



# The impact of electronic commerce on logistics service providers

Impact of  
electronic  
commerce

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**Abstract** *The impact of e-commerce on the business environment is often praised but seldom analyzed with scrutiny. In this paper we try to depict the underlying logistically relevant aspects of e-commerce and their impacts on logistics service providers. This seems to be of considerable importance, as logistics is seen as the back-bone of e-commerce operations. However, the firms specializing in this field are commonly neglected. We argue that the logistical implications of e-commerce can be differentiated into two main categories: the rise of e-marketplaces; and the elimination of supply chain elements (disintermediation). By analyzing these two categories and their major logistical implications in detail we deduct strategic consequences for logistics service providers.*

## Introduction

E-commerce has been one of the buzzwords of the last years. Analysts as well as researchers predicted enormous changes in the competitive landscape of whole industries, causing an as yet unwitnessed surge in stock prices of companies in the “new” economy. However, this was almost two years ago. Today, the dust has settled and many of the promising new e-commerce companies have failed or are struggling for economical survival. The failure of so many companies in e-commerce can be in part accounted for by the neglect of logistics as a key factor of success, implying a prominent role for companies specializing in the logistics segment (Bretzke, 2000). Logistics service providers (LSPs) are thus confronted with changes in their respective market environments. It is therefore surprising that little attention has been paid to an assessment of these changes and their direct as well as indirect implications for LSPs. (In contrast, e-commerce applications for logistics companies have stimulated a broader echo, e.g. Pfohl and Koldau, 1999.)

This paper tries to bridge the gap. It is divided into three main sections. The first part deals with a specification and classification of logistics service providers. In the second part a clarification of the term e-commerce is provided and prominent business models of e-commerce firms are depicted as well as modifications in the configuration of logistics chains illustrated. Finally, we focus on the implications of these modifications and trends for LSPs.

## LSPs

LSPs have grown in importance since more and more companies outsource their logistics functions (Sheffi, 1990). Generally speaking, logistics service



providers are companies which perform logistics activities on behalf of others. Additional popular terms for these companies are third-party logistic firm, or contract logistics firm (Razzaque and Sheng, 1998; Sink *et al.*, 1996). “Whatever label is chosen, it denotes external suppliers that perform(s) all or part of a company’s logistics functions” (Coyle *et al.*, 1996; Ihde, 1991). However, definitions of this kind only give an institutional characterization of LSPs, leaving the functional scope of these providers unanswered.

It appears reasonable to assess the functions of LSPs by referring to a definition of the underlying domain, that is logistics and logistics management. With reference to the predominant logistics definition provided by the Council of Logistics Management (2001), logistics functions include the planning, implementation and control of the flow of goods, services and related information.

LSPs differ among the palette of services they provide to their customers as well as with regard to other criteria. Although a commonly accepted typology for LSPs is still missing, some propositions exist on this matter, e.g. types of services (Muller, 1993a, b; Africk and Calkins, 1994), geographical scope of operations and type of goods handled (Niebuer, 1996). With regard to their contribution for the explanation of changes in the supply chain induced by e-commerce, we will pursue a characterization employing two criteria here, which are, however, closely related. We will focus on functions and the degree of customization, as the combination of these criteria allows a comprehensive clustering of LSPs.

An overview of functions LSPs typically perform, based on a survey among buyers of logistics services, is provided by Sink *et al.* (1996) (see Table I).

A more conceptual approach was taken by Engelsleben (1999), who clustered these functions into two broad groups: services which are directly related to the physical flow of goods, and services which are not directly related to the physical goods flow (see Table II).

However, these functions and types of services can be grouped with regard to the degree of customization as well. A clustering of LSPs according to this

| Function             | Activities  |
|----------------------|---|
| Transportation       | Shipping, forwarding, (de)consolidation, contract delivery, freight bill payment/audit, household goods relocation, load tendering, brokering |
| Warehousing          | Storage, receiving, assembly, return goods, marking/labelling, kitting  |
| Inventory management | Forecasting, location analysis, network consulting slotting/layout design   |
| Order processing     | Order entry fulfilment  |
| Information systems  | EDI/VANS, routeing/scheduling, artificial intelligence, expert systems  |
| Packaging            | Design, recycling   |

**Table I.**  
Activities associated  
with LSPs

**Source:** Adapted from Sink *et al.* (1996)

| Activities which are directly related to the physical goods flow  |   | Activities which are not directly related to the physical goods flow  |   |
|---|---|---|---|
| Logistical core processes   | Associated "added value" activities   | Management support and tools  | Financial services  |
| Transportation: shipping, forwarding, brokering (de)consolidation, contract delivery<br>Warehousing: storage, handling, commissioning, packaging, paletting, etc. | Assembly, quality control, merchandising receiving/order entry fulfilment, return goods handling, kitting, marking/labelling, project-related consulting/ forecasting, tracking and tracing, routeing, scheduling, etc. | Logistics project controlling, anticipative logistics consulting, location analysis, layout design, MRP, DRP, LIS, XPS development EDI/VANs, etc. | Factoring, invoicing/freight bill payment/audit, insurance services, etc. |

**Table II.**  
A classification of  
functions of LSPs

dimension was conducted by Niebuer (1996), who divides LSPs into three major groups. The first group consists of service providers, which only offer standardized and isolated logistics services or distribution functions, e.g. transportation and warehousing. The services they fulfil for their customers are standardized, resulting in highly interchangeable services among this type of LSPs. These companies are highly specialized in their field and do not take over coordinational or administrative functions for their customers. They mostly handle homogeneous objects and optimize their whole logistics system with regard to these special logistics objects. Standardizing LSPs plan, implement and control their own logistics system according to their requirements and considerations. Examples are traditional carriers and the integrators' original express parcel services as offered, *inter alia*, by UPS and FedEx. We will refer to them as standardizing LSPs.

The second group consists of companies which combine selected standardized services to bundles of logistics services according to their customers' wishes. We will thus call them bundling LSPs. The operational coordination and arrangement of these service bundles are provided by the LSP, whereas the disposition lies in the responsibility of the buying company. Frequently these bundles of services consist of a core logistics activity, like transportation, which is combined with secondary activities such as simple assembly and quality control activities, performed by traditional forwarding companies in the automobile industry. These bundles are offered undifferentiated for all potential customers and can thus not be regarded as customized services.

We will call the third group customizing LSPs, as these companies design logistics services and logistics systems according to the preferences of their

customers. These LSPs combine and modify components of logistics services especially for the needs of one specific customer. Companies of this type usually take over coordinative and administrative responsibility for their customer as well (Engelsleben, 1999). These providers also offer services which are not originally attributable to the logistics functions, but rather to financing and production activities. The core competence of customizing LSPs can thus be seen on the conceptual and coordination side, themselves outsourcing singular logistics activities to standardizing LSPs[1]. The customizing LSP takes over responsibility for the effectiveness and efficiency of the logistics system of its customer. Examples are the German WM Group and Ryder System in the USA. Table III illustrates the clustering of LSPs according to the customization criteria.

The combination of both dimensions reveals certain basic configurations of LSPs, as the nature of the product determines its potential for customization. Standardizing LSPs offer mainly the core logistics processes, as depicted above. These processes are subject to economies of scale and therefore favour specialized providers of these services.

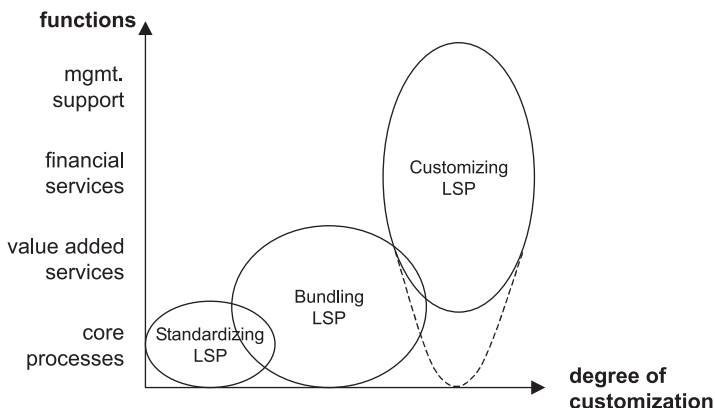
Bundling LSPs offer *ex definitione* more than one standardized product. The bundle they offer will most probably consist of certain core processes and/or value added services with regard to their customers' needs. Standardized financial services, such as insurance or payment services, may as well be part of their product portfolio. However, bundling LSPs will not offer management support services or tools, as these products have to be configured with regard to one special customer. These tools are therefore the domain of customizing LSPs. This group of LSPs will mostly refrain from producing the core processes themselves, as they will be sourced from specialized (standardizing) LSPs. The basic configurations are represented in Figure 1.

**E-commerce**

To understand the importance of logistics in many e-commerce business models, we will first propose a definition of electronic commerce. Subsequently, we will point out the relative importance of logistics for each generic e-commerce business model and describe how supply chains are affected by e-commerce.

|  | Standardizing  | Bundling   | Customizing   |
|--|--|--|---|
|  | Standardized   | Disposal by the customer                                     | Individual, complete logistics solutions for specific customers |
|  | Disposal by the customer                                 | Combination of isolated services and coordination by the LSP | Responsibility for important customer logistics functions       |
|  | Optimization and offering of singular logistics services | Optimization of the bundle of logistics services             | Administrative and disposal tasks                               |

**Table III.**  
Types of LSPs with regard to the standardization of their services



**Figure 1.**  
LSP clusters

“Broadly speaking, electronic commerce includes any form of economic activity conducted via electronic connections” (Wigand, 1997). Although this is a very broad definition of e-commerce, it highlights the two crucial elements:

- (1) economic activity; and
- (2) electronic connections.

An economic activity or, more precisely, an economic transaction can generally be divided into five phases:

- (1) initiation;
- (2) agreement;
- (3) exchange;
- (4) inspection/control; and
- (5) adjustment/service (see Figure 2).

It is clear that the term electronic commerce combines economic transactions with electronical means. The question to be raised is: which of the five phases have to be carried out electronically to allow the term e-commerce to be applied?

We will include the most fundamental transaction phase, that of agreement, at the core of the definition. Furthermore, the electronic initiation of the transaction will be considered an essential component of the term e-commerce. The initiation phase is the phase where electronic means are perceived to offer the most radical changes and improvements (Evans and Wurster, 1997, 1999; Bakos, 1997, 1998) over the physical world. The inclusion of both phases



**Figure 2.**  
Phases of an economic  
transaction

excludes the mere online search for product information followed by a visit in a traditional shop as e-commerce. By the same token, the mere advertising on the Internet without the possibility for closing the deal online will not be treated as e-commerce.

We do not include the electronic exchange of goods or services as a necessary condition for e-commerce. This very narrow approach (Choi *et al.*, 1997) would only comprise digital products, therefore reducing logistics to solely information logistics and render a further discussion of the implications of e-commerce for logistics useless. The electronic conduct of the exchange phase will thus be treated as a non-necessary condition for e-commerce. By the same token, the electronic control and adjustment/service phase are non-necessary conditions as well.

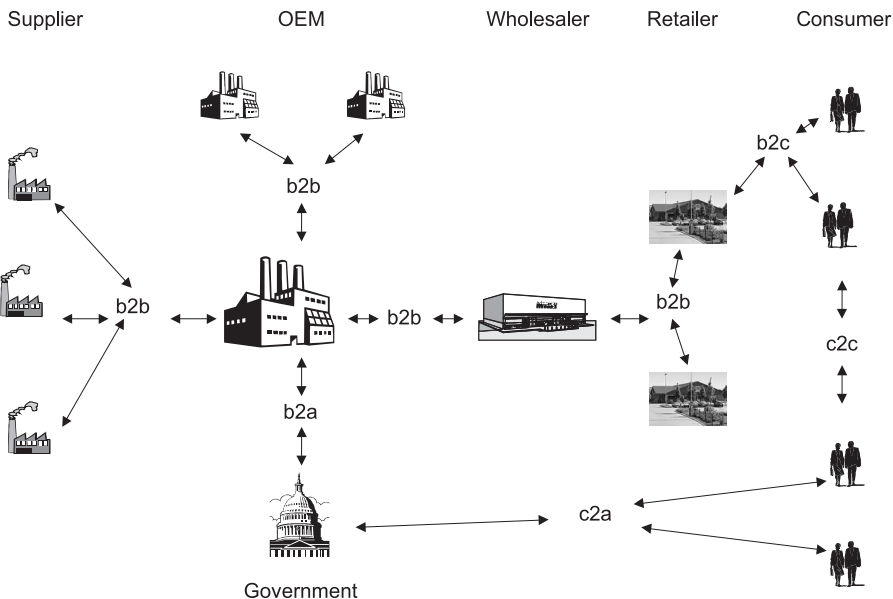
The second essential element of e-commerce is the electronic connection. Electronic connections range from phone lines and telegraphic wires to fibre-optic cables and satellite communication. A definition of e-commerce using the term electronic connection would encompass simple phone ordering. However, this is usually not interpreted as e-commerce. For our purposes, we will focus on computer-to-computer connections via electronic data interchange (EDI) or Internet technology, encompassing the World Wide Web as well as classic EDI/VANs connected to the Internet and using the transfer protocols of Internet technology (Unitt and Jones, 1999). The reason for the concentration on Internet technology is simple: as a two-way communication network overcoming the trade-off between reach and richness of information (Evans and Wurster, 1999) and offering significant potential for lowering transaction costs (Bakos, 1997; Wigand, 1997) the Internet appears to be the currently most promising back-bone for conducting economic transactions. We will concentrate on the Internet, as we expect it to become the only medium for electronic transactions within the next decade. We define e-commerce as the electronic conduct of at least the initiation and agreement phase of an economic transaction via electronic networks that allow the automated processing of transaction data.

E-commerce following this definition can be identified in nearly every possible economic relationship (Figure 3).

By referring to three basic groups of actors (business, administration, and consumer), five general types of e-commerce can be identified:

- (1) business-to-business (b2b);
- (2) business-to-consumer (b2c);
- (3) consumer-to-consumer (c2c);
- (4) business-to-administration (b2a); and
- (5) consumer-to-administration (c2a).

To simplify the examination we will treat governments and other public organizations like businesses where they act as buyers. Furthermore, we will ignore transactions between consumers, thus concentrating on b2b and b2c exchanges.



**Figure 3.**  
Types of e-commerce

Within these types of transactions, three basic classes of business models can be identified:

- (1) portal;
- (2) market maker; and
- (3) service provider (Mahadevan, 2000).

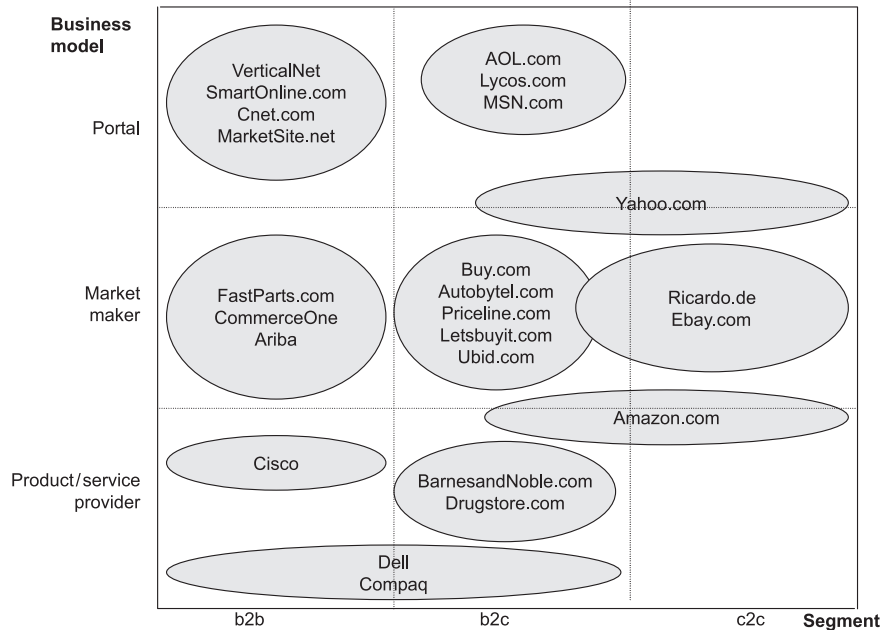
Portals offer information and search services for their customers. They serve as the entrance into the online marketplace and are among the most recognized. Their revenue streams mainly come from advertisements and provision fees for channelling Web traffic to Web sites of product/service providers.

Market makers not only build a community for customers like portals, they also enable economic transactions between them by offering mechanisms for the secure and trustworthy conduct of such transactions. Their source of income can be provision fees for every transaction on the marketplaces enabled by them or one-time charges for developing and establishing electronic marketplaces.

Product/service providers, finally, are companies that sell directly via the Internet. According to our definition of e-commerce they present, market (e.g. at portals) and sell their products/service on the Web. Depending on the type of good/service, the result will be the physical or digital delivery of goods or the performance of some kind of service.

Figure 4 displays the three business models and a sample of companies.

Obviously, some companies span more than one of the generic business models and cover more than one segment, trying to leverage their brand name and customer base (Arthur, 1996). For the scope of our examination, portals are



**Figure 4.**  
Business models in  
e-commerce

Source: Adapted from Mahadevan (2000)

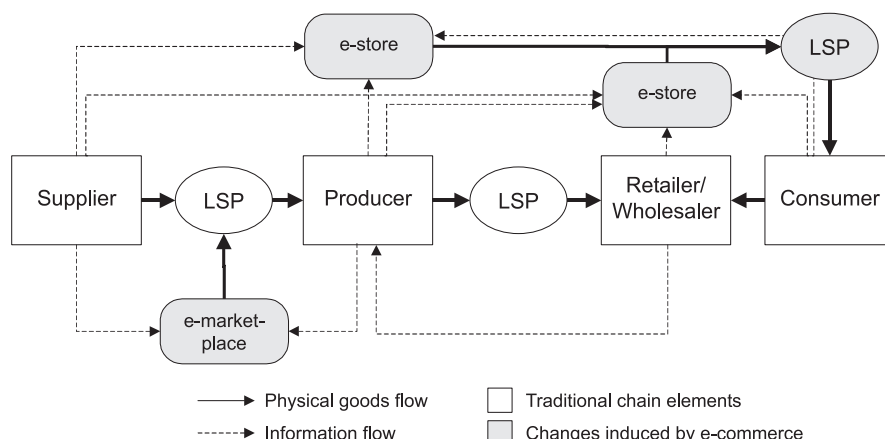
of minor interest, because the only logistics flows they generate are information flows. Of greater relevance are the market makers and of course the product providers, because they generate logistics challenges. As we will see in the following section, some of these challenges caused by e-commerce do not differ from logistics operations and management in traditional businesses. But there are consequences of some business models in e-commerce that lead to completely new supply chain structures and therefore cause yet unknown challenges for logistics operations.

### Changes in supply chain configurations and the role of logistics service providers

The business models for e-commerce described affect the structure of supply chains of whole industries. As illustrated in Figure 5, the main factors of change are the emergence of electronic marketplaces in the upstream part of the supply chain (b2b sector) and the possible disintermediation of the downstream chain (b2c sector) (Delfmann and Albers, 2000). In this section we will describe the effects of electronic marketplaces and disintermediation on the configuration of supply chains and subsequently discuss the implications for logistics service providers.

As we have seen above, constituent elements of e-commerce transactions are that the initiation and agreement phases of a transaction are conducted via the





**Figure 5.**  
Generic supply chain  
and LSP involvement

Internet. Whenever the goods for which the transaction is pursued are physical goods, the subsequent phases involve physical flows between the seller and the buyer. Wherever there are physical goods, a potential field of activity for LSPs is involved.

In traditional supply chains logistics service providers take a prominent role, as goods are to be shipped between suppliers and OEM producers as well as downstream through the distribution chain. The extent to which these activities are outsourced to LSPs differs among industries as well as among individual companies. The grey-shaded boxes in Figure 5 are the new elements added to a generic supply chain by e-commerce applications. They can either complement or substitute traditional supply chain structures. While the e-stores would represent the product/service provider business model described earlier, the e-marketplace could represent a market maker business model.

### Changes in the downstream segment

The first and most obvious point of interference is the stage between consumer and retailer. Traditionally the products were pushed down the chain with the last mile logistics being performed by the consumer himself. In e-commerce the consumer chooses his products on his personal computer via an online store with the fulfilment being handled by the e-commerce provider. This shift has major implications, as decentralized and uncoordinated logistics activities (from individual customers) are transformed into potentially bundled goods flows, which are at least to a certain extent controlled by the supplier side, leaving room for sophisticated planning and design of effective logistics systems (as, for example, traditional home-order companies operate). The opposite is true when the retailer stage is skipped, as if producers offer their goods directly to consumers. In this case highly bundled shipments to retailers are substituted with far less bundled shipments to end consumers. Therefore, both the retailer and the producer will have to reconfigure their established logistics systems from consolidated shipments to small packages. Both effects are the result of the

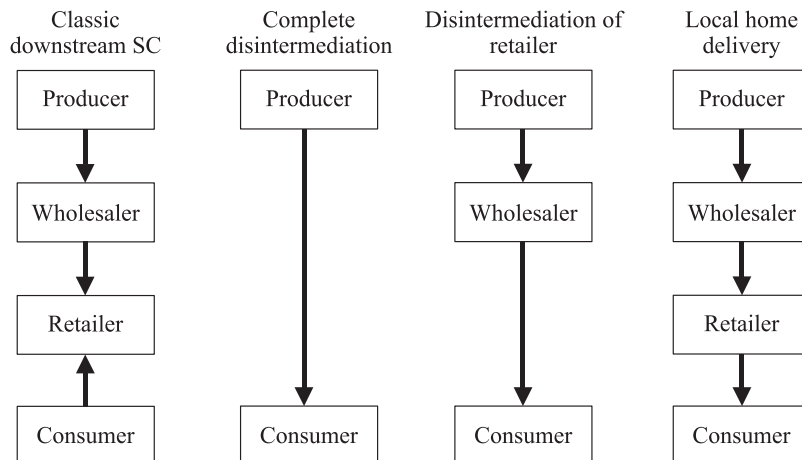
disintermediation phenomenon incurred by e-commerce (Hawkins *et al.*, 1999). In the classical supply chain the retailer was the only interface with the consumer. Figure 6 shows the different possibilities in greater detail.

The reasons for disintermediation are derived from the following logic. Every stage in the chain adds costs in the form of handling, shipping, profits and transaction costs (Benjamin and Wigand, 1995). A producer offering direct home delivery has to answer the question whether the additional costs related to direct home delivery are more than compensated for by the savings incurred from skipping the additional stages of the distribution chain. However, the retail stages not only add costs, they also add value.

Wholesalers and retailers not only are an additional handling stage, they fulfil a vast array of functions (Müller-Hagedorn, 1993). The most important function is to offer an assortment of goods, enabling the consumer to choose between products from different producers (e.g. the consumer can choose between personal computers of at least three or four producers at a computer shop compared with only Dell's pcs at Dell.com). However, the Internet is a medium well suited to offer this assortment function (Evans and Wurster, 1997). The most popular Internet retailer, Amazon.com, offers a product selection of nearly five million items, including more than four million books. This compares with 200,000 books at the largest offline book-stores. But this vast selection is not, as many analysts and shareholders may have believed, a virtual selection. Amazon has to manage inventory, pick and pack, and ship items as well as every other offline mail order company – on a larger scale. As Jeff Bezos, founder and CEO of Amazon.com, remarks: "Amazon.com is most of all a logistics company" (see, for example, *Logistik Heute*, 2000; Gurau *et al.*, 2001).

### Changes in the upstream segment

The supplier in the generic supply chain (see Figure 5) does not offer goods of interest to the consumer or the retailer, thus isolating him from the downstream



**Figure 6.**  
Forms of supply chain  
disintermediation

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part of the supply chain. E-commerce for him becomes visible through electronic marketplaces, where a fraction of his products will be procured from his customers. In the classic supply chain the supplier-producer or producer-retailer relationships were characterized as stable networks of a limited number of partners interconnected via dedicated electronic data interchange (EDI) connections. The use of spot market transactions for procurement was limited to a few commodities like crude oil due to the high transaction costs for the establishment and then operation of market-based procurement platforms. Modern information technology in the form of the Internet and related protocols can reduce this transaction costs in two ways. The costs of establishing electronic market systems are reduced drastically by the high connectivity of the Internet. Furthermore, the Internet offers the potential for lowering search costs as an important part of overall transaction costs (Bakos, 1997). For the structure of the supply chain this implies more potential partners in a less stable network.

These new open marketplaces create a challenge for supply chain planning, since they could introduce a change from stable, long-term relationships with suppliers towards unstable spot-market relationships with changing partners in certain industries. But these traded goods will still have to be transported to the customer; therefore the role of LSPs is – in general – not disputed. However, e-marketplaces are considering closer ties to preselected LSPs, aiming at providing their customers with higher service levels when trading in their market. In this case a selection among LSPs becomes probable. Even in those cases where the use of modern IT does not lead to the introduction of electronic marketplaces it will allow for a much higher integration of supply chain partners, which could lead to different order patterns and therefore to new challenges for LSPs.

To summarize, e-commerce business models are distinct from offline business models not only because of higher interactivity and 24/7 availability. They promote the importance of logistics (Gurau *et al.*, 2001) and, in many cases, create different logistical tasks. The logistical systems of many companies, especially in the retail sector, are not sufficient to manage the new challenges. In order to participate in e-commerce, companies will have to seek new logistical solutions. Pure e-commerce players will, in the worst case, have to focus on logistics as well as on marketing; offline players will have to build a second logistical structure when participating in e-commerce. This offers great opportunities for logistics service providers.

### **Strategic impacts for LSPs**

As seen above, changes in the supply chain are encountered in the b2b (upstream) section regarding electronic marketplaces, and with regard to the disintermediation phenomenon on the downstream b2c side[2]. However, the physical goods flow does still have to be performed, wherefore it does not threaten the role of LSPs in general. But as different requirements are directly

linked to, and are an immediate consequence of, disintermediation and e-marketplaces, LSPs have to reconsider their strategic positioning.

*Marketplaces and LSPs*

Contracting at b2b marketplaces implies four major aspects of importance for LSPs, which we will consider subsequently:

- (1) the duration of relationships;
- (2) the geographical dispersion of customers and vendors;
- (3) the type of goods traded in e-marketplaces; and finally
- (4) the type of contracts which are concluded.

We will argue from the buyer side but the same applies *mutatis mutandis* for the supplier side.

The most obvious and frequently mentioned characteristic of e-marketplaces is the rise of short-term, spot-based transactions with a varying and great number of different suppliers. With regard to the logistical implications, we arrive at a substitution of long-term predetermined logistics flows through stable networks by physical flows through constantly- and fast-changing origin- and destination pairs. Obviously, this is important for the transportation function, as long-term line-services, which regularly shuttle on certain city-pair relations, may no longer be feasible. Instead, LSPs fulfilling logistics for electronic marketplaces have to offer a more flexible transport system in order to serve fast-changing customers. Regarding warehousing as another core process, a shift from single-customer warehousing towards multi-customer warehousing is to be expected for those industries where electronic marketplaces increase the number of potential transaction partners. Especially automated warehouses are subject to large economies of scale and therefore require a high capacity utilization, which can be achieved more easily by the shared use of one warehouse by several parties (multi-user warehouse). However, already the constantly changing transport relations have to be considered in the company's logistics function, adding to the ever-increasing complexity of the logistics system.

In addition to the short-term relationships and the thus permanently changing configuration of the logistics network, another aspect has to be considered, which is tightly related to the dynamic aspect of decreasing relationship duration. This is the aspect of geographical dispersion of suppliers. Not only does the danger exist that origin-destination pairs change with every contract negotiated at an e-marketplace. It is also probable that the contracting suppliers' locations are considerable distances apart. For LSPs this implies the question of geographical coverage. If the buyer closes longer-term contracts with one LSP to handle all of its physical procurement activities, it has to be sure that this LSP covers all relevant geographical regions (Wong *et al.*, 2000). The question of coverage is especially valid for standardized and bundling LSPs, as they mostly operate with dedicated assets, whereas, for the

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customizing LSPs, the know-how of whom to contact and which facilities are accessible is of major relevance.

There are two other aspects which have impact on the suitability of e-marketplaces in general not only for the supplier, but for the LSPs as well. These are the type of goods shipped as well as the type of contract companies negotiate on e-marketplaces. It has been pointed out that not all types of goods are suitable for contracting in e-marketplaces (Bretzke, 2000). Following a frequently cited differentiation of goods types, commodities are the prime subjects for trading in e-marketplaces. Although not all commodities are shipped as bulk-shipments, the logistical requirements for commodities are, to a certain extent, standardized and not very high, that is they do not pose special requirements regarding transport and handling equipment, etc. Therefore, when focusing on the type of goods contracted in e-marketplaces, it may be stated that these goods are, in general, suitable for standardizing and bundling LSPs. Regarding the type of contracts which are negotiated in e-marketplaces it appears reasonable to differentiate between long-term delivery contracts or short-term spot-delivery contracts. Whereas the long-term contracts between buyer and seller specify a certain amount of the good in question to be delivered over an extended period of time – that is, the price and conditions of delivery are fixed by the market mechanism, but not the whole quantity of the product in question has to be delivered at once – the short-term contracts require the supplier to deliver the agreed quantity at one specified point in time. Whereas the former eases the short-term problems and challenges, as discussed before, to a certain extent, the latter even complicates them.

The emergence of e-marketplaces seems to favour standardizing and, to a certain extent, bundling LSPs, as requirements regarding transport services rise significantly. Short-term relationships between buyer and seller, fluctuating geographical distances and greater dispersion of buyer and customer favour those LSPs of this type who operate an extensive network in order to be able to cover all city-pairs required by their potential customers. In addition to the mere geographical extension, the question of network density arises. With the term network density we try to grasp that a network in a given geographical area contains a certain number of nodes, relations and services along these relations in a given frequency. Short-term contracts favour LSPs which offer a high network density, as they can comply with nearly all the requirements of the customers.

The above is certainly true if the contractor has sufficient logistics know-how to design the logistics chain himself, that is he will take care of the disposal of the logistics services. He might then enter long-term contracts with standardizing LSPs or bundling LSPs in order to be able to fulfil the contracts. This might be either the buyer or the supplier but may as well be the market maker (if different from the buyer or seller), who offers the fulfilment as an additional service to the users of his marketplace. However, with regard to the continuing outsourcing and core competency-shrinking (e.g. van Laarhoven *et al.*, 2000; Rabinovich *et al.*, 1999) companies are not willing to build up, or

even do not want to keep, possibly existing logistics know-how. In this case, customizing LSPs are provided with generous opportunities for expansion in the marketplace. Customizing LSPs will take over the planning of the respective supply chain for supplier, buyer or the market maker. Customizing LSPs with their consulting and IT knowledge will also be involved in the design and implementation of the e-marketplace as a procurement tool in the logistics system of the company in focus.

Taken together, for network-related LSPs, such as standardizing and bundling LSPs, the configuration of the network they operate is a source of competitive advantage. They rely on their efficient systems design and get involved in delivery and fulfilment activities by customers with considerable personal logistics know-how. This seems especially true for the Internet product/service providers such as Amazon.com, who see themselves as logistics companies. Standardized and bundling LSPs rely on their efficiency and the scope of their network as a source of staying in this highly competitive market. For customizing LSPs market opportunities tend to rise, as requirements on supply chain configuration and management increase significantly, as pointed out above.

#### *Disintermediation and LSPs*

Discussing the disintermediation phenomenon requires the specification of essentially two aspects:

- (1) the degree of disintermediation (or substitution) of existing supply chains; and
- (2) the structure of shipments induced by a supply chain designed to comply with the requirements of e-commerce.

The degree of disintermediation seems worthwhile, considering that disintermediation is not necessarily total or non-existent. We will use the term degree of disintermediation for the extent to which a distribution via e-commerce replaces the traditional distribution chain. Regarding producers who simply add the Internet distribution to their marketing and ordering channels, they are required to design and operate two parallel but different channels in their supply chain. Therefore it might be argued that, instead of the elimination of a stage in the distribution chain, another layer is added to the chain; at least in the short run it does not threaten the distribution via the traditional channel. In the case where one or more stages of the traditional channel are abandoned disintermediation occurs.

Whereas the traditional distribution chain still benefits from consolidated transports to the traditional customers, such as wholesalers and distributors, a distribution chain bypassing these stages will have to handle smaller shipments, which have to be shipped directly to the consumer. In contrast with the b2b case this not only is of relevance for the transportation process but has implications for all prior activities such as warehousing, commissioning, labelling, payment, etc. as well. For all upstream actors in the supply chain who

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consider bypassing any downstream stages in the chain, this implies the design and implementation of completely new logistics systems, designed to serve the requirements of consumer distribution.

It may be expected that standardizing LSPs will take over responsibilities in the distribution of the small packages to end consumers, as they operate large networks, therefore providing the networks needed for Internet distribution as well as the dedicated transportation and handling capacities to transport the packages in a short time. For a timely delivery large transportation networks have to be established and the volume of traffic has to be large enough to allow for capacity optimization. It is known that in this area economies of traffic density are to be gained and thus it favours large operating distribution systems. Value added services can be regarded as considerably important as well. The handling of returns, payment services etc. is important as well, offering LSPs, which provide all these services, a potential for growth.

Customizing LSPs will also benefit from this new orientation, as completely new logistics strategies, warehouses, commissioning systems, distribution concepts etc. have to be worked out, requiring in-depth logistics know-how which they possess. The operation of the implemented facilities will most probably also be transferred to these providers. Logistical consulting services, the set-up of appropriate software tools for controlling and managing the extended supply chains, are expected to rise as well. This is especially true, as the competition among the different companies in the Web (product providers) will be based considerably on fulfilment services. One example of this strategy can be observed in books delivery, where Bertelsmann's affiliate BOL offers four-hour delivery for a selected portfolio of books. In order to use logistics and fulfilment as an effective tool in competition among Internet-based vendors, logistics know-how is indispensable. Furthermore, with regard to the economies of traffic density referred to earlier, it becomes more and more interesting to allow warehouses and transportation to be operated by specialized LSPs, which use their capacity more effectively by combining offers from several Internet stores. It can thus be argued that in an intermediate period the demand for logistical consulting and other services rises as well. These are high margin operations which will attract a number of companies from different segments, which have so far refrained from entering the logistics markets.

With regard to the b2c segments we thus arrive at a differentiated conclusion. On the one hand, demand for standardized services will increase as well as the demand for logistics consulting and other services. However, this is only true for companies which have not yet seen logistics as their core competence. Regarding mail order companies such as Otto Versand in Germany, which even operate their own parcel service, these companies possess the know-how as well as the facilities necessary to compete on their own in the marketplace in the age of e-commerce. It may even be assumed that they offer their services to other companies, therefore attracting additional business, and explore even further economies of scale and density.

*Strategies for LSPs*

How will LSPs have to address the challenges just outlined? We propose essentially two strategy components, which can be roughly described as flexible capacity management and global presence. Both factors can be regarded as indispensable for LSPs in the e-commerce environment and should thus be included in the overall competitive strategies of the companies concerned[3].

To cope with the challenge of more short-term, spot-based transactions via electronic marketplaces, LSPs should strive for a more flexible capacity management in order to achieve a high capacity utilization, despite the more unstable order amount they will face. Classical long-term relationships with a regular shuttle service guarantee a high stability in planning and therefore make it relatively easy to achieve a high capacity utilization. As we have pointed out above, this planning stability is lacking in e-commerce-dominated markets and therefore LSPs run the risk of under-utilization of their fleets when serving electronic marketplaces. They have to ensure that the part of the fleet not used for long-term contracts (which will still account for a large part of their services) does not cause high costs due to low utilization. Basically, two possibilities exist to prevent this:

- (1) reduction of the personal asset base; and
- (2) spot market offering of unutilized capacity.

The first alternative includes the reduction of their asset base by decreasing the fleet size to the level needed for long-term contracts and relying on transportation spot markets for buying excess capacity if needed. This would be a classic outsourcing strategy. Second, they could hold on to that part of their fleet no longer needed for long-term contracts and offer the excess capacity to transportation spot markets, becoming a capacity provider specializing in spot-market transportation, offering capacity not only for the companies exchanging goods in electronic marketplaces but also for other LSPs who follow the first alternative. Either way, the objective has to be to increase the flexibility of the capacity in transport or warehousing (Romaine, 2000).

Both alternatives in pursuing the flexible capacity management strategy include the use of electronic marketplaces for logistics services, especially transportation services. These marketplaces would have to be directly integrated with the product marketplaces, thus immediately offering a logistical service for every transaction conducted on the product market. This can thus be seen as offering new opportunities for LSPs: provided that they could gather sufficient IT knowledge (or the right software partner), they could act as a market maker for electronic marketplaces for logistical services.

In addition to these special opportunities that IT knowledge might offer for some of them, all LSPs will have to reach a certain IT standard to survive in the market. Their IT systems must be able to support the goods and information flow and allow an integration with their customers' systems. This means that many of today's LSPs are not up to the challenge, as recent studies show (Delfmann *et al.*, 2000). Computerized systems for network and capacity



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planning, as well as fully automated order administration systems, are the basic prerequisites for every LSP in the future together with a seamless systems integration across company boundaries.

The second strategy component we consider as essential to survive in e-commerce-coined markets is to achieve a global presence. LSPs will thus have to consider a classic make-or-buy decision when trying to build this global presence:

- organic growth;
- mergers and acquisitions;
- cooperation strategy; and
- extensive use of local logistics spot markets.

The organic growth strategy seems inappropriate with regard to the time horizon necessary for pursuing such a strategy in e-commerce markets. The second strategy can be pursued over a much shorter time period but requires massive financial resources. This strategy has been recently pursued by German logistics giant Deutsche Post World Net (Klaus, 1999). The currently most popular strategy, which obviously circumvents the disadvantages of the two alternatives described before, is a cooperation strategy, which results in forming strategic alliances with regional partners in order to enable every alliance member to offer a global service network. However, alliances have disadvantages as well: they are fragile structures, as partners may leave the alliance due to changes in corporate strategy or because they are acquired by other companies, leaving a white spot in the network structure of the alliance just abandoned (Hertz, 1996, 1998). Furthermore, there are specific challenges in the management of alliances (e.g. Das and Teng, 1997; Doz and Hamel, 1998; Kanter, 1994) which have to be taken into account. The extensive use of local spot markets can be seen as an extreme transactional form of the buy-decision. An LSP performing this strategy in no way needs personal assets (or at least only to a rather limited extent), as he can buy all necessary capacity in spot markets, therefore providing him with a high flexibility and enabling competitive pricing behaviour. However, he is dependent on the capacity decisions of other competitors, which might react by not offering capacity in spot markets or by demanding higher prices for capacity offered in these markets.

### **Conclusion**

In this paper we identified the two major changes induced by e-commerce, which were disintermediation and the upcoming electronic marketplaces. For both changes we specified logistically relevant drivers. These are for electronic marketplaces:

- the duration of relationships;
- the geographical dispersion of customers and vendors;

- the type of goods traded in e-marketplaces; and
- the type of contracts which are concluded.

With regard to the disintermediation phenomenon the drivers were:

- the degree of disintermediation (or substitution) of existing supply chains; and
- the change in the structure of shipments.

We suggested two fundamental strategies, which have ever since been important in the logistics market but rise in importance with the upcoming e-commerce. These are flexible capacity management and global presence.

For the types of LSPs identified earlier, we therefore see a movement towards the two extremes of our continuum due to the need for specialization. The standardizing LSP with flexible capacity management and global presence will rise in importance, as disintermediation and the emergence of parallel distribution chains for e-commerce advance. The customizing LSP will rise in importance, as he can specialize in logistics know-how and his management and consulting abilities, which will be needed in the fast-changing marketplace. This poses a significant contradiction to the efforts of many specialized LSPs to become bundling LSPs which we have witnessed in the last years. We conclude that the bundling LSP will lose market share, as customers will turn either directly to the customizers, which will in turn selectively involve specialized LSPs, or to the standardizers. By implementing the strategies outlined above, bundling LSPs may still endure in the marketplace but will sooner or later be forced to decide whether they become customizers or standardizers.

#### Notes

1. However, a definite statement regarding asset ownership of these firms cannot be made, as customizing LSPs may at least partially own dedicated assets to perform certain logistics functions. Customizing LSPs can also be regarded as a fourth party (Fourth Party Logistics Provider, 4PL) in the traditional relationship between buyer, seller and third-party logistics firm (Bedeman, 2001).
2. It can be argued that a third change, the fundamental shift in the structure of shipments from bundled to small package shipments, is relevant as well. However, we have subsumed this point to the disintermediation phenomenon described below.
3. It should be stressed that neither of the two components *per se* offers a competitive advantage, but needs to be properly embedded in the overall competitive strategy of the company. However, both components outlined here are suited to support cost leadership or differentiation strategies (Delfmann and Reihlen, 2002; Porter, 1985; Barney, 1996).

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