E-commerce: Cyber- and Physical Environments

HARRY BOUWMAN

Expectations with regard to e-commerce in Europe run rather high. European and national programmes aim at the development of electronic markets and information structures that support commercial activities. Forecasts show enormous markets and turnovers. Although a lot of case material is available, little research is reported on the actual developments of electronic markets rather than the predicted or expected developments. Research into actual opportunities, limitations and developments with regard to e-commerce is necessary to assess the potential of new ways of doing business. E-commerce is defined as an activity within a traditional business-to-business value chain, and e-commerce as part of the developing value chain of offering access to the Internet for consumers and businesses. One of the assumptions is that e-commerce is global in nature. This contribution discusses this proposition and addresses whether the opportunities of e-commerce shouldn’t be looked at from a more local, regional or national level. Two case-studies are presented. Although the scope of the two cases is different, the main focus is comparable: the embedding of e-commerce within a specific geographical area.

E-commerce Internet in b-to-b access value chain - value chain
Regional Case 1
European Case 2 Case 2

The first case deals with the development of e-commerce in a regional environment. The research is based on a survey among 230 ICT- and ICT-related organizations within a main metropolitan area in the Netherlands. It was expected that the ICT-industry, given the intangible nature of the larger part of their products and services, would be early adopters of e-commerce and e-commerce related business practices. The survey deals with regional orientation, the embedding of individual companies in the regional value chain, orientation towards the local knowledge infrastructure, and the use of Internet and e-commerce. The goal of the study was to analyse the actual state of the art and the potential of e-commerce for the regional ICT-industry.

The second case deals with the Internet access value chain in six European countries (Finland, France, Germany, Italy, Netherlands and the UK). The study was done by a consortium of Databank Consulting, TNO-STB and Idate. Data were obtained via:

Abstract

One of the assumptions is that e-commerce is global in nature. This contribution discusses this proposition. The question is addressed if the opportunities of e-commerce shouldn’t be looked at from a more local, regional or national level. Two case-studies are presented. Although the scope of the two cases is different, the main focus is comparable: the embedding of e-commerce within a specific geographical area. Increased awareness of potential benefits and possible solutions should be increased.

Author

Harry Bouwman
(h.bouwman@sepa.tudelft.nl) is Associate Professor Information Communication Technology at the Delft University of Technology, the Netherlands, at the Faculty of System Engineering, Policy Analysis.
• a survey of Telecommunication and Internet Backbone operators (based on 17 face-to-face interviews);
• a survey of European Internet Service and Access Providers (61 Internet questionnaires); and
• a survey of professional, business and organizational content providers. The survey was based on 317 telephone interviews of professionals, small and medium enterprises (SMEs), educational and cultural organizations (schools, universities, libraries and museums), and public administrations with a website.

The case-study presents material from these three surveys. The goal was to describe the Internet Value Chain and its future development in Europe. Central questions were, among others:

• to what degree can national, regional and local differences be observed within Europe?
• which trends can be foreseen regarding the development of e-commerce, from the perspective of both the value chain in which the involved corporate content providers (mainly SMEs) are active and that of actors in the Internet Value Chain?
• what is the relationship between local, regional, and national orientations and e-commerce?

THEORETICAL FRAMEWORK

Two approaches are dominant within the context of e-commerce and geographical dimensions. First we deal with approaches in which the concept of Electronic Commerce is central. Conceptualization is related to organizational issues and how organizations (i.e. businesses) deal with information and communication technology. The second approach is oriented more to spatial implications of information and communication technology. Both approaches can be related to transaction, and coordination costs perspectives. We deal first with approaches from the organizational and transactions costs perspective.

E-commerce: Organizational and Transaction Perspective

In some studies e-commerce is associated with all activities within organizations and businesses, such as research and development, support, marketing, and sales (Crocker 1997). Others focus on security, cryptography, electronic currency and payments. Not only is the scope of e-commerce broad, the concept in itself is also defined sometimes in general terms. Kalakota and Whinston (1997) make a distinction between definitions from a communications, business process, service and online perspective. In our perspective the business definition is most appropriate. Electronic commerce can be defined as any form of business transaction that is conducted electronically, using data- or telecommunications networks. Such transactions occur between companies, between companies and customers, and between companies and public administration. A distinction should be made between electronic trading of physical goods and services (tangibles) and electronic trading of information-based content that can be delivered directly through the network (intangibles, like images, voice, text, and software).

ICT and Organizations

Information and communication technologies enable the improvement of internal efficiency and the effectiveness of organizations as analysed by Barras (1986). These are the first benefits that will be achieved by introducing information and communication technology in organizations and businesses (compare first-order effects, Sproull and Kiesler 1991). According to Barras’s reversed product cycle, the next step is service innovation (compare second-order effects, Sproull and Kiesler 1991; impact-value framework, Hammer and Mangurian 1987; OTA 1990), most notably in the process of customer–supplier interaction (see Figure 1).

Internet is one of the dominant drivers behind innovation in customer relations. New service concepts are becoming possible due to the increasing proliferation of the Internet. In general, it can be observed that many commercial but also governmental organizations are at this moment struggling with such questions as: how to connect to the customer; how to be accessible; and how to reap the benefits of information and communication technology when communicating with their environment, i.e. customers, citizens.

In most approaches to electronic commerce the global scale of developments is stressed (for example: http://www.cordis.lu/esprit/src/ecomint.htm; OECD 1997; Hulsink and Van Bolhuis 1998; Ministerie van Economische Zaken 1998). Electronic commerce is seen as a means to implement and support changes on a global scale. It enables companies to be more efficient and flexible in
their internal operations, to work more closely with their suppliers, and to be more responsive to the needs and expectations of their customers. It allows companies to select the best suppliers regardless of their geographical location and to sell to a global market. The supplier has the opportunity to be globally present, and the customer has a global choice. The boundaries of electronic commerce are, in this vision, defined neither by geography nor national borders, but rather by the coverage of computer networks. And since networks are ubiquitous and global in scope, electronic commerce enables even the smallest supplier to achieve a global presence and to conduct business worldwide. The customer benefit is global choice. A customer can select from all potential suppliers of a required product or service, regardless of their geographical location.

Electronic Markets and Hierarchies: Transaction Cost Perspective

The goal of most electronic commerce approaches is to reduce problems in co-ordination of economic activities. In general, these activities include initiation, negotiation, completion, control and adaptation of transaction relationships (Wigand, Picot and Reichwald 1997). Problems can arise from inefficient market structures and/or the inadequate operation of technologies. Transaction costs depend upon the coordination mechanism being used. Williamson (1975) has stated that transaction costs will rise when the unpredictability and uncertainty of events increases, and/or when transactions require very specific investments, and/or when the risk of opportunistic behaviour is high. Williamson argues that the higher the transaction costs are, the more likely transactions will take place within hierarchical relations. If transaction costs are low, that is straightforward, non-repetitive and require no transaction-specific investments, then the market is the most likely form. Information and communication technologies can be related to these types of coordination. Electronic markets are developing on the Internet; hierarchies are reflected by Electronic Data Interchange applications and Intranets.

In electronic markets coordination within a value chain is dependent on supply and demand, and on transactions between involved parties. The market defines design, price, quantity and terms of delivery. The customer has to make a choice from many opportunities and favours the solution that fits their needs. Coordination costs in a market are high. Costs are related to information-processing directed to control over labour, human capital and machinery, selection of suppliers, contract-negotiations, financial transactions, etc. Markets are more information intensive than hierarchies.

In electronic hierarchies coordination in the value chain is controlled by higher management or organizational layers or by dominant actors in a value chain. Management decisions are decisive for price, quantity and terms of delivery. Selection of suppliers is not at stake. In general, transaction are made within an established relation and according to standard procedures. Although markets are information intensive, hierarchies do not always lead to the choice of the cheapest suppliers. Information and ICT are important components of coordination costs and can have cost-saving effects.

Geography and Transaction Costs

Networks enable communication over longer distances, independent of the environment in which the organization operates. Nevertheless, spatial criteria do play a role. Cities are the nodes of multiple infrastructures among which tele- and data-communication are initiated: the demand for capacity, connections, access and services is articulated in cities. Cities are developing into centres in which services, shops, banks and offices are dominating. Arguments for the articulation of these organizational and technological innovations in metropolitan areas are, according to Hepworth (1989):

- the greater information intensity and spatial compactness of firms, which contribute to an increased and localized demand for advanced services and highly skilled labour;
- the operational efficiency of flexible production systems, which require strong information linkages and spatial proximity.

Transaction cost-minimizing behaviour is facilitated not only by information and communication in general, but also by spatial proximity. There are two arguments to be made. In the first place the specificity of products (asset, time or site specificity) and the complexity of the information transferred makes it necessary for the seller and buyer to be physically close or even on the same spot, i.e. ordering a pizza, buying a house. Barriers due to logistics, consumption and after-sales services of physical goods and personal service lead to a limited geographical scope of e-commerce. The second argument has to do with the nature of the processes, especially in the case of negotiating and monitoring. These processes or tasks can be perceived as complex, and therefore information-rich communication channels, such as face-to-face meetings, are preferred over computer-mediated communication (Daft and Lengel 1984). Partly this is due to lack of trust. These barriers are also limiting the geographical scope of e-commerce. Both arguments lead to the assumption that combinations of e-commerce and physical trading within a limited spatial domain are more likely to occur. Internet is being used for reducing searching costs, but negotiations and quality control are done on-site. Physical closeness is a unique resource that cannot be replaced by virtual presence in all situations. Furthermore, this tendency is reinforced by cultural barriers (as indicated by language and cultural orientation). The cases presented next deal
with the degree to which physical closeness plays a role with regard to e-commerce.

**CASE 1: E-COMMERCE IN A REGIONAL ENVIRONMENT**

In this case-study we were interested in e-commerce and the regional orientation of the ICT-industry. The goal of the study was to analyse the actual status of implementation and potential development of e-commerce for the local ICT-industry. It can be expected that the ICT-industry has a leading role in the development and implementation of e-commerce, not only because of the nature of the technology, ICT, but also because goods and services delivered are for the larger part intangible.

The number of companies with an ICT, telecommunications or multimedia background active in this region is about 1000. A sample of 233 companies participated in a telephone interview. Many of these companies are recently established — almost 55% date from 1990 or after. In general, small companies are dominating the scene: 82% have fewer than 10 employees. Software development (39%) and ICT-services (34%) are the major activities. Telecommunications operators and hardware suppliers were less visible. Companies that are Internet- and/or content oriented amount to 33% of the sample. A certain overlap between activities can be observed. Most companies were connected to the Internet (76%) and almost half of them had a website at the time of this survey (1997).

Businesses are established in this specific metropolitan area mainly for: personal reasons (48%, N = 190), residential climate (29%), historical ties (23%), proximity of important customers (15%), and physical infrastructure (10%). Telecommunication and ICT-infrastructure are mentioned as an important incentive by only 1.5% of the respondents. Other reasons are more important — either telecommunications make it possible to run operations from anywhere, or telecommunications are not that essential.

Indications for a local orientation can be found in the markets as defined by the ICT-industry. Their market orientation can be local (the central city), regional (the city and its direct surroundings), national or international. The reader has to keep in mind that the national Dutch market can be physically covered from the metropolitan area within less than two hours.

<table>
<thead>
<tr>
<th>Markets</th>
<th>Average % of market</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>4</td>
<td>174</td>
</tr>
<tr>
<td>National</td>
<td>96</td>
<td>176</td>
</tr>
<tr>
<td>Regional area</td>
<td>49</td>
<td>141</td>
</tr>
<tr>
<td>City</td>
<td>29</td>
<td>139</td>
</tr>
</tbody>
</table>

Table 1. Market Orientation of Participating Companies (% and N)

The market is mainly defined as the Dutch business-to-business market: 96% of the businesses see the Netherlands as their primary focus (see Table 1). The most important customers can be found throughout the Netherlands (55%), in the local region (32%) or in the principal city (8%). For only 5% of the businesses is their most important customer outside the Netherlands. The same results are found for the principal suppliers: 45% can be found in the Netherlands, 25% in the region, and 10% in the central city. The most important suppliers for only 9% of the companies can be found abroad. There is some correlation between both indicators (.35, p < .001).

Most of the businesses have multiple reasons to be present on the Internet, (these are summarized in Table 2). It is striking that arguments relating to transactions (online order, online purchases) are scarcely mentioned. Although Internet presence and accessibility for third-parties might be interpreted as a way to make information available for the initiation of a transaction, most organizations appear to be hesitant to initiate transactions via the Internet themselves. Only 21% of the businesses who have access to the Internet have concluded a transaction via the Net, and for most of these transactions involved physical products (13% of the businesses), which are ordered and paid for via the Net (12% of the businesses). The actual number of businesses involved in transactions is quite small (N = 31). Only 16 companies had at that time been involved in ordering and making payments via the Internet, and 8 had made use of online services.

Although e-commerce would be especially relevant for businesses active in telecommunications, multimedia or the ICT-industry, use is still passive. Internet use is mainly to access information or to e-mail. Active commercial use was not apparent at the time of this case-study. E-commerce is broadly discussed, but certainly not a reality. The readiness for e-commerce, however, is present: 47% are prepared to do business via the Net in the near future.

In general these results reflect some of the shortcomings of the Dutch economy and the ICT-sector. There is a lack of experience with investment in high-tech ICT-industry (Bouwman and Van Stralen 1997), and a lack of an entrepreneurial culture (McKinsey 1997). Traditional businesses are not expected to be leading e-commerce; but

<table>
<thead>
<tr>
<th>Reasons for Internet Presence</th>
<th>Mentioned by (%)</th>
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<tbody>
<tr>
<td>E-mail, online communication</td>
<td>57</td>
</tr>
<tr>
<td>Improvement to internal communication</td>
<td>4</td>
</tr>
<tr>
<td>Access to information</td>
<td>40</td>
</tr>
<tr>
<td>Internet presence</td>
<td>38</td>
</tr>
<tr>
<td>Accessibility for third parties</td>
<td>13</td>
</tr>
<tr>
<td>Online sales, orders</td>
<td>8</td>
</tr>
<tr>
<td>Online purchases</td>
<td>5</td>
</tr>
<tr>
<td>To experiment</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 2. Companies with an Internet Presence (%)
new startups, who often know next to nothing about the markets they enter, are (Anderson 1998). These new entrants are present, as was apparent in this case study, but not yet visibly active with e-commerce in the region under study. The main market for e-commerce appears to be the national b-to-b market.

CASE 2: THE INTERNET MARKET IN EUROPE

The second case study (also from early 1997) focused on European Internet development. Internet is growing very fast in Europe. The development rate is keeping up with the pace of growth in the US. The number of hosts related to the number of inhabitants was still in 1997 lagging behind in comparison to the US, but it is catching up (see Figure 2).

WWW represents the most popular and fast-growing Internet service. A survey among Internet Service and Access providers indicates that more than half of the Internet traffic (52%) is WWW traffic. An important indicator for the geographical dimension of Internet is the language featured by Websites. By analysing a sample (1% of all the available Websites) of European sites, the study shows an overall trend towards the reduction of the percentage of English-only sites, and an increase in bilingual and national-language sites. National-language sites are the majority. Internet use appears to be directed to serve national users (see Table 3).

INTERNET SERVICE OR ACCESS PROVIDERS (ISPs)

The orientation towards national, but more specifically towards regional and local dimensions is confirmed by the ISP survey (N = 60). ISPs were asked to define their primary markets. Their orientation is mainly towards local and regional markets. Within a European context that means an orientation to metropolitan areas in the case of local orientation and, for instance, towards Länder in Germany and towards a number of Départements in France in the case of regions. ISPs are less directed to offer services on a European and World level. The main reason for not finding service providers on a European and World level could be due to the small sampling size and the limited response from major private, internationally oriented online services.

Almost half of the ISPs (46%) claim that more than 50% of their operations are directed to local customers; 23% claim that more than 50% of their operations are directed to the regional market; and 46% claim that more than 50% of their operations are directed to customers who operate on a national level. Furthermore, negative correlation indicates that when ISPs are oriented towards local markets, they have smaller regional (ρ = .40, p < .01) or national (ρ = .57, p < .01) market shares. A small proportion of the ISPs offer only a limited number of services to international organizations and businesses. Competition between ISPs is assessed to be strongest on the national level, followed by the local and then the regional level; competition on a European or World-wide operational level is assessed to be least fierce.

CORPORATE CONTENT PROVIDERS

Corporate content providers were selected after an inspection of their website. Most of the time the information offered on these sites was formulated in the national language; sometimes sites were bilingual. In the latter case the non-native language parts were less extensive. SMEs, cultural organizations and public authorities, in particular, have sites in their own language. The orientation of SMEs appears to be towards local businesses, most strikingly in Finland. Furthermore, sites for specific products such as

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Table 3. Distribution of Languages on the WWW in Europe Source. (Data Consulting 1997)

<table>
<thead>
<tr>
<th>Number of sites</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>Native (non-English)</td>
<td>333</td>
</tr>
<tr>
<td>Native (English: UK and Ireland)</td>
<td>84</td>
</tr>
<tr>
<td>English only (outside UK and Ireland)</td>
<td>98</td>
</tr>
<tr>
<td>Total English only</td>
<td>182</td>
</tr>
<tr>
<td>Bilingual</td>
<td>240</td>
</tr>
<tr>
<td>Multilingual</td>
<td>70</td>
</tr>
<tr>
<td>Grand Total</td>
<td>825</td>
</tr>
</tbody>
</table>

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Figure 2. Growth rates for hosts 1996-97 (source: Databank Consulting 1997)
cars and real-estate offer central access to services and general information, but link to local businesses for specific information and personal advice.

Most content providers, according to the survey, see the Internet as a channel for advertising and communication. Access to information sources and easier communication with third parties is the most mentioned usage. Search costs are reduced. On-line ordering, purchases or sales are less important. There is a strong will to be on the Net, but less so to act via the Internet (see Table 4).

The driving force is the wish to improve visibility and to advertise relevant activities. Advertising products and services is relevant for SMEs and professionals. According to the sample, 54% agree with the opinion that the Internet is suitable for advertising and 60% hold the opinion that information exchange and communication are proper use formats. Only a minority (16%) consider the Internet to be suitable for transactions, while 45% consider the Internet unsuitable for transactions. Lack of security and trust are the most frequent reasons given.

Actual implementation of e-commerce is directed mostly to online order activity, with very few users carrying out online transactions. Most users (68%) never use the Internet for real transactions. Online orders with separate payments is the most favoured type of economic transaction over the Internet (54%). Purchases with electronic payments have been made by 30%. Only 6% of the organizations interviewed sold goods in combination with electronic payments. Traded products include goods (62%), services (42%) and online information (27%). In general, users are reasonably satisfied about the Internet as a medium for economic transactions.

A large number of the organizations interviewed never participate in pilots aiming at the introduction of e-commerce. In Finland the Internet is used for e-commerce by almost half of its organizations. For other European countries this is between 27 and 35%. Involvement in pilots is high in the Netherlands at 27%, while organizations in Italy and Finland are hardly active in pilots at all (see Figure 3). Almost half of the content providers (49%) who never made transactions via the Internet themselves are not planning to do so in the future. One-third of the sample (37%) is planning to make transactions via the Net. Taken together with other results, there are indications that organizations that are using the Internet for e-commerce are not dissatisfied; but on the other hand, that organizations with no experience are rather reluctant.

CONCLUSIONS

The two case studies show that:

- A national, and not a global, orientation is dominant both for businesses in the ICT-value chains in a metropolitan area in the Netherlands and in the Internet Value Chain, as studied in Europe.
- The use of Internet, according to both cases, was still rather passive in early 1997; it is still a show-case for information rather than a means for online purchases.
- E-commerce is developing slowly in Europe and is still in an early phase of its development; safe electronic payments standards will not be sufficient to generate e-commerce; awareness of potential benefits and possible solutions should be increased.

The development of the Internet appears to be driven by global interest most prominently linked with telecommunication infrastructures. But although the network may be global, services and content offered via the Internet are more local and national. For a large part this is indicated by the markets as defined by the businesses under study, and the way in which they are embedded in value chains of suppliers and customers. In the first case the ICT-industry in a specific metropolitan area was directed more to the
regional and national market, while the value chain was more national in nature. In the second case the orientation of both ISPs and corporate content providers was more towards regional and local markets. This is confirmed by the language being used on the sites of the corporate content providers. Furthermore, the orientation towards e-commerce appears, at the moment that the case studies were done, to be rather passive. The provision of information and the desire for Internet presence appear to be the most important arguments for being active on the Net. Transactions via the Internet are less favoured. The explanation for this phenomenon should be seen not only as due to a lack of trust in the security of the network, but also in relation to the fact that the Internet as a medium is not yet suited for such complex processes as negotiation and quality control. There are empirical indications, for instance as shown in the second case, that e-commerce is not global in nature but might offer the potential to support local trade.

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References


