

E-Commerce Web Site Attributes: Differentiating Hype from Reality

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■ Introduction

Many firms are adopting Internet-based electronic commerce as a part of their business strategies. The migration paths adopted and the attributes of the World Wide Web sites that are being established can be examined to yield insights that help to distinguish between over-optimistic expectations of the benefits of e-commerce and the actual outcomes for firms that are integrating Internet-based activities within their business strategies. Research on the emergence of electronic commerce tends to focus overwhelmingly on high profile firms such as Amazon.com and eBay.com. In this paper, we consider the potential of business-to-business (B2B) electronic commerce in the light of the reality of the efforts of firms in the road transport logistics industry to employ the Internet to strengthen their positions in the market.

The main issue that is considered in this paper is whether the Internet-based activities of road transport logistics firms are encouraging firms to develop a more 'open' business environment as compared to that associated with their use of electronic data interchange (EDI) systems. The use of EDI systems has been linked to relatively closed business environments in which access to information and communication technology

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systems is restricted to discrete groups of traders (MANSELL & JENKINS, 1991; GRAHAM & al. 1993; FERNE & al., 1996; MANSELL, 1996; HAWKINS & al., 1999). The development of more open network environments based on Internet platforms is in line with some expectations about the way B2B e-commerce is likely to evolve (BAKOS, 1997; HOFFMAN & al., 1995; LEEBAERT, 1998; THRELKEL & KAVAN, 1999). Many observers have suggested that the abilities of firms to access trading networks and to expand their memberships are likely to be augmented by the use of Internet technologies.

A brief overview of the characteristics of the road transport logistics industry in the United Kingdom is provided in the next section. Then we consider the emergence of Internet-based electronic commerce migration strategies. The following section presents the results of a pilot study of the Internet websites based on a sample of large firms in the road transport logistics sector in the United Kingdom. These results are considered in the last section in the light of suggestions that B2B electronic commerce in an Internet environment will be associated with more open and competitive trading.

■ The Transport Logistics Industry

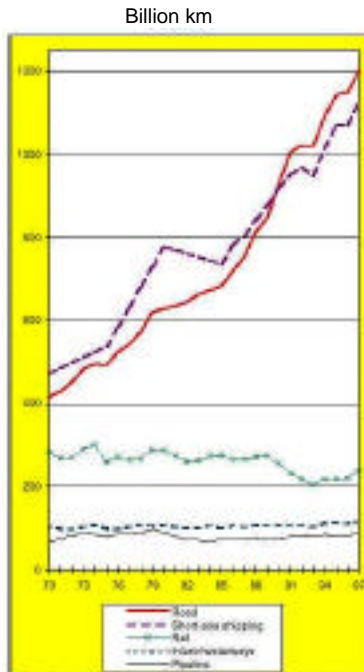
The road logistics industry has been experiencing rapid growth in recent years (OECD, 1996). During the period 1970-1997, the volume of goods transported in the European Union by road nearly trebled (see figure 1). In 1997 goods transported in the European Union by road accounted for 43.4 per cent of the total, while goods transported by rail accounted for only 8.6 per cent of the total volume as measured by weight times the distance transported. In the United Kingdom, in 1998, the volume of goods transported by road was estimated at 160 billion tonne-kilometres, a 2.0 per cent increase over the previous year. More than 515,000 people were employed directly or indirectly in this sector in 1998. Some 67.8 per cent of goods distribution in the United Kingdom was by road (as compared to 7.6 per cent by rail, 19.5 per cent by water and 5.1 per cent by pipeline) in the same year ⁽¹⁾. Over the period 1994 to 1999, transport and storage activities were among the fastest growing services in the British economy, although

(1) Department of the Environment, Transport and the Regions 1998, Statistical Report, London.

employment remained relatively constant. During 1999 freight forwarding and related activities generated £10.2bn, cargo handling and storage, £3.9bn, and courier activities, £3.6bn. Freight forwarding revenues were expected to reach £13.0bn by 2004 (*Keynote Report 2000*).

The expansion of this sector in recent years has been associated with decreasing profit margins, intense competition, and trends towards consolidation of the industry. The clients of the firms in this sector increasingly expect the provision of global, or at least regional, services and this has triggered a series of mergers and acquisitions. The consolidation of the single market in Europe, greater competition, and increasing latitude for market entry are factors that are encouraging the firms in this sector to search for innovative ways of extending their businesses into higher value added services provision.

Figure 1: European Union Goods Transport, 1970-1997



Source: European Commission (2000)

The use of information and communication technologies to support service provision is a key component of logistics service development (ASSENT, 1999; National Office for the Information Economy, 1999). The advent of Internet-based e-commerce is regarded as a logical next step in a progression towards the provision of information-intensive services to clients on a global scale. The main technologies in use include mobile telephones, facsimile, computer networks, electronic data interchange (EDI) systems, the Internet, global positioning systems (GPS), satellite navigation, bar-coding and on-board weighing. The use of these technologies is enabling firms to improve services such as warehousing and stock control. Specialist firms are seeking to offer 'one-stop solutions' to support the supply chains of their clients and this means that services must be customised to respond to distinctive needs of clients and different corporate cultures (*Distribution Magazine*, 1996, 1997, 1998). Firms that are using EDI systems are known to be experimenting with Vendor Managed Inventory (VMI) and Co-Managed Inventory (CMI) systems based either on proprietary or open platforms.

Those firms that have introduced EDI systems are using them to exchange messages and information using standard formats. These exchanges include inventory and stock details, transportation updates (pickup and dispatch confirmation) and purchasing and sales orders. Typically they are based on value added networks supported by leased lines rather than on the public switched network and internetworking supported by the Internet Protocol.

The government and the Freight Transport Association in the United Kingdom have suggested that the application of new technologies in this sector will promote a more competitive freight industry. Firms that take advantage of B2B electronic commerce to support communication between dispatchers, operators, drivers and terminal operators are expected to experience efficiency gains. Their use of electronic commerce is also expected to contribute to the improvement of management processes, the greater use of electronic clearance systems, and information systems supporting monitoring of the position and progress of vehicles and loads. However, there are no empirical studies of the extent to which Internet-based B2B electronic commerce is actually being deployed by firms in this particular sector or of the way trends in the industry that may be associated with the adoption of various B2B electronic commerce migration strategies.

■ Migration Strategies and E-Commerce Innovation

Internet technologies provide a platform upon which firms may exploit new opportunities for revenue growth. Some firms may see the deployment of Internet-based services as a way to expand their advertising and marketing channels, while others may regard the Internet platform as providing a way to capture information about clients and to expand their sales channels. Others may regard the use of internetworking simply as a powerful new way to conduct business, albeit in experimental ways that have yet to fully demonstrate their potential contribution to growth strategies (VERHOEST & HAWKINS, 2000). The way firms migrate their existing business activities online can be classified as follows:

- a) Firms using the Internet as an **awareness** building tool mostly for providing information to prospective clients or to other individuals. Although web sites may provide the basis for reaching global markets, these firms do not transact business online.
- b) Firms using the Internet to **transact business** online by extending sales and marketing channels. Firms use websites to take orders and deliver products, but they do not offer novel customised services or abandon conventional sales channels.
- c) Firms using the Internet to **redefine value chains**. These firms develop systems that link price, product and design information with customers and suppliers. These firms offer personalised or customised services to their clients and seek to generate substantial revenues from online transactions.

The development of increasingly information-intensive business models is expected to transform the way firms operate internally and the way they interact with other firms in the supply chain. Some of the differences between the activities of firms using Internet-enabled services and those using pre-Internet services are suggested in table 1.

Table 1: Comparing the Pre-Internet and Internet-Enabled Economy

	Pre-Internet economy	Internet-enabled economy
Suppliers	<ul style="list-style-type: none"> • Arms length relationships • Telephone, mail EDI orders and payments 	Flexible online relationships
Intermediaries	<ul style="list-style-type: none"> • Acting independently • Mix of manual and real time information 	<ul style="list-style-type: none"> • Extended links and integration with users and suppliers • Real time information
Customers	<ul style="list-style-type: none"> • Communication with suppliers difficult • Hard copy information 	<ul style="list-style-type: none"> • Direct access to supplier • Increased access to real time information • Increased customer service • Personalisation
Focus	Energy intensive	Information intensive
Strategy	Rational	Incremental
Structure	Hierarchical	Flexible – team based
Service-product	Standardised	Customised
Competitive environment	<ul style="list-style-type: none"> • Independent firms • Alliances in order to complement current gaps 	<ul style="list-style-type: none"> • Networks • Alliances with customers, suppliers and even competitors

Source: NIORAS & al. (2000) based on various sources.

Experimentation with the use of the web is expected to lead to new ways of attracting customers or clients and to substantially greater flexibility and openness in the relationships between collaborating firms and their clients. No firm can expect to integrate all of its activities within its boundaries, and although outsourcing of business activities is growing, extreme cases of entirely 'virtual' or non-'virtual' firms are extremely rare (KRAUT & al., 1995). Nevertheless, firms may decide to outsource functions to gain access to specialised inputs and reduce their dependence on a single supplier.

When the use of the Internet plays a major role in alliances and outsourcing activities enabling firms to share resources, some studies suggest that such relationships will differ from alliances formed prior to the use of the Internet (OECD, 1999). Market pressures associated with globalisation, liberalisation and the diffusion of information and communication technologies are expected to encourage a shift from firm-centred innovation to collaborative innovation based on extensive networking (OECD, 1999). Web-based alliances are expected to involve a greater diversity of firms, to be less formal, and to involve a leading firm that is capable of defining standards for the members of the alliance. In order to forge these networks of alliances, intra and inter-organisational information and communication technology-based infrastructures are essential (MONGE & al. ,1998).

However, counteracting forces are also likely to be present. These may mitigate against flexible and collaborative arrangements for firms. Firms entering alliances to develop information and communication technology systems may choose to encourage either autonomous or systemic network arrangements (CHESBROUGH & TEECE, 1996). In the latter instance, firms must depend on other members of their networks over which they have little control. The nature and extent of such alliances may also be constrained by the fact that not all kinds of information can be exchanged easily between partners using information and communication technologies. The tacit knowledge of organisations and their members often resists codification and incompatible technical standards may cause friction between members of alliances (SCHMIDT & WERLE, 1998; SENKER, 1995; STEINMUELLER, 2000).

One motivation for increasing centralisation of firm activities is the reduction of inventories between business units. This may result in increased integration and co-ordination costs for a firm and require some decisions to be made at a higher level. Pressures towards centralisation and hierarchical forms of organisational structure may also be introduced when information systems are used to support the sharing of services (such as copying) between business units. Research by KRAUT & al. (1995) suggests that firms will guard some informational aspects of their activities and prefer the use of fax, express mail and the telephone over the use of open information and communication systems. Their study of firms in the United States suggests that firms are less likely to use electronic networks when they are dealing with tangible goods than with intangibles and that the use of electronic networks may imply a stronger degree of integration of firms with their suppliers as well as a greater tendency to produce key inputs in-house. Nevertheless, ZWASS (1998) and others such as STRADER et al. (1999) and SCOTT (2000) argue that the overriding trend is for information and communication technology systems to be introduced that enable more decentralised arrangements within and between firms. When co-ordination costs fall as a result of the deployment of new information and communication systems, firms are expected to exploit economies of scale and to develop new growth strategies.

With the advent of B2B electronic commerce based on the Internet, what is the likelihood of more open, decentralised and collaborative relationships between firms? It has been argued that firms will be more likely to enter open networking arrangements if they can preserve their control of key resources that they perceive as essential to maintaining their

competitiveness (HAWKINS, 1998; HAWKINS & al., 1999). Firms in any given supply chain may be more likely to prefer closed than open market structures, especially when control over information and communication is vital. Despite the fact that the Internet can accommodate, and may even encourage, open networking, this may not be the most likely evolutionary migration pathway. The pathway that predominates is likely to depend on the particular dynamics of specific industrial sectors, the existing relationships between firms, and the nature of the product or service in question (OECD, 1999). Internet-enabled B2B electronic commerce can be configured so that a firm can monitor and examine the flow of goods in a competitor's network which may offer strategic opportunities that enable the former to 'play against' the latter's capabilities and strengths in the market.

Open networking arrangements based on the Internet in the road transport logistics industry are being developed to support online order tracking systems that increase control and predictability (*Keynote Report*, 1999). This, in turn, is expected to encourage the interconnection of multiple firms into more cohesive networks embracing agents, distributors, suppliers, warehouse providers, manufacturers, brokers, carriers and customers.

This possibility raises a question about whether Internet technologies are useful in extending the Penrosian 'scope of managerial control' which would contribute to the expansion of the size of the firm (PENROSE, 1959) or whether better access to information and markets supported by the Internet will allow for and encourage further divisions of labour (without limit) for firms, that is, whether the 'libertarian' dogma will prevail (TAPSCOTT, 1998, 2000). The latter outcome may be more likely if one firm in a network is able to force other firms to compete while still retaining control over key resources.

Network-based collaboration between firms can be facilitated using proprietary Extranets (that may be based on Internet platforms) or on open Internet hubs. Proprietary Extranets are software extensions of enterprise information systems. Using these systems, firms may offer access to their information systems, but the services remain within their boundaries. Extranet systems often require clients to operate several systems that are connected to the network and there is often a unique connection to each system. In contrast, open Internet configurations generally consist of a central hub where information is stored and which may be accessed by clients from a single personal computer. This approach is favoured by those

who envisage the expansion of open networks and greater collaboration between firms.

One possibility is that firms will resist open Internet B2B electronic commerce configurations because of their histories of lock-in to proprietary EDI systems. An industry can be regarded as a dynamical system where many asymptotic states (stable attractors) exist (DAVID & GREENSTEIN, 1990). Any event or 'perturbation' can affect the whole system and orient it towards a particular attractor. This suggests that a particular event in the past may influence the strategy that a firm follows. It is difficult to predict *ex ante* what the predominant trends in the adoption of new technological systems will be. Firms exhibiting path dependency cannot easily discard past events because the costs of doing so may be high or there may be resistances to changes (DAVID, 1986). However, lock-in is more likely when that changeover costs are reasonably high. If these costs decline rapidly, the standard doctrine concerning sunk costs may apply instead and firms may have a greater incentive to migrate to new forms. Migration strategies from closed or proprietary EDI systems to open and collaborative Internet-based systems may be established on the basis of expectations about future profit margins, rather than on the basis of past commitments.

The deployment of Internet-based B2B electronic commerce is expected to encourage disintermediation of the transaction process and the demise of the role of intermediary firms such that goods producers move to establish direct relationships with customers (BENJAMIN & WIGAND, 1995; SCHIMITZ, 2000). However, if road transport logistics firms are able to develop highly valued services that play a pivotal role in mediating producer-customer relationships, then this will provide a potential basis for their survival. It is difficult to discern in the absence of empirical investigation just what functions are likely to become disintermediated in any particular industry sector since most intermediaries are specialists performing some function that either brings together buyers and sellers or supports the transactions between them (HAWKINS & al., 2000). As producers become part of networked alliances, many functions such as market co-ordination may be performed by firms that are not closely integrated with these firms (HAGEL & RAYPORT, 1997; SANKAR & al. 1998).

Existing research on Internet-based B2B electronic commerce provides little basis for drawing sector specific conclusions about the most likely implications of the spread of this technology for firms in the road transport logistics sector or to indicate which of the alternative strategies for migration

is most likely to predominate. Existing research does provide a foundation, however, for formulating several hypotheses about developments in the road transport logistics sector.

1. Firms in the road transport logistics sector are likely to migrate their activities onto open Internet-based platforms relatively slowly and there is likely to be evidence of continuing efforts to extend proprietary information and communication systems to support services for clients.

2. The role of road transport logistics firms as intermediaries will be strengthened by opportunities created by the Internet, but there will be evidence of some firms playing substantial leadership roles.

3. The existing utilisation of EDI systems will limit the potential for introducing horizontally organised, collaborative networks of alliances between firms in the sector due to the reluctance of road transport logistics firms to share commercially sensitive information.

■ B2B Electronic Commerce Realities in the Road Transport Logistics Industry

A sample of the 120 largest (in terms of turnover) road transport logistics firms in the United Kingdom provided the basis for an investigation of key attributes of the firms' web sites. The research examined features of B2B electronic commerce service provision in the sector (see appendix 1 for the sample of firms) ⁽²⁾. An initial screening of the web sites of these firms was undertaken to assign them to one or more categories of Internet-based B2B electronic commerce development.

- a) Firms using a web site for building awareness of their presence in the market.
- b) Firms conducting transactions online, extending sales and marketing channels.
- c) Firms using the Internet to redefine the structure of the supply chain within which the firms play an intermediating role.

⁽²⁾ The firms were selected from the FAME database, 2000.

The search produced a total of 27 web sites for the firms in the sample ⁽³⁾. The 27 companies included in the sub-sample are shown in appendix 2 ⁽⁴⁾. Key attributes of these websites were mapped to reveal the nature of the firms' B2B electronic commerce activities ⁽⁵⁾. The search revealed that there were very limited numbers of web links between the 27 sites to other companies or associations within the sector. This observation provided an initial suggestion that these firms were not actively using their sites to encourage extensive networking between competing firms in the logistics sector or to encourage new clients to use their services. Table 2 provides the web addresses of the 27 firms and a summary of their web-based activities including services supporting online tracking and ordering, the use of their own proprietary software systems (S/W), whether or not the firm had its own information technology department and the overall category of electronic commerce activity ⁽⁶⁾.

⁽³⁾ Secondary documentation was used to provide information about the 27 firms with respect to: turnover, number of employees, ownership, transaction/business models apparently in use, use of own or outsourced technology, provision of services to external firms, recent alliances and acquisitions, type of goods transported, types of software in use or accessible at sites, and geographical coverage.

⁽⁴⁾ It may be that more web sites for the firms in the initial sample exist and could have been found if the time period for searching had been extended.

⁽⁵⁾ The web-based data were supplemented by information from sources such as trade magazines, Department of Trade and Industry reports and company annual reports. The research for web sites was undertaken over three weeks in May-June 2000. The search for web sites proceeded as follows. A simple search was conducted using search engines such as the Yahoo! and Hotbot (typing the firm's as provided by the database). If this failed to produce a result, the search proceeded by typing company 'x' logistics, then company 'x' transport and finally company 'x' distribution. Further efforts were made to find web sites by seeking links in transportation directories such as Deliver-IT.com, the Yahoo! business directory for the UK, the European Business Directory, Forward Trade Net and associations such as the Transport Association. The final search used portals such as trl.com, clicklogistics.com and cargoweb.com.

⁽⁶⁾ This study is an exploratory investigation of website attributes. It is recognised that firms will represent their characteristics on websites so as to magnify their strengths and minimize their weaknesses. There is likely to be a bias in the direction of over-claims about service capabilities, etc. Data from websites are not used in this study to explore how firms organize their internal operations.

Table 2: Web activities of the road logistic firms

Company	Web Site Address	Online tracking	Online ordering	Own S/W	Own IT dept	E-com Cat. a, b, c
1	walshwestern.com	yes	yes	yes	yes	b
2	hays-plc.co.uk	no	no	no	yes	a
4	tibbet-britten.com	no	no	yes	yes	a
10	tnt.co.uk	yes	yes	yes	yes	b
11	salvesen.com	yes	no	yes	yes	b-a
14	securicor.com	no	no	yes	yes	a
15	boc.com	yes	no	n.a.	yes	b-a
17	dfdstransport.com	yes	yes	n.a.	n.a.	b
22	autologic.co.uk	no	no	n.a.	n.a.	a
24	dartgroup.co.uk	no	no	n.a.	n.a.	a
26	hr-shipping.co.uk	no	yes	no	yes	b-a
34	taylorbarnard.co.uk	no	no	yes	yes	a
36	europa-worldwide.co.uk	yes	no	n.a.	n.a.	b-a
38	merlindistribution.com	no	no	n.a.	n.a.	a
39	gefco.fr	no (?)	no	n.a.	yes	a
46	users.skynet.be	no	no	no	n.a.	a
56	hoyer-group.com	no	no	no	yes	a
67	fowel-welsch.co.uk	no	no	yes	yes	a
77	ffg-hil.com	yes	yes	yes	yes	b
84	baylis.co.uk	no	no	no	n.a.	a
95	asg.se	yes	yes	yes	yes	b
98	citygroup.com	no	no	no	yes	a
99	sca.se	no	no	n.a.	yes	a
101	transeuro.com	yes	yes	n.a.	yes	b
109	ecc.nl	no	no	n.a.	yes	a
112	jardine-shipping.com	no	no	n.a.	yes	a
119	transmec-tit.com	yes	yes	no	yes	b

Note: Ranked by number of employees.

Of the 27 firms, most (16) were assigned to category 'a' – **awareness building**. A few firms (7) were assigned to category 'b' – **transact online business**, and even fewer (4) were assigned to a mixed 'a-b' of category. None of the firms were assigned to category 'c' – **redefine value chains**.

As indicated in table 2, 10 firms were providing online tracking of shipments to clients and eight were providing order status services and, in some cases, information about stock levels and transaction histories. A few were allowing online transmissions of data. Most of these firms claimed to be preparing further expansion of their web interfaces. In most cases, clients

could access data by using a simple browser. Where other interfaces were in use, the firms were providing the opportunity to clients to download the necessary software online. Some firms were offering online tutorials supporting the use of their existing EDI systems (e.g. managing transport booking, pricing, scheduling and mode planning and supply chain management software).

Overall, firms based in the United Kingdom had the least information available at their sites with respect to the attributes mapped in this study. Moving down the list of firms shown in table 2, the Internet initiatives were less ambitious in providing information and in the scope of the services provided. Foreign firms with a presence in the United Kingdom had much more sophisticated sites.

Of the 16 firms where information was available from the website, nine firms were developing their own software platforms and 20 had an internal IT Department. The others were using platforms and software from firms such as IBM, Oracle and Microsoft. For Internet applications, the most popular platforms were Windows NT and, in some cases, Unix and Novell Netware based on local area networks. Software platforms used for management of the supply chain included SAP R3, IBM RS 6000, IBM AS400, Lotus Notes and the Oracle platforms. The minimum standard for accessing web-based applications was browsers such as Netscape V4 and Microsoft Explorer V4.

The services offered, types of goods transported, geographical coverage and ownership characteristics are shown in appendix 3. The most common services offered were warehousing and distribution. The larger firms were also offering a variety of specialised services including product assembly, stock control, consultancy services and customised warehousing. The most common client firms that these firms were supporting were active in Electronics (5), Retail (7), Chemicals (4), Consumer products (3), Automotive (4), Industrial (6), Food (5) and Manufacturing (5). The results in appendix 3 also suggest that firms based in the United Kingdom were offering fewer services than their foreign counterparts and had the capacity to provide services in fewer geographical regions.

In summary, the road transport logistics firms in this sample predominantly were using their web sites as an awareness building tool. None of the firms were using their web sites to encourage a redefinition of their value chains. Other key attributes included:

- All 27 sites were supporting online contact via e-mail with division managers or other company personnel.
- 17 sites were employing some form of 'infomediary' model (HEGEL & RAYPORT, 1997), for example, offering visitors industry news.
- Encryption software was employed by 10 of the 27 firms to enable clients to logon to view documents, but this security measure did not prevent access to the information and other resources.
- Five firms were providing clients with the opportunity to download or upgrade software online.

Recent alliances and acquisitions undertaken by the sub-sample of firms were mainly with other road transport logistic firms or with firms supporting other modes of transport. Smaller companies were targets for acquisition and nearly half the companies in the sample provided information about recent acquisitions aimed mainly at achieving a pan-European presence in the logistics market ⁽⁷⁾. In many cases, the road logistics firms appeared to be in a leadership position in these arrangements. For example, they were providing the information and communication infrastructure and many were expecting their clients to link into these systems. A considerable number of firms was providing their own hardware as well as software and they were responsible for the installation and testing of these systems.

The degree of information and communication system integration varied considerably. Firms active mainly in distribution and warehousing, appeared to require a relatively low level of system integration such that clients could access their systems to monitor inventories using a standard browser. For firms responsible for the assembly of products, however, the degree of system integration appeared to be higher.

Only 14 of the firms were providing information on their web sites about whether they were using EDI systems. Table 3 shows that eight of these firms indicated that they were using EDI systems. Ten firms were using the Internet as an extension of their existing EDI systems, that is, as a complement to their existing systems to enhance their performance.

⁽⁷⁾ Hays (2) acquired Daufenbach GmbH, a German firm specialising in spare parts in the automotive industry with clients including GM, BMW and Toyota. Exel (1) acquired the Welsh Western Group which specialises in the transport of electronics goods. Christian Salvesen (11) acquired Tinsley Distribution, a chilled food distributor to strengthen its position in the food industry.

Table 3: EDI and Internet Use

Firm No.	Use of EDI	Use of Internet (as a compliment for EDI)
1	Yes	Yes
4	Yes	Yes
10	n.a.	Yes
11	Yes	Yes
14	Yes	n.a.
17	n.a.	Yes
26	No	Yes
34	Yes	No
36	Yes	No
39	Yes	No
46	n.a.	Yes
77	n.a.	Yes
95	Yes	Yes
119	No	Yes

Note: n.a. not available.

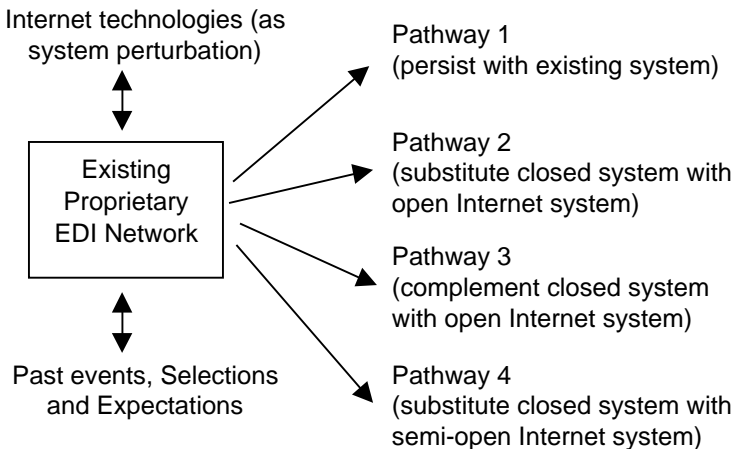
On the basis of this pilot analysis of web sites, the Internet appears to be providing a platform for services that complement, rather than substitute, for existing EDI systems. The web sites of this sub-sample of firms appeared to be being developed to increase their visibility in the market. The firms' sites seemed to be open internally to key clients, but they were relatively closed to external firms that were not members of their alliances or client base. Although there was improved access to information for clients at these sites, there was little evidence that the sites were being designed to enable greater collaboration between competing road transport logistics firms.

Proprietary EDI systems and open web-based services provided by the firms appeared to be strengthening their roles as intermediaries. All of the 27 firms were offering core services including warehousing and distribution. Twenty-five of the 27 firms were offering additional specialised services ranging from kit assembly, printing, and consultancy to transport insurance. Most of the firms were offering fully integrated services from transport to assembly and providing stock control systems which were customised. Overall, the relative position of these firms with respect to their clients seemed to be one of closer integration and customisation.

The migration pathway towards internetworking may be expected to influence the evolution of the road transport logistic sector in unpredictable

ways. The innovations in networks and their architectures suggest that there may be four broad migration pathways available to these firms as illustrated in figure 2. This figure suggests that the migration process will be influenced strongly by whether the availability of Internet technologies creates a 'system perturbation' that, in turn, opens opportunities for firms to develop strategies to integrate this technological innovation. However, the pathway selected is also likely to be influenced strongly by past investment strategies, the factors influencing the selection of alternative technologies, and expectations about future events that may occur in the firm's immediate or global environment.

Figure 1: Migration Pathways



In the case of pathway 1 shown in figure 2 firms are likely to persist in developing their existing proprietary EDI systems. In pathway 2, firms may be expected to substitute their previously closed EDI systems with open Internet sites that encourage collaboration between competing firms and encourage the build up of an extended client base. In the case of pathway 3, firms may be expected to maintain their existing proprietary systems alongside new open Internet systems that support a range of information access and some online transaction services. Finally, in the case of pathway 4, firms may migrate entirely to the new Internet platforms and develop semi-open systems and services.

The evidence resulting from the mapping of website attributes suggests that two migration pathways were predominant in the road transport logistics industry in the United Kingdom in mid-2000. Migration pathway 1 was clearly present, i.e. persistence in the use of existing proprietary EDI systems as was pathway 3, i.e. the use of open Internet web sites as complements to other proprietary EDI systems development. This conclusion is supported by the following observations. There were:

- few web links pointing either to competitors or to road transport logistics associations suggesting the existence of relatively closed supply chains;
- many internal IT departments suggesting a source of lock-in to existing proprietary EDI systems such that these departments claim they can successfully implement new technologies even when they have great difficulty in doing so - thus delaying implementation of new technologies until management outsources new system development activity;
- internal development of new proprietary software systems;
- uses of own software platforms rather than market leader platforms such as those offered by IBM, Oracle or Microsoft;
- uses of the web to support online tutorials supporting existing EDI systems;
- providers of own hardware and 'free' proprietary software, as well as installation and maintenance to clients;
- providers of highly customised and specialised services that are client (or industry) specific ⁽⁸⁾.

Overall, the results of this analysis suggests that the road transport logistics firms in the sample were undertaking a relatively slow migration to the opportunities presented by Internet-based B2B electronic commerce which provides preliminary confirmation for hypothesis 1. There was little sign of any weakening of the intermediary roles of these firms in the supply chains for a wide range of goods which also tends to confirm hypothesis 2. There was some evidence that there are efforts on the part of the developers of existing EDI systems to constrain migration to Internet-based platforms at the time this study was undertaken thus confirming hypothesis 3. In addition, there was evidence that foreign-owned firms were moving more rapidly than British-owned firms to exploit the potential of web sites to extend the geographical reach of their services and to host online transactions that are openly accessible to a greater variety of clients.

(8) E.g., Company 56 targets the liquids sector and offers services such as mixing, filling and packaging. Company 67 supports the horticultural industry and offers clients services.

■ Conclusion

The results of this examination of the web sites of a relatively small number of firms indicates that there is a rather substantial degree of malleability in the B2B electronic commerce strategies that involve the use of Internet platforms. In the road transport logistics sector, the use of web sites was somewhat limited in the United Kingdom (i.e. only 23 per cent of the firms in the sample had web sites at the time of the study) at the time the study was undertaken in mid-2000 and 59 per cent of these firms were using them predominately to build awareness of the services that they were offered using existing proprietary EDI systems. Only 26 per cent of the firms with web sites were using them to support online transactions. Given the limited use so far of Internet-based B2B electronic commerce in this sector, it is difficult to assess which of the alternative electronic commerce pathways will be predominant in the future.

There are signs in this industrial sector of an incremental process of migration. This result differs considerably from the strategies envisaged in the trade press and by some representatives of the policy making community. The predominant expectation has been for a very rapid shift from the development of relatively closed, specialised information and communication systems towards open, flexible networks and services based on the Internet. However, the case of the road transport logistics industry provides a preliminary indication that an incremental process of migration is underway which is informed more by the overall business strategies of the firms in the sector than by the technological opportunity provided by the Internet. Firms appear to be integrating the new technologies so as to strengthen their shares of an expanding geographical market and to generate new revenues from the provision of highly customised services.

Assertions by government representatives and some of the logistics services trade associations to the effect that the implementation of B2B electronic commerce will contribute directly to strengthening the competitiveness of British-based firms are informed more by the hype and potential of the Internet and electronic commerce than by evidence of how the new technologies are being aligned and configured to support business strategies. The changes that are being introduced into the interiors of the road transport logistics firm networks seem to involve the use of Internet platforms to forge more open relationships with partners only within clearly

defined alliances and with key clients. This is consistent with observations from studies of other sectors where there are signs that building Internet-based communities frequently entails partitioning of the Internet space into relatively closed membership communities (MANSELL & STEINMUELLER, 2000). The prevailing goals appear to be the achievement of the capacity to provide higher value added services through the effective use of a range of existing and new technologies rather than through substantial innovation in the business strategy. There appears to be scope both for expanding the scope for Penrosian managerial control on the part of key intermediary road transport logistics firms through internetworking alliances in a way that is also consistent with industry consolidation.

The fact that road transport logistics firms are seeking to intermediate more information-intensive functions within the supply chain may lead to even tighter networks of relationships between these firms and their clients. The evidence about the patterns of alliances and acquisitions, suggests that these firms are seeking to control key points in the transaction chain and that foreign-owned firms are somewhat more advanced in achieving this than British-owned firms. The web sites of the foreign-owned firms were more sophisticated, more likely to support online transactions, and often showed signs of a migration strategy like pathway 4, i.e. the substitution of closed proprietary EDI systems with 'semi-open' B2B electronic commerce systems. This suggests that it is important to consider whether the more limited variety of migration pathways that are evident for the United Kingdom-owned firms is a reflection of their distinctive styles of experimentation as compared to firms based in other countries. Alternatively, firms based outside the United Kingdom may be better positioned to dominate the market for road transport logistics services as a result of the greater variety in their strategies for migration to configure Internet-based B2B electronic commerce.

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Appendix 1: Initial sample of road logistics firms

No.	Company Name	Turnover £ (000)	No. of Employees
1	EXEL PLC	21032	38588
2	HAYS PLC	40792	20897
3	OCEAN GROUP PLC	15980	14900
4	TIBBETT & BRITTEN GROUP PLC	22818	27362
5	NFC UK LIMITED	54276	
6	LEP INTERNATIONAL WORLDWIDE LIMITED	26977	4059
7	UNIGATE DISTRIBUTION SERVICES LIMITED	8743	13594
8	TESCO DISTRIBUTION LIMITED	22088	8400
9	TRANSPORT DEVELOPMENT GROUP PLC	10337	8404
10	TNT UK LIMITED	6304	9570
11	SALVESEN LOGISTICS LIMITED	30229	11046
12	TIBBETT & BRITTEN LIMITED	16992	11792
13	TDG LIMITED	41167	6824
14	SECURICOR OMEGA EXPRESS LIMITED	50808	8750
15	BOC DISTRIBUTION SERVICES LIMITED	10109	4646
16	RYDER PUBLIC LIMITED COMPANY	65331	3650
17	DFDS PLC	32985	1807
18	HAYS DISTRIBUTION SERVICES LTD	11823	3824
19	CONDE NAST & NATIONAL MAGAZINE DISTRIBUTORS LIMITED	10336	341
20	TNT EXPRESS WORLDWIDE (UK) LIMITED	9519	1811
21	UNIDRUG DISTRIBUTION GROUP LIMITED	2948	100
22	AUTOLOGIC HOLDINGS PLC	53960	1717
23	UNITED CARRIERS GROUP PLC	48730	3072
24	DART GROUP PLC	40194	869
25	EDDIE STOBART LIMITED	27632	1728
26	HR HOLDINGS LIMITED	24692	459
27	TARGET EXPRESS PARCELS LIMITED	24480	1149
28	NIGHTFREIGHT PLC	21758	1664
29	SECURICOR OMEGA CONTAINER LOGISTICS LIMITED	14786	693
30	NORFOLK LINE LIMITED	13442	164
31	LANGTREE INDUSTRIES LIMITED	12508	107
32	ANC LIMITED	11721	842
33	UNITED CARRIERS LIMITED	9690	2374
34	TAYLOR BARNARD LIMITED	7044	1494
35	TARGET EXPRESS LIMITED	4689	1149
36	EUROPA FREIGHT CORPORATION LIMITED	3832	955
37	TURNERS (SOHAM) LIMITED	3116	985
38	FIEGE MERLIN LIMITED	2634	1251
39	GEFCO U.K. LIMITED	1582	253
40	NFT DISTRIBUTION LIMITED	1228	1142
41	THOMAS HARDIE COMMERCIALS LIMITED	63743	534
42	BULKHAUL LIMITED	61946	365
43	THE GIBSON O'NEILL COMPANY LIMITED	61946	365
44	ROADWAYS CONTAINER LOGISTICS LIMITED	61631	176
45	BRAMBLES U.K. LIMITED	61447	782
46	MAT GROUP LIMITED	61356	458

No.	Company Name	Turnover £ (000)	No. of Employees
47	SECURICOR OMEGA LOGISTICS LIMITED	60911	892
48	G.B. EXPRESS LIMITED	60660	552
49	THOMAS HARDIE GROUP LIMITED	58431	490
50	RICHARD LAWSON AUTO LOGISTICS LIMITED	58306	937
51	THE CURRIE GROUP LIMITED	57575	436
52	INTER FORWARD LIMITED	57423	943
53	I.B.C. LIMITED	57248	93
54	INITIAL TRANSPORT SERVICES LTD	57102	974
55	MURFITTS TRANSPORT LIMITED	56678	419
56	HOYER UK LIMITED	55812	682
57	W. H. MALCOLM LIMITED	53464	769
58	FRIGOSCANDIA LIMITED	52875	690
59	TUFFNELLS PARCELS EXPRESS LIMITED	50254	1113
60	ERITH HAULAGE COMPANY LIMITED	47598	145
61	NIGHTFREIGHT (GREAT BRITAIN) LIMITED	46554	1165
62	BERNARD GROUP PLC	44836	268
63	SCHENKER LIMITED	44019	
64	CERT GROUP OF COMPANIES PLC	43386	554
65	TIBBETT & BRITTEN APPLIED LIMITED	42801	946
66	RH GROUP LIMITED(THE)	40611	497
67	FOWLER WELCH LIMITED	37672	383
68	RDL DISTRIBUTION LIMITED	37660	228
69	INITIAL IFF LTD	36488	36
70	GREGORY DISTRIBUTION LIMITED	36019	686
71	CAVEWOOD LIMITED	35785	392
72	DUKES TRANSPORT (CRAIGAVON) LIMITED	35783	565
73	BELL BROS.(ASHINGTON)LIMITED	35300	98
74	HILL HIRE PLC	35048	143
75	W.H.BOWKER LIMITED	33459	173
76	MCC TRANSPORT LIMITED	33259	16
77	FFG-HILLEBRAND LIMITED	33226	89
78	MERCEDES-BENZ CHARTERWAY LIMITED	31071	21
79	SUTTON AND SON (ST.HELENS) LIMITED	31037	408
80	CURRIE EUROPEAN TRANSPORT LIMITED	30367	207
81	EUROFLEET LTD.	30323	541
82	A.A.GRIGGS AND COMPANY LIMITED	30317	339
83	BAYLIS GROUP LIMITED	30046	595
84	BAYLIS DISTRIBUTION LIMITED	30043	581
85	EXPRESS CARGO FORWARDING LIMITED	29915	542
86	CALBERSON PROJECTS LIMITED	29650	16
87	RYGOR GROUP LIMITED	29304	266
88	FRED SHERWOOD & SONS (TRANSPORT) LIMITED	28758	181
89	S. JONES INDUSTRIAL HOLDINGS PLC	28047	289
90	WOODSIDE HAULAGE (HOLDINGS) LIMITED	27547	385
91	SAM ANDERSON (NEWHOUSE) LIMITED	27398	200
92	NEWELL AND WRIGHT (HOLDINGS) LIMITED	27290	260
93	C.E.L. GROUP LIMITED	27195	223
94	COOLCHAIN GROUP LIMITED	26888	453

No.	Company Name	Turnover £ (000)	No. of Employees
95	ASG (UK) LIMITED	26690	97
96	JOHN G. RUSSELL (TRANSPORT) LIMITED	26642	448
97	RVL HOLDINGS PLC	26143	204
98	CITY LOGISTICS LIMITED	25670	354
99	SCA TRANSPORT UK LIMITED	24982	265
100	VOSPER-MANTECH LIMITED	24866	208
101	TRANS EURO PUBLIC LIMITED COMPANY	24799	222
102	MONTGOMERY TRANSPORT LIMITED	24730	329
103	EXXTOR SHIPPING SERVICES LIMITED	24644	185
104	LANE GROUP PLC	24217	377
105	JOHN RAYMOND TRANSPORT LIMITED	23552	333
106	ARCHBOLD HOLDINGS LIMITED	23458	160
107	FASTRACK PARCELS LIMITED	23138	444
108	AVIDMOOR LIMITED	23103	672
109	EWALS CARGO CARE LIMITED	22425	42
110	FERGUSONS (BLYTH) LIMITED	22321	404
111	C. BUTT LIMITED	22311	426
112	JARDINE TRANSPORT SERVICES UK LIMITED	22052	79
113	ROSIER DISTRIBUTION LIMITED	21735	183
114	ROADFERRY LIMITED	21678	74
115	PORTBRIDGE TRANSPORT INTERNATIONAL LIMITED	21567	30
116	DSV SAMSON TRANSPORT LTD	21522	221
117	SHEERTRUCK INTERNATIONAL LIMITED	21357	129
118	CARPET EXPRESS LIMITED	21330	433
119	TRANSMEC UK LIMITED	21121	107

Source: FAME database, 2000⁽⁹⁾

⁽⁹⁾ Some of the firms listed two or more of their divisions as separate companies. Company 10 (TNT UK Ltd) and company 20 (TNT Express Worldwide UK Ltd), for example. These were not treated as separate companies, but in the search for websites they were examined.

Appendix 2: Firms with web sites found from those listed in Appendix 1

Co. No.	Company Name	Latest Year	Turnover £ (000)	No. of Employees
1	Exel plcC	99/09	21032	38588
2	Hays Plc	99/06	40792	20897
4	Tibbett & Britten Group plc	98/12	22818	27362
10	TNT UK Ltd.	98/12	6304	9570
11	Salvesen Logistics Ltd.	99/03	30229	11046
14	Securicor Omega Express Ltd.	98/09	50808	8750
15	BOC Distribution Services Ltd.	98/09	10109	4646
17	DFDS plc	98/12	32985	1807
22	Autologic Holdings Plc	98/12	53960	1717
24	Dart Group Plc	99/03	40194	869
26	HR Holdings Ltd.	99/03	24692	459
34	Taylor Barnard Ltd	98/12	7044	1494
36	EUROPA Freight Corporation Ltd.	98/12	3832	955
38	Fiege Merlin Ltd	98/08	2634	1251
39	GEFCO UK Ltd	98/12	1582	253
46	MAT Group Ltd	98/09	61356	458
56	Hoyer UK Ltd	98/12	55812	682
67	Fowler Welch Ltd.	99/03	37672	383
77	FFG-Hillebrand Ltd	98/12	33226	89
84	BAYLIS Distribution Ltd	98/12	30043	581
95	ASG (UK) Ltd	98/12	26690	97
98	City Logistics Ltd	98/12	25670	354
99	SCA Transport UK Ltd.	98/12	24982	265
101	TRANS Euro Public Ltd Company	98/01	24799	222
109	Ewals Cargo Care Ltd.	98/12	22425	42
112	Jardine Transport Services UK Ltd.	98/12	22052	79
119	TRANSMEC UK Ltd	98/12	21121	107

Source: A. Nioras, based on website search.

Appendix 3: Services, goods, coverage and ownership based on web attributes analysis

Co. No	Services offered	Type of Goods Transported	Geographical coverage	Ownership
1	Kit Assembly Procurement Distribution Printing Warehousing	Electronic Automotive Chemical Consumer Retail	Europe Americas Asia 28 countries	UK
2	Distribution Warehousing	Chemicals Food Retail Manufacturing Automotive	Europe	UK
4	IT services Warehousing Distribution	Electronics Manufacturing Agricultural chemicals Food Retail	32 countries	n.a.
10	IT Distribution Warehousing	n.a.	55 countries (Covering 200)	n.a.
11	Warehouse design Warehousing IT products Distribution	Industrial Manufacturing Food Consumer Retail	Europe-8 countries	n.a.
14	Distribution Communications Security	n.a.	Europe Asia Africa North America	n.a.
15	Distribution Warehousing	Industrial Food Manufacturing Chemicals	Europe Far East	UK
17	n.a.	n.a.	Europe North America Far East	Denmark
24	Distribution Warehousing	Fresh produce	n.a.	UK
26	IT Consultancy services Relocation services Engineering/Technical Interior design/Space planning Distribution	Expertise in hazardous cargo Explosives consignments	Europe North Africa Americas	n.a.
34	Distribution Warehousing Product assembly	Consumer Paper Retail Healthcare Industrial	n.a.	UK

Co. No	Services offered	Type of Goods Transported	Geographical coverage	Ownership
36	Warehousing Distribution Purpose built warehousing	Textiles/fashion goods Medical products Automotive Industrial Electrical & Electronic	Europe	Germany
38	Warehousing Distribution Transport insurance	Automotive Paper	Europe Asia	Germany
39	Distribution Fairs & Exhibitions organization Warehousing	Automotive Industrial	Europe Americas Asia Africa	France
46	Assembly Distribution Warehousing	n.a.	Europe-15 countries	Belgium
56	Distribution Warehousing Consolidation Mixing, filling & packaging of liquids	Liquids Dry-bulk products Chemicals Gases Waste materials	n.a.	Germany
67	Distribution Handling of imported blooms Clearance and collection from UK airports for clients	Fresh Produce Flowers	UK	UK
77	n.a.	Wine & Spirits	Europe Americas Ausrtalasia	n.a.
84	Distribution Warehousing	n.a.	UK	UK
95	Warehousing Distribution	n.a.	n.a.	Norway
98	Warehousing Distribution	Food Industrial	n.a.	UK
99	Relocation Warehousing	Antique Fine Art	Europe	Sweden
109	Distribution Warehousing	Automotive Retail	Europe	Holland
112	Distribution Warehousing	Retail Manufacturing	Asia Europe (UK) Americas (US)	n.a.
119	Warehousing Distribution	n.a.	Europe	Italy