show the overwhelming predominance of industrialised countries and the prevalence of commercial and formal organisational uses of the Internet. There is, as many observers have claimed, a "digital divide" between the wealthy and poor countries and, although not indicated by these data, within countries and regions.

It is also widely acknowledged that the majority of the content of the World Wide Web is produced in the English language, creating a barrier for many potential users. Figure 1.3 shows changes in the propensity of Web users to choose to surf the Internet 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 search languages other than English. This would suggest that there are opportunities for other language communities to take advantage of the Internet.

Figure 1.3: Languages used to access Google, March 2001-January



Source: Google, http://www.google.com/press/zeitgeist.html, accessed on 16 October 2004.

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 a *UN Human Development Report* (1999) noted, it should not be assumed that the presence of a network and computers means that they 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 many poor countries as compared to the wealthier industrialised countries (see Table 1.1). The cost of personal computers also can represent more than a year's salary for people in many developing countries.

Table 1.1: Monthly Internet access prices in selected OECD and African countries

OECD[1]	US$	% of GDP per capita	Africa	US$	% 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

Source: Commonwealth Working Group on Electronic Commerce (2000), p. 41.

Note: Comparisons need to be interpreted with caution due to data reliability problems and variations over time.

[1] Organisation for Economic Co-operation and Development.

The continuing presence of a "digital divide" means there is a substantial risk that those without access to the Internet will be marginalised. The extension of global telecommunication networks appears to offer firms in developing countries new means of communication and information exchange, which could enable them to compete on a more equal footing with other firms in world markets. This is because the new technologies have the potential to make possible cost reductions in infrastructure provision and service development. This would suggest that the application of ICTs should enable firms in developing countries to sell their products and services more easily in external, distant markets.

The optimistic view of the potential for ICTs and B2B e-commerce, in particular to open up global markets to developing country firms, rests on the idea that the major obstacle to the efficient exploitation of new markets by these firms 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. As a result, Internet-based B2B e-commerce appears to offer substantial advantages for firms in developing countries (UNCTAD, 2002).

Electronic commerce benefits and costs

If firms in developing countries are to benefit from the implementation of B2B e-commerce there must not only be a reduction in the technological aspects of "digital divides". There is also a need for improved institutional arrangements to support firms' participation in international trade. Most studies of the potential of ICTs for developing countries focus on the indigenous constraints with which firms located in these countries must contend. However, firms must also contend with the many different interactions between connectivity, access, network security, capability and skills sets, market structures and governance structures, as well as the specific regulatory environments that influence how access arrangements and business strategies influence whether firms can participate more effectively in the global economy.

A key idea that influences discussions about the potential of the Internet to support gains in productivity for firms in developing countries is the notion that the use of the Internet's applications will lead to significant decreases in transaction costs associated with trade across organisational and geographical boundaries. The adoption of ICTs is often expected to facilitate closer integration of the value-added chain, allowing firms to reduce the costs associated with selecting suppliers, and negotiating and fulfilling contracts. Such a reduction in the costs of co-ordinating trading relationships is expected to encourage firms to expand the number of transactions they conduct across both organisational and geographical boundaries.

Although this idea has been promoted by a host of development assistance agencies nationally and internationally, it downplays the importance of organisational procedures and processes, as well as the dynamics of most international trading relationships. The idea is symptomatic of a tendency to discuss ICTs and "the Internet" as simple appliances – rather than as complex means of networking that may or may not lead to more effective and efficient trading relationships. The failure to consider the processes and practices that underpin ICT use in any particular trading context can lead to overestimates of the potential savings and to underestimates of the costs that firms in developing countries may experience when they attempt to use new technologies to participate in global trading networks (Maitland, 2001).

Empirical studies of the actual experiences of firms provide one means of assessing the conditions under which assertions about the potential gains for firms from the use of ICTs can be examined. While it is clear that in some cases the development of B2B e-commerce applications can reduce the costs of making firms known to each other, there are many additional processes that need to be in place to support international trade, even when potential buyers and sellers are known. For instance, many implementations of Internet-based e-commerce do not offer services such as payment and settlement mechanisms, insurance, logistic systems, inspection services, certification of quality or customs clearance services. Without low cost access to such services, developing country firms may find it prohibitively expensive to exploit external markets.

A study by Humphrey *et al* (2003) of Internet-based B2B e-commerce examined the services provided by e-marketplaces that are accessible via the Internet. Tables 1.2 and 1.3 summarise the types of services that were found to be available on websites in 2002-03. Overall, the services required by firms to support international trade were extremely limited in terms of the offerings available directly from the e-marketplace providers. The ability of buyers to obtain product samples and/or laboratory reports about the horticulture products they may wish to purchase was found to be extremely limited, for instance. Table 1.3 would suggest that such services may be somewhat more accessible for buyers in the garment sector than in the horticulture sector. In both sectors, in most cases when facilities inspection services and information about product certification were accessible, this was almost always dependent on the use of third parties as intermediaries.[2]

[2] See also Paré (2003).

Table 1.2: 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	2B	29	9	5	3
Request for Quotes (N=10)	6	4	3	0	1	3	5D	10	8	2	1
Auction (N=8)	3	5	4	0	0	0	2E	6	3	0	1
e-Retail (N=7)	0	7	4	0	0	0	1H	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%)***

Source: Paré (2003).

[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 licences 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 1.3: Product and partner information in garments

Type of e-marketplaces (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%)***

Source: Paré (2003).

[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 (International Organization for Standardization) certified, as well as for information about 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.

When firms are attempting to trade in international markets a central aspect of the information required for buying or selling a product is the product and partner information to which a firm has access before deciding whether to place an order. The nature of this information influences the costs associated with negotiating and fulfilling a contract. The extremely limited amount of information that firms have at their disposal before entering into a trading relationship within an Internet-based e-marketplace environment suggests that, in contrast to the expectation of transaction cost theory, these marketplaces 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 could support the trading needs of firms in developing countries. In most cases the firms using e-marketplaces need to make decisions for themselves about the settlement mechanisms to use, whether to employ third parties to make assessments of the creditability and legitimacy of trading partners, and about how to arrange for delivery of the product once a sale has been agreed. As a result, using these marketplaces the firms bear the risks and costs associated with trading – just as they do in the offline world of trading.

The reality of B2B electronic commerce experience in developing countries

In addition to the study cited above, Humphrey *et al* (2003) examined the B2B e-commerce experiences of a sample of firms in the horticulture and garments sectors in Bangladesh, Kenya and South Africa. This research was based on interviews with senior management representatives of 74 enterprises. An additional 37 key informant interviews with industry experts, business associations, e-commerce solution providers and government officials were also conducted across the three countries. Of the 47 interviewees from garment firms, slightly more than half were linked to enterprises employing in excess of 1 000 people. In the case of the horticulture firms, more than two-thirds of the 27 interviewees were linked to enterprises with more than 1 000 employees (including casual labourers). Given their size, and the fact that the sample selection was biased towards firms that were already involved in international trade, there were reasonable grounds to expect that the majority of firms would have views about, and/or experience of, B2B e-commerce applications.

Garment sector experience

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

Although it is widely acknowledged that global buyers are raising their expectations about the range of services and characteristics that potential supplier firms should have, all the interviewees in this sector indicated that implementing B2B e-commerce was not yet a condition for participation

in international trade within their supply chains. With the exception of one interviewee from Kenya, all respondents reported that they had experienced no direct pressure from their buyers to make greater use of ICTs. However, interviewees 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. Interviewees commented along the following lines:

> The lack of electronic 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 electronic commerce systems.
>
> Ironically, this company was prepared to make greater use of IT related solutions, but our UK-based customers weren't.

There were two main reported motivations for adopting B2B e-commerce. The first was the belief that the implementation of such technologies would facilitate and enhance the growth, development and learning potential of a firm in the long term. The second was the perceived need to keep up with what other firms were doing. The main pressures that the interviewees reported experiencing from buyers concerned price reductions and technical issues such as improved fabric and garment performance.

More than half of the firms in this sector had no company website, and they relied on online directory listings only to a very limited degree. Although none of the Kenyan firms had company websites, approximately 57% of the South African firms and 57% of the Bangladeshi firms had sites. These were mainly static, rather than interactive, sites offering few capabilities beyond email links. They tended to be used as marketing tools to demonstrate the companies' production capabilities and to provide product (excluding price-related information) and contact details. Despite the fact that all of the firms with websites were receiving product enquiries, none had succeeded in generating sales solely from the information available on their sites. Only one interviewee, from a South African firm, indicated that his firm was constructing a B2B transaction-based website; and one of the Bangladeshi firms was examining the possibility of creating such a site.

All the interviewees reported that their firms used computers and had connections to the Internet. Connections were established using analogue-based modems or an ISDN (Integrated Services Digital Network) link (see Table 1.4). Only three of the firms – all based in Bangladesh – reported using high-speed Internet connections.

Table 1.4: Type of Internet connection – garments

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

Source: Humphrey *et al* (2003).

Only a third of the interviewees noted that their firms had installed an Intranet (see Table 1.5). 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 to allow access to databases. None of the firms had 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 Bangladeshi, firm interviewee/s mentioned that their firms were accessing the extranets of their buyers.

Table 1.5: Adoption of Internet technologies – garments

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

Source: Humphrey *et al* (2003).

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

Despite remaining heavily dependent on the telephone and fax, interviewees saw email as a means of significantly reducing the costs of communication (see Table 1.6).

Table 1.6: Use of email – garments

To maintain contact with buyers/supplier:	**Frequency**	**%**
Always	33	77
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	0	0
No response	1	2
Total	**47**	**100**

Source: Humphrey *et al* (2003).

The majority (79%) of the interviewees in this sector indicated that their firms had never used the Web to purchase or sell any of the firm's products internationally (see Table 1.7). Two South African firms reported that they had used the Internet to link into the e-procurement systems of large United States (US) retailers in order to bid for contracts.

Table 1.7: Use of Internet to buy or sell products and/or services internationally – garments

	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**

Source: Humphrey *et al* (2003).

The evidence suggests that among the garment producing firms in Bangladesh, Kenya and South Africa, B2B e-commerce of some kind was being used to enable messaging and marketing and for processes relating to preparing transactions and supporting existing customers and suppliers.

Horticulture sector experience

In the horticulture sector a combination of product innovation, a need for reliable delivery of consistent-quality products, and concerns about pesticide residues, environmental impact and labour standards, has been encouraging the development of tightly co-ordinated supply chains within the industry. In today's horticulture supply chains large retailers do not source horticulture products without conducting extensive audits of the suppliers' premises and systems with respect to quality, management and traceability. Often, the product is customised in accordance with the retailer's requirements. The majority of firms in the horticulture sample of this study were members of tightly consolidated or integrated agribusiness value chains.

All the Kenyan and South African interviewees noted that their firms had experienced no direct pressure from their buyers to make greater use of e-commerce. There was consensus among the interviewees in the sample that B2B e-commerce needs to prove its worth before extensive investment occurs. The motives for adopting B2B e-commerce in this sector included the following. First, these technologies (and in particular email), were seen as effective means of reducing communication costs. In addition to cost savings, interviewees from the Kenyan firms stressed that email offers companies an effective means of circumventing the unreliability of Kenya's telecommunications infrastructure. The implementation of email and Internet access were also perceived as enabling firms to keep up with what others were doing.

The majority – 81% – of the horticulture interviewees reported that their firms had no website. Only 13% of the Kenyan interviewees had a company website, and an additional 13% claimed that they were developing one. Some 27% of the Kenyan interviewees noted that, when dealing with potential buyers, they often looked to see if the company had a website as this was seen as offering a degree of credibility. Within the South African sample, 25% of the interviewees indicated that their firms had a website. As in the garment sector, these sites were offering few interactive capabilities beyond email. All the interviewees with websites reported that they had received varying numbers of enquiries, but none had succeeded in generating sales solely from the information available on these sites.

All the interviewees 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 ISDN (see Table 1.8). 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 café to minimise access costs.

Table 1.8: Type of Internet connection – horticulture

	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**

Source: Humphrey *et al* (2003).

Only a small number of firms – one in South Africa and one in Kenya – had implemented an Intranet (see Table 1.9). These were used to enable staff to read company information and to access databases. None of the firms had an extranet.

Table 1.9: Adoption of Inernet technologies – horticulture

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

Source: Humphrey *et al* (2003).

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

The horticulture firm interviewees reported that the most frequently used Internet application was email (see Table 1.10).

Table 1.10: Use of email – horticulture

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**

Source: Humphrey *et al* (2003).

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 firm interviewees 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. Telecommunications penetration in rural Kenya was extremely low at the time of the study despite the growth of the mobile communications market. Slightly more than half of the Kenyan firms reported using cellular telephones 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 interviewees indicated that their firms "frequently" or "always" accepted orders via email from their buyers. In Kenya international buyers were placing weekly orders for products throughout the growing season. International buyers were faxing and emailing their orders simultaneously. When email orders were received from a new customer, the order was always 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 1.11). Some 92% of firms "seldom" or "never" used the Web to accept orders from foreign buyers. And 96% "seldom" or "never" used the Web to place orders with international suppliers.

Table 1.11: Use of the World Wide Web – horticulture

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**

Source: Humphrey *et al* (2003).

The Web was not being used very much as a market intelligence mechanism, as a means of finding new customers or as a new supply source. Only a small percentage of the firms were exploiting the information-seeking potential of the Web. Some 29% of firms indicated that they "frequently" or "always" used the Web 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 1.12).

Table 1.12: Use of the Internet to buy or sell products and/or services internationally – horticulture

	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**

Source: Humphrey *et al* (2003).

Among horticulture firms in South Africa and Kenya, B2B e-commerce applications were being used 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 Web had played a role in increasing the number of international buyers and suppliers with which the firms traded. The primary benefit of accessing the Internet was seen as the increased ability to communicate quickly with existing and/or potential clients.

The aggregate data from the sample of firms in this study provide an overview of some of the main opportunities provided by Internet access for the firms in the two sectors. The interviews also provided considerable insight into the perceived relationships between investment in various forms of B2B e-commerce and the future prospects of internationally trading firms in the two sectors. The next section of the paper draws illustrations of these relationships from a selection of firms in the larger sample.

Relationships between business prospects and B2B electronic commerce

The examples of firms in this section illustrate the potential roles and difficulties confronted by website operators that aim to support internationally trading firms, the role of intermediary organisations, the goals and problems of entrepreneurs, and some of the pressures towards stronger supply chain integration.

The role of website operators ...

Company A was operating as an Internet site for the South African horticulture sector. It was catering to domestic producers and was majority owned by a South African connectivity provider.[3] In 2002 it employed about 10 people. Users of the site were expected to have some existing knowledge of the South African horticulture sector. The main part of the business was the provision of web links to information content and revenues were being generated through advertising. A second revenue source was a subscription service, in terms of which Company A sold content and served as an information "broker" for a limited number of paying subscribers. A third revenue source was in the planning stage: an online auction for three types of agricultural commodities – fresh produce, grains and livestock. A fourth segment of Company A was focusing on the development and sale of e-procurement systems, e.g. bespoke software solutions. As of January 2002 the average number of visitors or hits on the website was 120 000 per month or 6 000 per day. This was not regarded as "huge" but rather as reasonable, given the relatively low levels of connectivity in the sector.

An auction platform was in the development stages and was to be restricted to buyers and sellers based in South Africa initially. At the time of the interview, Company A was experiencing many technical problems with the auction platform; it was not functioning properly because the user interface was very complicated. This was said to be partly because the platform was being developed from the "bottom up" and was not modelled on any other online auction.

This company had been started in 1999 by another firm in the agricultural trade magazine business and, according to the interviewee, "without the support of the printed media, it probably wouldn't have survived". Despite its business schemes and high expectations, the original firm soon became a financial "black hole". Company A, a telecommunications connectivity provider, took over without changing the business focus. It was acknowledged that Internet connectivity within South Africa was a problem and that Web access was slow and expensive. The interviewee indicated that there was an urgent need for a platform like this to be available within South Africa but that the producers in the South African horticulture market were not very dynamic. As he put it, "the industry is perhaps naive and uninformed. The potential benefits need to be proven".

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3 Interview notes in support of Humphrey, J *et al* (2003) in collaboration with the Department of Agricultural Economics, University of Stellenbosch, South Africa.

Eventually, an online auction was expected to operate daily and Company A's role was to be that of a "bank" providing a service to sellers by requiring that buyers guarantee they would have the funds for prospective purchases. The interviewee expected that the technical side of the online auction would be a key determinant of its success. In addition, assuming that trust, confidentiality and payments could be handled efficiently, the auction was expected to take off because intermediary agents were said to be charging too much for their services.

Company A was developing an e-procurement system, which was expected to allow farmers to log into the system to browse catalogues from suppliers and to place orders. In 2002 the target was not individual farmers but buyer groups, who were expected to see price decreases as a result of consolidating their orders.

Company A was also developing other B2B e-commerce applications. For example, it had developed an in-house software application for internal operations. It had outsourced the development of the software package to a local firm. The package was supporting bar-coding for product distribution and generating invoices when shipments were received. The interviewee said that this was "a nightmare I started" because it was extremely difficult to create a bar code containing all the information required by the parties in the supply chain.

This interviewee's view of B2B e-commerce was that it would grow – but only within certain limits; he suggested that it would never become entirely seamless because "if you shorten the supply chain you will likely short-change yourself". For this company, 60-70% of its costs were accounted for by freight costs. As far as the interviewee was concerned the "most significant electronic commerce innovation was the introduction of digital cameras". The products handled by this company included both those that were highly standardised and those that were very distinctive, and they were part of their core and non-core businesses.

New sources of supply and access to potential export markets were being developed on the basis of market analysis by the buyers and suppliers of the firms' production, quality and management systems. Despite the availability of ICTs, the means of making these assessments continued to be dominated by social and professional considerations and by face-to-face interactions. B2B e-commerce was being structured in a specific way through the use of new information channels to "support" the completion of transactions. The transactional dimensions of buyer and seller trading were still taking place offline, where deals could be negotiated on the basis of pre-established trust relationships.

The role of intermediaries ...

Company B was a South African garment exporting agent with eleven employees; the company was owned by a large Hong Kong-based international trading group.[4] Company B was willing to become involved in any aspect of the supply chain except manufacturing. In South Africa its primary role was that of quality assurance. The South African office was relying on a local dial-up service to the Internet and each individual in the office had a 56K modem connection.

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4 Interview notes in support of Humphrey, J *et al* (2003) in collaboration with the School of Development Studies, the then-University of Natal (now KwaZulu-Natal).

Email was providing the most frequently used means of maintaining contacts with suppliers but documentation was still being conveyed on a physical basis, i.e. paper hard copies. The interviewee from Company B estimated that about 90% of garment factories in the Southern African Development Community had access to email; and he said, "We don't want to work with the other 10%", not because they were unconnected, but because they were micro firms that might be engaged in questionable practices, producing goods of questionable quality. Company B had email contacts with all of its customers and there was a heavy dependence on the use of email attachments.

Overall, foreign buyers were thought to be becoming more ICT sophisticated but many buyers were said to be not very sophisticated in terms of their use of ICTs. In early 2002, 90% of buyer needs could be taken care of through the use of email.

It was possible to contact Company B via the Web but it was not being used as a research tool. This was because some of the firms in South Africa did not have any Web presence. In cases where there was a company website it was being used as a marketing tool. Company B had established a website in the US where registered customers could do "transactions" – in this case, place orders. This was seen as a good strategy for attracting smaller customers because the site offered smaller firms a cost-effective way of doing business. The only customers that could access the site were those that had already been doing business with Company B, and the volumes of trading were said to be very low.

This interviewee observed that garment factories were attempting to keep overheads as low as possible and that there was no great pressure on garment producers to make greater use of B2B e-commerce when exporting to international markets. He argued that, for garment manufacturers, an intermediary like Company B would be more important than the use of a B2B marketplace. He thought that ICTs and the Internet were useful tools for seeing what is on offer and saving on travel-related costs. This interviewee attributed resistance to the use of ICTs to "mature managers" who lack an understanding of ICTs. The cost of ICT in South Africa was not perceived as a major factor – "it's not that expensive here in terms of overall expenditures" – and the skills required to make greater use of ICTs were thought to be present in the country. He said that:

> In terms of ICT, there is a lot of progress being made on the processing side of things in terms of customers and suppliers receiving information. Email is faster, easier, and quicker than fax. Virtually no progress is being made at the transaction level. Doing deals is another story; people want personal contact.

Entrepreneurial initiatives ...

Company C was a South African company run by someone who regarded ICT applications as a hobby and who had developed a substantial database of international garment manufacturers.[5] The database was used by other organisations and was seen as a key feature of a new South Africa-based fashion industry online presence. The database project had begun as a result of personal interest but the initiative had also started because the business was functioning as a recruitment agency for the garment sector. The database included contact and product information for garment firms (apparel, footwear, textiles) in a large number of countries. The interviewee

5 Interview notes in support of Humphrey, J *et al* (2003) in collaboration with the School of Development Studies, the then-University of Natal (now KwaZulu-Natal).

observed that, “Originally I thought that it would be a static site. It started as a joke and turned out to be a nightmare”.

The database information was collected by contacting foreign embassies and consulates to obtain trade directories. Contacts were also established with national garment sector organisations and associations and from Yellow Pages, directories and by word-of-mouth. The two countries for which it was the most difficult to get information were reported to be the US and the United Kingdom (UK).

This interviewee claimed that the garment sector in South Africa was not set up to deal with B2B e-commerce in the form of Internet-based e-marketplaces. In this interviewee’s opinion, in the case of most firms: “unless they want something, you have to bang on their door and drag them into the 21st century”. An ICT solutions developer firm had taken the database on board to develop a fashion industry website. The idea was to provide an interface for conducting e-commerce on the Internet by offering an e-marketplace for posting trade leads and requests for quotes for the international garment sector. The plan was to “go live” only as an information site and then to move towards providing B2B and customer-related e-commerce services. The interviewee argued that it would be up to individuals and firms to complete their deals: “we won’t mediate transactions. We’ve got the technology but the human element behind the trade is the problem”.

The interviewee argued that in South Africa the Internet was developing as an information medium rather than as a business tool. Part of the reason for this was that the cost of high-speed connections was prohibitively high and small and medium-sized enterprises could not afford dedicated lines.

Towards supply chain integration ...

Company D was one of the largest horticultural exporters in Kenya. It was producing fresh vegetables and flowers. With some 5 500 employees, the firm was growing a lot of its produce on its own farms and also had processing facilities. Company D was managed by a single management structure and had an annual turnover in excess of £35 million in vegetables alone. It was exporting about 95% of its produce to the UK supermarkets under contract and the rest to continental Europe. The company was importing seeds from the US and Europe, and chemicals, fertilisers and irrigation equipment from Israel.

In early 1992, this company was using an analogue modem connection to the Internet and was using the Web to buy or sell products – although it had a website for promotional purposes.

When the business first started, Company D used the telephone and telex to keep in touch with buyers; the latter was then substituted by fax. In early 2002 email was being used extremely frequently and this had led to a significant reduction in telephone costs. For vegetable orders, a spreadsheet was being sent to Company D by the buyer’s representative as an email attachment on a weekly basis. For each product line, and for each customer, a schedule for the following week would specify the weight, the sell-by date, the price to be put on the packs, the number of the containers for the produce and the number of punnets per container. This information was specified for each day of the week. The spreadsheet also specified the date when the product should be picked in the fields and the date that it should arrive on the supermarket shelf.

Almost all of Company D’s product range was sold in some kind of packaging, mostly in trays. The specifications for the products to be supplied (size, packaging, whether they are chopped, topped-and-tailed, etc.) did not vary. Many products were being packed – including bar-coding and labelling – in Kenya.

An email to the UK importer provided the necessary information about shipments; the email specified the position of each pallet on the plane, the items on each of the pallets, and the shipment, broken down by firm and by product. This information was input at the airfreight depot, taken across to headquarters and emailed to the UK. A similar system was operating for flowers. When there were problems with products, a digital photograph would be sent to Kenya to illustrate the nature of the specific problem.

This company had a strong preference for contracts that would offer a fairly stable price. There was no interest in selling flowers through auctions or in selling through intermediaries who would charge a commission. An interviewee explained that the company's sales depended on trust and reputation and that supermarkets would not buy products on the Internet "because traceability is essential".

Company E was another vegetable and flower producer based in Kenya with some 3 000 employees and a turnover in excess of £15 million annually. Company E was part of a group of companies operating under the same management. Some 80% of its products were being exported to the UK and the rest to continental Europe. Company E was importing planting materials from the Netherlands and most of its chemicals, fertilisers and seeds were purchased locally, although some were being imported from Israel, South Africa and the UK.

At the time of the interview in early 2002 the company had an analogue modem link to the Internet, and an "always on" connection was being investigated. A digital line was to be installed at the airport and Company E expected its Internet connection to be upgraded at the same time. The company would have liked to access the Internet via a direct satellite link but was unable to do so despite the fact that it was using satellite links for most of its UK telephone calls. This company was making extensive use of email to maintain contacts with its buyers and suppliers and to place and accept orders. In the view of one interviewee: "email is the best thing that has ever happened to us ... The fax is virtually dead".

Company E was receiving 15 to 30 emails per day from one UK importer but the interviewee said that contact with supermarket buyers continued to be face-to-face. Production schedules, orders and delivery information were all being co-ordinated by email. Company E was working on the basis of yearly, weekly and daily planning with an annual programme agreed in advance. Like Company D, Company E was receiving a weekly order schedule in the form of a spreadsheet attached to an email. This was subject to frequent changes received by email from the importer. Similarly, each week Company E was sending the UK importer an email attachment setting out a three week rolling forecast of the produce the company expected to have available for export.

This company did not have a website and it was observed that using the Web to access information was very slow. The company had a small amount of excess produce, which was being traded in the physical Dutch flower auction, and the results were thought to be very poor in terms of price. In the future, it was thought that the Kenyan Flower Council might begin to host information about product availability on its website.

An exception to this company's non-use of the Internet arose when a buyer required it to use some new machinery for chopping and dicing its produce. Company E's UK importer provided it with a list of websites where it was possible to find out about machinery specifications and prices. However, it was not envisaged that the Internet would be used to integrate information provided by email about production schedules, order quantities, etc., as the interviewee said that this information was needed by only one person in the company.

This company was not experiencing pressure from its buyers to make greater use of B2B e-commerce. However, the interviewee had heard that a UK buyer was setting up an Internet-based system to improve the timeliness of new product launches. Since many people are involved in such launches – packaging, chefs, label suppliers, artwork, etc. – Internet-based access to information was regarded as a good thing so that everyone would be aware of where the product launch is: "It will prevent 'Chinese whispers'".

This interviewee also observed that its French marketing agent was working on a website as a place to exchange information between buyers and consumers. In this case, the produce from a particular field would have a unique label. Customers would go to the site and key in the label to obtain information about the day the product was arriving. A restricted-access layer of the website would provide information about pesticide programmes and what had been sprayed on the crop. A demonstration using one of Company E's products was expected to enable the marketing agent to attract venture capital to support the idea. Company E's representative did not know what the business model was and was certain that neither his company nor the supermarkets would be willing to pay for this service.

Tighter supply chain integration is not a straightforward matter of introducing new software or network applications. It depends upon the specific positions of buyers and sellers and on the characteristics of the sector concerned.

Conclusion

Governments in developing countries need to be aware that different types of ICT use create a variety of challenges for firms and other organisations. The potential for investment in ICTs and B2B e-commerce to lead to productivity gains certainly exists for firms in developing countries. However, as is the case in the industrialised countries, that potential cannot be exploited without paying detailed attention to sector-specific characteristics of the market structures, supply chains, and the resources available to firms to support their businesses. In developing countries these characteristics must be expected to differ from those in wealthier countries. This means that the implications of investments in ICTs must be examined empirically to determine what applications are in place, how they are being used and with what consequences for firms.

The aggregate data and the selected experiences of firms reported in this paper provide substantial evidence of the variety of ways in which the spread of the Internet and e-commerce is influencing the international trading behaviour of firms in the three countries and two sectors examined. This would suggest that there is no single recipe or template for B2B e-commerce that is likely to enhance either firm or sector performance in international trade. Nevertheless, it is apparent that firms are relying to an increasing extent on network connectivity of one form or another to maintain the links with upstream buyers and downstream suppliers. It is also clear that whatever the benefits of Internet connectivity, face-to-face meetings and negotiations continue to be very important. These appear to be complementary to the application of new technologies and networking applications; new technologies do not substitute for them in most instances.

Despite their declining costs, ICTs and their applications remain costly investments for most firms in developing countries because of the need to achieve far more than simple connectivity to global networks. Applications have to become embedded within organisations in a way that does not

result in increased costs of co-ordination – both within the firm and between buyers and sellers in their supply chains. More systematic evidence regarding the experience of the use of various implementations of B2B e-commerce is needed for firms in developing countries before robust conclusions can be drawn about the relationship between investment in ICTs and B2B e-commerce applications and productivity at the firm level in these countries.

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