

Business-to-Business Marketplaces for Freight Transportation

By

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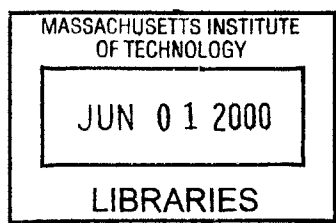
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Abstract

Business-to-business (B2B) marketplaces bring together buyers and sellers in different industries using the Internet to conduct or facilitate business transactions. Among these new intermediaries or “infomediaries” are several firms that address spot market transactions and long-term contract negotiations for truckload, airfreight, ocean and intermodal shipments. Most of the initial activity in freight transportation has focused on the highly fragmented truckload sector. Currently, none of these firms process enough shipments to constitute critical mass or a self-sustaining business model. Without liquidity, B2B marketplaces that rely solely on an exchange cannot present a viable alternative to existing transportation intermediaries, such as brokers and forwarders, since shippers’ orders cannot be frequently matched with carriers’ capacity. Channel mix and domain expertise are the critical *strategic mobility barriers* for B2B marketplaces. Firms must make strategic decisions early about whether to include or exclude existing intermediaries and also how carriers’ direct sales forces may be displaced. The service offering must either reinforce or replace the basic functions of intermediaries. Technology leadership in applications critical to shippers (e.g., shipment consolidation, mode selection and combinatorial bidding) is a proxy for domain expertise and will largely determine a company’s ability to differentiate its offerings and form a broad versus narrow line. Shippers will receive the greatest benefit from B2B marketplaces and Internet-based transportation management systems present the best opportunity for value creation.

This research examines indirect channels for freight transportation and the specific functions performed by existing intermediaries. Trading models are categorized and four case studies of truckload marketplaces are presented. Frameworks are provided for channel structure and strategic groupings.

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1 Introduction

As of March 2000, over 600 companies with venture capital funding were attempting to establish business-to-business (B2B) marketplaces to bring together buyers and sellers in different industries (AMR Research, 2000). Among these new firms were several that addressed spot market transactions and long-term contract negotiations for the different modes of transportation. Initially, most of the activity has occurred in the highly fragmented truckload sector. Companies are attempting to quickly develop independent trading networks for truckload, airfreight, ocean and intermodal shipments. These new firms rely on the Internet to conduct or facilitate business transactions.

1.1 Motivation for Thesis

This research analyzes the critical success factors for Internet-based transportation marketplaces. Initially, the US market for freight transportation is considered including the role of existing intermediaries. Current offerings of business-to-business marketplaces for truckload transportation services are categorized and four case studies are presented with different business models. The perspectives of key stakeholders — shippers, carriers and intermediaries — are examined followed by probable future trends. The conclusion outlines critical success factors for these firms.

1.2 Market Size

In the United States, \$503 billion was spent on freight transportation in 1997 (US DOT, 1999). Figure 1-1 indicates the distribution of freight expenditures among transportation modes. Trucking is the dominant mode and accounts for nearly 80 percent of all transportation spending.

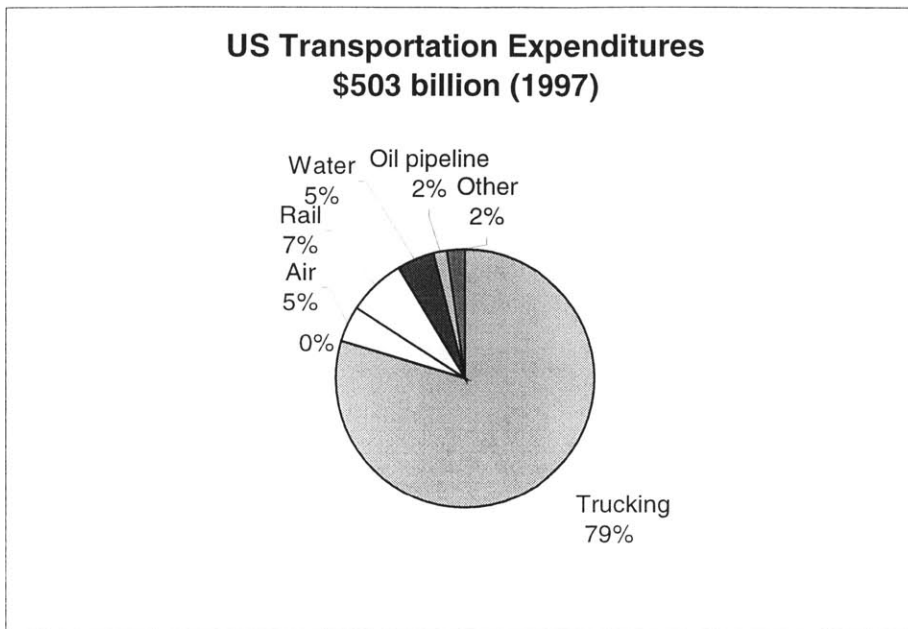


Figure 1-1 US Transportation Expenditures (1997)

Source: US Department of Transportation, Bureau of Transportation Statistics

Segmentation by type and number of firms for the motor carrier industry is provided in Figure 1-2. The truckload sector is the most highly fragmented with approximately 50,000 firms. The four largest truckload carriers — Schneider National, J.B. Hunt Transportation, Swift Transportation and Werner Enterprises — account for just 12 percent of the total revenues for the sector. Not surprisingly, the truckload sector has attracted the most intermediaries (see Property Brokers below). The less-than-truckload (LTL) sector is more concentrated: the four largest LTL carriers — Yellow, Roadway Express, Consolidated Freightways and Con-Way — account for 57 percent of total revenues. The next largest transportation mode, rail, is highly concentrated. The four largest rail carriers — Union Pacific, CSX, Burlington Northern Santa Fe and Norfolk Southern — account for nearly 99% of industry revenues (See Exhibit 1, Market Fragmentation for US Transportation).

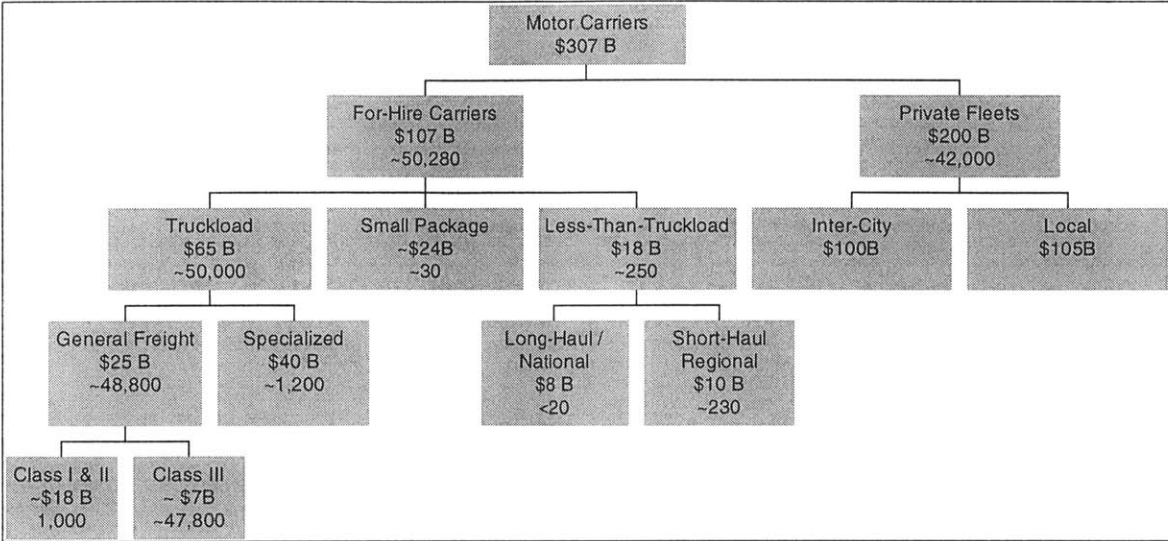


Figure 1-2 Trucking Industry Structure (1997)

Source: Standard & Poors (1998)

Revenue classification: Class I, greater than \$10 million; Class II, \$3-10 million; Class III, less than \$3 million

According to Goldman Sachs, the amount of freight transportation sales that originate on the Internet will reach \$40.5 billion in 2004.

	1998	1999	2000	2001	2002	2003	2004
Transportation/ Freight	308.1	317.3	326.9	336.7	346.8	357.2	367.9
% Internet Based	0.5%	1.0%	2.5%	4.0%	6.5%	9.0%	11.0%
\$ Internet-Based	1.5	3.2	8.2	13.5	22.5	32.1	40.5

Figure 1-3 Estimates of Internet-based Freight Transportation Sales

Source: Goldman Sachs (1999)

The presumption of many industry analysts is that a large portion of these sales will be initiated on business-to-business transportation marketplaces that represent transactions between many buyers and many suppliers rather than carrier web sites that provide access only to a single carriers' set of services.

1.3 Freight Transportation Intermediaries

“You can eliminate a mediator, but you cannot eliminate the mediator’s *functions* (promotion, inventory, receivables, assumption of risk, etc.). All you end up doing is *shifting* the functions either up the channel to marketers, or down the channel to customers.”

— Mohanbir Sawhney, Professor of Technology Marketing, Kellogg Graduate School of Management, Northwestern University.

Traditional freight transportation intermediaries provide a context and a basis of comparison to examine new information intermediaries or “infomediaries.” To redefine the channel structure by supplanting existing intermediaries or by inserting themselves as a new layer of distribution, new firms must be aware of what services are provided and how value is created. With the exception of integrated airfreight carriers, transportation carriers tend to focus on a single transportation mode (i.e., truck, rail, air or water). By necessity, management attention is directed at asset utilization.

In general, transportation intermediaries can be categorized as either **brokers** or **forwarders**. Brokers perform a matching function, by finding carriers for shippers and vice versa, predominantly for truckload shipments. Legally, brokers are not responsible for carrier performance. Forwarders perform a coordination function by arranging transportation across different transportation modes, particularly the handoffs to and from ocean carriers and airlines. Typically, forwarders will also consolidate shipments. To a shipper, a forwarder acts as a carrier; to a carrier, a forwarder is a shipper.

The 1997 US Economic Census indicated that the industry referred to as Freight Transportation Arrangement — North American Industry Classification System (NAICS), formerly Standard Industry Classification (SIC), code 4885 — had total revenues of \$16 billion. Firms that arrange and manage the movement of goods without owning the freight or the carrier equipment are generically known as third parties or intermediaries. The terms used to characterize the activities of these firms primarily describe the interaction with a single transportation mode or regulatory body. In practice,

many firms engage in a combination of these activities in arranging transportation for customer shipments.

Mode	Intermediary Term	Regulatory Agency
Truck	Transportation property broker, freight forwarder	Federal Highway Administration
Rail	Intermodal marketing company	—
Air	Airfreight forwarder (international and domestic) or indirect air cargo carrier, air cargo agent	Federal Aviation Administration (International Air Transport Association)
Water	Ocean freight forwarder, non-vessel-operating common carrier (NVOCC),	Federal Maritime Commission

Figure 1-4 Mode, Intermediary and US Regulatory Agency

Other intermediaries include customs brokers, shipper associations, export management companies, and freight consolidators.

By convention, freight transportation intermediaries record the total freight charges to customers as sales, not just the firm’s commissions. Net revenue, or gross profit, is the difference between what is paid for freight services (purchased transportation) and what is charged to customers for these services (gross revenues). By aggregating buyers, a third party can negotiate with larger freight volumes than its customers and therefore can obtain lower prices and better service commitments than a firm could achieve on its own. Third-party firms are the fastest growing segment of the freight industry. By some estimates, third parties account for 20 percent of the freight shipments and, depending on the industry segment, are experiencing growth rates of greater than 10 percent a year (US DOT, 1998).

In 1999, the Transportation Intermediaries Association (TIA) conducted a survey of its membership. The response rate for the survey was 53% with 323 responses from 614 regular members. Most of these intermediaries (83% of members) have annual revenues of less than \$10 million; 250 of the 614 have revenues of \$1-4 million. The primary revenue source for the majority of respondents (61%) is from truck brokerage, predominantly truckload. The most commonly handled commodities in order of response are paper, building materials, steel, grocery and food products, machinery, consumer packaged goods and chemicals. Less than one-third of these intermediaries offer any type of electronic data interchange (EDI) service and less than 17% offer Internet-based shipment tracking. Forty-two percent operate warehouses.

1.3.1 Property Brokers

A property broker arranges transportation services by truck for which a motor carrier performs the actual movement. Brokers assume no responsibility for the property being transported. Traditionally, brokers of property (freight) are distinguished from household goods brokers. Regulatory requirements are minimal: anyone with \$300 for the filing fee and a surety bond in the amount of \$10,000 may obtain a property broker license. As of October 1998, there were approximately 10,000 property brokers licensed by the Federal Highway Administration.

Brokers work either on behalf of shippers in need of a carrier or carriers in need of shipments. Typically, brokers charge their customers a markup of 10-15% over the motor carrier's transportation charge (Business Horizons, 1995). Many truckload motor carriers also engage in brokerage activities primarily to capture more business from shippers. Industry experts estimate that property brokers account for between 5-10 percent of total truckload revenues or \$3.25-6.5 billion (with a 15% markup, \$3.74-7.5 billion) with a high variability related to seasonality (this estimate is based on conversations with executives from Werner Enterprises, CRST International, and OTR Express, Vos (1999)

MIT Survey results and Standard & Poor's (1998) estimated truckload market size of \$65 billion).

C.H. Robinson is the largest property broker in the United States with gross revenues of \$2.04 billion and net revenues of \$245.7 million in 1998, representing a markup of 12%. Other companies that derive revenues primarily from truckload brokerage operations include Pittsburgh Logistics Systems (\$280 million in gross revenues for 20 customers, recently started eflatbed.com) and Allen Lund (\$100 million in gross revenues for 72,000 shipments). Truckload carriers with large brokerage operations include Schneider, the Transplace carrier-investors — Covenant Transport, JB Hunt, MS Carriers, Swift Transportation, US Express and Werner Enterprises (see Figure 2-8 Operating Results for Transplace Carriers), and Landstar, Inc. (\$250 million in gross revenues with an operating margin of 3%). The Transportation Intermediaries Association lists 258 property brokers as members 27 of which have annual revenues in excess of \$20 million.

1.3.2 Surface Freight Forwarder

Domestic or surface freight forwarders were once subject to the control of the Interstate Commerce Commission and had a very defined type of service they could offer the public. However, the industry was deregulated in 1986. Today, freight forwarders are subject only to registration and insurance requirements. As a result, these forwarders now offer a variety of services. Normally, surface freight forwarders perform a consolidation function and provide some value-added service such as assembly and end-distribution. Unlike a broker, freight forwarders act as carriers and assume the responsibilities of a common carrier when arranging freight transportation. Normally, forwarders also issue bills of lading. As of October 1998, there were 817 active surface freight forwarders licensed by the FHWA (Source: FHWA Federal Register Notice).

1.3.3 Intermodal Marketing Companies

Intermodal marketing companies (IMCs), also known as intermodal management companies, essentially are wholesalers of rail-truck intermodal services. An IMC will retail intermodal or piggyback services to shippers. In the case of trucking fleets (for-hire and private) or ocean carriers, customers may own the container or trailer that is transported. For end customers, an IMC will arrange rail transportation and local drayage for pickup and delivery. IMCs select the carriers, handle the billing, process claims and maintain equipment pools of containers and trailers. IMCs are often affiliated with a carrier such as a railroad or trucking company. The Intermodal Association of North America (IANA) lists 48 IMCs among its 640 members. Industry consolidation has occurred over the last ten years and the number of IMCs has been reduced from 400 to 85 in 1999. The ten largest companies account for 75% of the market (Journal of Commerce, 2000). Intermodal containers and trailers account for roughly 15 percent of total rail revenues and 6.8 percent of the tonnage number — about 100 million tons (Association of American Railroads, 1996).

The Hub Group, Inc. is North America's largest intermodal marketing company with gross revenues from intermodal services of \$910 million in 1998 and a net revenue margin (gross margin) of 12%. Mark VII Transportation, Inc. (recently acquired by MSAS Global Logistics, a subsidiary of Ocean Group, PLC.), also derives its revenues primarily from rail-truck intermodal services; gross revenues in 1999 were \$725 million with a net revenue margin of 12%. Other IMCs include Pacer International (a recently formed combination of smaller IMCs with revenues of \$970 million), Railvan (gross revenues of \$400 million), Alliance Shippers, GSTX and FreightConnection.

1.3.4 Airfreight Forwarders

US airfreight forwarders originally were licensed by the Civil Aeronautics Board to pick up, deliver, consolidate, and containerize freight moving by air. With the elimination of federal regulatory controls in the mid-1970s, the industry now provides a full range of intermodal air-related services. Currently, indirect air cargo carriers are only regulated by

the Federal Aviation Administration with respect to airport security, Title 14 of the United States Code (Aeronautics and Space) Part 296. Because of marketplace forces, there are few clear distinctions among the different players in the U.S. air freight industry—forwarders, cargo agents, and cargo consolidators. International airfreight forwarders are accredited by the International Air Transport Association (IATA). These intermediaries provide a wide variety of services on international shipments which can range from: supplying the necessary U.S. and foreign documentation; arranging rates and routings as well as storage and warehousing; and, meeting hazardous materials requirements, special packaging or handling needs, or any other licensing or regulatory rules.

Cargo Network Services, an affiliate of IATA, manages a centralized clearinghouse for airfreight called the Cargo Accounts Settlement Systems (CASS). It reports cargo sales and settles accounts between cargo intermediaries and carriers. In 1998, CASS was in operation in over 30 countries, processed 13 million documents and settled \$12 billion in cargo sales. (Source: IATA http://www.iata.org/cargo/agency_cass.htm). IATA has approximately 267 member airlines throughout the world. From the US there are only 18 airlines, including FedEx and UPS. The organization has accredited 5,900 air cargo agents worldwide (including forwarders, cargo handlers and consolidators). Cargo agents do not consolidate shipments and, like travel agents, receive a commission from airlines for booking freight shipments. Approximately 1,500 companies currently use the CASS system.

Airfreight Forwarder Survey (Malkin, 1999)

Cargo Network Services, an affiliate of the International Air Transport Association, conducted a survey of US-based airfreight forwarders in 1999. Among the key findings from the 381 respondents:

- only 3% provide worldwide coverage
- 39% reported that air cargo represented 80-100% of revenue
- 42% provide customs brokerage

- consolidation activities differ considerably among airfreight forwarders: 13% perform none whatsoever, while only 2% consolidate 100% of shipments
- 89% make at least occasional use of all cargo lift, suggesting that there is not enough capacity provided by passenger airlines.

According to the Boeing World Air Cargo Forecast (1998/1999), world air cargo is a \$40 billion industry. In 1997, US airfreight expenditures were \$22.7 billion. Express carriers such as Federal Express and United Parcel Service account for 60% of US domestic airfreight revenues; scheduled carriers (mostly passenger airlines) account for about 25%. Air Express International (AEI) is the largest airfreight forwarder in the US with \$1.2 billion in gross airfreight revenues. The company was recently acquired by the Danzas division of Deutsche Post.

Most of the large freight forwarders offer both airfreight and ocean transportation services and have offices throughout the world. The largest freight forwarders are based in Europe: Kuenhe and Nagel with gross revenues of \$4 billion, Panalpina (\$3 billion) and MSAS Global Logistics (\$2.6 billion). Companies with headquarters in the US include AEI (\$1.5 billion), Fritz Companies (\$1.3 billion), Expeditors International (\$1 billion) and Circle International (\$738 million). Exhibit 2 provides an analysis of ocean and airfreight revenues for US based freight forwarders.

1.3.5 Ocean Freight Forwarders, Non-Vessel-Operating Common Carriers

Ocean freight forwarders and non-vessel-operating common carriers (NVOCC) arrange intermodal services for domestic or international shipments when the transportation involves the use of bulk or liner water carriers. Ocean transportation intermediaries are licensed by the Federal Maritime Commission. These intermediaries must obey any tariff filing requirements or other economic controls imposed by the agency. NVOCC is a common carrier that does not operate the vessels by which the ocean transportation is provided and is a shipper in its relationship with an ocean common carrier. (Source: Title 46 United States Code Part 583.1d) The NVOCC issues bills of lading, publishes tariffs

and otherwise conducts itself as an ocean common carrier — such as billing and processing of loss and damage claims — except that it will not provide the actual ocean or intermodal service. (Source: US DOT Maritime Administration Dec 11, 1999 web site <http://www.marad.dot.gov/publications/Glossary>)

Many of these firms arrange end-to-end service for customers i.e., ocean transportation and inland transportation by truck or rail for the origin and destination. Others have a geographic focus and simply arrange a portion of the ocean to inland transportation either at the origin or destination port. Forwarders usually provide the necessary documentation for importing or exporting goods. Typically, other firms operate container depots and provide consolidation functions for less-than-container load shipments.

Industry experts estimate that NVOCCs account for 20-30% of ocean carrier revenues. (Source: based on conversations with Mark Weaver, NYK Lines, March 7, 2000). The Ocean Shipping Reform Act of 1998 has essentially deregulated the industry by allowing for confidential contracts between ocean carriers and shippers (NVOCCs are still required to publish all rates). The power of “cartel”-like carrier conferences that collectively determined rates has been substantially reduced, the Trans-Atlantic Conference Agreement has been particularly effected (Wilner, 1999).

1.3.6 Customs Brokers

Customhouse or Customs brokers are licensed by the U.S. Treasury Department to handle all types of international shipments. These brokers prepare Customs entries, determine applicable Customs tariff rates and shipment values, as well as file other necessary Customs documentation. In addition to the Treasury, more than 40 other government agencies administer non-tariff requirements in the United States. Customs brokers handle more than 90 percent of all U.S. imports, and also often arrange for the transportation of these shipments.

1.3.7 Others

Shipper associations attempt to create buying power by aggregating the purchases of many companies.

Export management companies offer a broad range of services from arranging transportation, export licenses and letters of credit to the creation of foreign sales and distribution networks. Often, these entities specialize in either particular markets or types of commodities.

Freight consolidators take shipments that are less than truckload, containerload, or other size equipment and create full size shipments. These firms also break down full-sized loads for distribution to various destinations.

1.3.8 Third-Party Logistics Providers (3PL)

Third party logistics firms offer a wide range of services including warehousing, carrier management, dedicated fleet operations, distribution and inventory management. Although difficult to distinguish from the other activities of these firms, third-party logistics is marked by a high degree of integration with customers' operations. 3PLs perform value-added activities such as packaging, setting up, and stocking retail store displays. Berglund, Larrhoven, Sharman and Wandel (1999) argue that 3PLs add value through operational efficiency, integration of customer operations, vertical or horizontal integration and supply chain management. During the 1990s, many companies outsourced their transportation management functions to 3PLs; the industry growth rate for 1998 was 21 percent. Gross revenues for the 3PL industry grew by 15 percent to nearly \$40 billion in 1998. Net profitability for 3PLs ranges from 5-7 percent. (Armstrong, 1999). Industry experts estimate that U.S.-based 3PL's will grow 15-20 percent annually for the next 3 to 5 years. Armstrong (1999) observes that only half of Fortune 500 firms are using 3PLs. His analysis of customers indicates that major opportunities are available in companies of all sizes especially mid-sized and smaller

companies. In general, customers of 3PLs experience reductions of 10 percent in their integrated logistics costs.

The largest 3PL companies in the US are Ryder Systems, Penske Logistics, Schneider Logistics, Tibbett & Britten Group, Exel Logistics, Caliber (a division of FDX), UPS Worldwide Logistics Group, Caterpillar Logistics Services and Menlo Logistics (see Exhibit 3, Revenues for Third-Party Logistics Providers).

1.3.9 Financial Intermediaries

Financial intermediaries such as factors, freight audit and payment services continue to play a significant role in freight transportation. Factors provide a credit function to carriers by offering immediate cash in exchange for existing accounts receivable. Typically, remittance advice for freight bills is addressed directly to the factoring service. Depending on whether the receivables are taken with or without recourse — whether or not uncollected receivables or bad debts are passed back to the carrier — fees for the service can range from 2-10% of accounts receivable. Since deregulation of the trucking industry in 1980, large shippers have used many different carriers with different rate structures and varying contracts. Freight audit and payment services exist to verify the accuracy of carriers' freight bills and provide consolidated billing and reporting. Freight audit services typically charge a fee per invoice processed \$0.50 – 1.00 (Source: Cass Logistics). Examples of such firms include Cass Logistics and US Bank's PowerTrack service. Cass Information Systems processes over \$6.5 billion in annual freight payables. US Bank is the largest processor of credit card transactions in the United States. Its PowerTrack service provides Internet-based shipment information and tracking as well as freight bill reconciliation. The service is free to shippers; carriers pay a discount fee of 1-2% of the freight bill but receive payment within three business days. (Source Cass Logistics and US Bank company web sites). Financial intermediaries have amassed large databases of shipment transaction and carrier prices. Freight audit and payment services also have established fiduciary relationships with shippers. Recently, Schneider Logistics

purchased Tranzact Systems, a freight payment and auditing service that processes more than \$4 billion in transportation expenditures for 400 customers (Cottril, 2000).

1.4 Channel Structure

Most intermediaries serve a wholesale function to carriers. Minimum efficiency scale is relevant in activities such as intermodal marketing, airfreight and ocean freight forwarding where intermediaries must buy large amounts of carrier capacity to garner volume discounts. For example, in March 2000, the Norfolk Southern railroad raised the minimum volume requirements for IMCs from 250 units per year to 1,000. (Transportation Intermediaries Association, 2000).

Figure 1-5 provides a representation of indirect channels in US freight transportation and estimates of market sizes for truckload brokerage, intermodal marketing companies, NVOCC and ocean freight forwarders and airfreight forwarders.

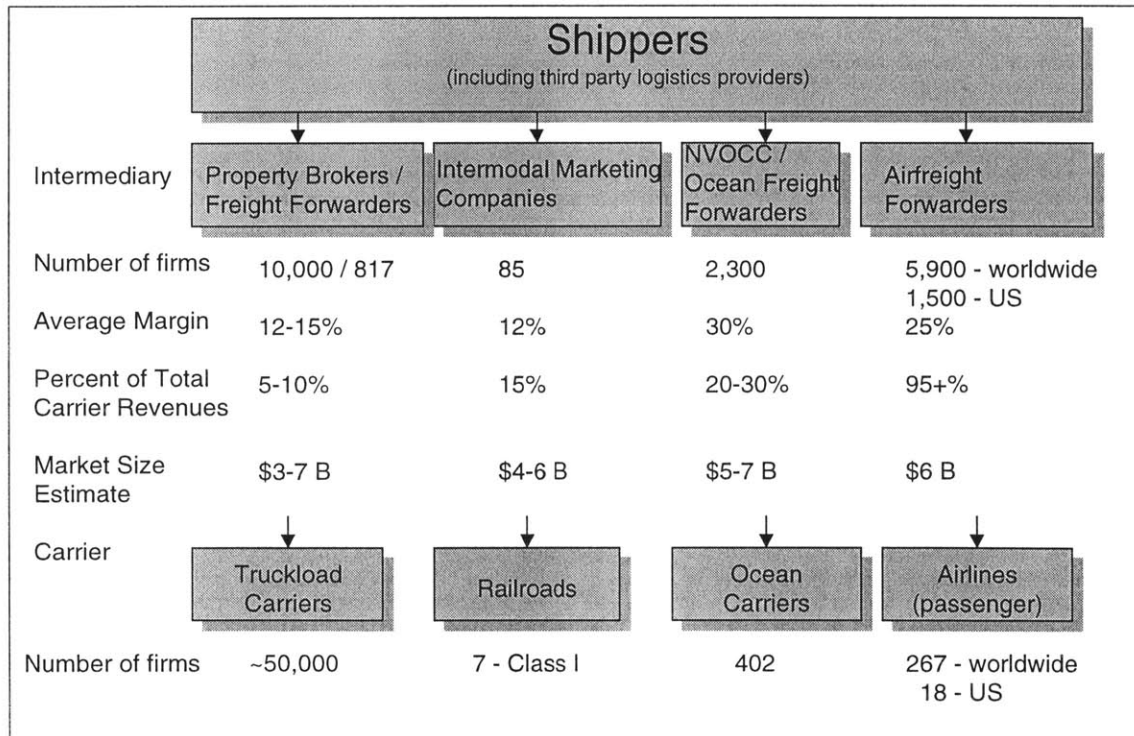


Figure 1-5 Indirect Channels for US Freight Transportation

1.5 Summary

Freight transportation intermediaries may be broadly classified as brokers, forwarders or third party logistics providers. Brokers that only serve a single transportation mode run the greatest risk of channel elimination or disintermediation since the matching function they provide can potentially be performed more efficiently using the Internet. Forwarders arrange and consolidate shipments that travel over multiple transportation modes and would be more likely to favor single mode B2B marketplaces since they will enhance rather than supplant the forwarder's traditional role. Passenger airlines, ocean carriers and railroads already rely on indirect channels for a large portion of revenues. The truckload sector of the trucking industry represents the highest degree of buyer and seller fragmentation but is predominantly served by direct sales. Any attempts to reorder the channel structure by a B2B marketplace must address existing intermediaries either by inclusion or exclusion.

2 Business-to-Business Marketplaces for Freight Transportation

Business-to-business (B2B) marketplaces use the Internet to bring buyers and sellers together in a virtual marketplace. By design these entities must satisfy multiple stakeholders or constituents. Unlike stock exchanges, the Securities and Exchange Commission does not regulate these marketplaces. Also, in contrast to stock exchanges where an individual can be a buyer or seller of a stock or other financial instrument, in most B2B marketplaces buyers are distinct entities from sellers or service providers.

2.1 Definition

Sculley and Woods (1999) distinguish business-to-business exchanges from companies that simply use the Internet to communicate with industrial buyers: “The unique feature of a B2B Exchanges is that it brings multiple buyers and sellers together (in a “virtual sense”) in one central market space and enables them to buy and sell from each other at a dynamic price which is determined in accordance with the rules of the exchange.”

Sawhney and Kaplan (1999) refer to “eHubs” and define the term as “neutral Internet-based intermediaries that focus on specific industry verticals or specific business processes, host electronic marketplaces, and use various market-making mechanisms to mediate any-to-any transactions among businesses.”

2.1.1 Trading Models

The activities of a B2B marketplace can be distinguished by the method of trading or price discovery. Essentially, market-making mechanisms use fixed-prices (catalog), one-on-one negotiations (post and search) or dynamic pricing (auctions, exchanges).

Catalog models provide buyers with a price listing from multiple suppliers. Prices may have been previously negotiated in a contract or may be updated frequently by suppliers, but essentially the price is fixed for the duration of the buyer's search. Companies such as Commerce One and Ariba have applied catalog models for purchases of items for maintenance, repair and operations (MRO) in order to streamline procurement and curtail maverick buying. Purchases are usually for small-ticket items and suppliers are normally pre-qualified. Carrier tariffs and customer routing guides (collections of preferred carriers by geography and price) are well suited to the catalog model. Examples of the catalog model in B2B marketplaces for transportation include iship (express and less-than-truckload rates; alternatives pricing and time schedules are displayed), smartship (parcel), e-transport (ocean), ilink (international landed cost for non-parcel items) and freightquote (LTL). Many of these sites link directly to Internet-based retailers. As procurement sites expand from MRO related purchases to direct materials more detailed information will be required about freight charges to evaluate total landed cost. Pricing information about alternative transportation arrangements will need to be available to properly analyze the tradeoff between transportation and inventory costs.

Post and search is the simplest form of on-line trading and equates to a classified ad or bulletin board. Interested parties usually end up conducting negotiations via phone or fax. Post and search is the most common form of B2B marketplace for truckload transportation. Examples include DAT Services/IFS (see discussion below), The Internet Truckstop, getloaded.com and NetTrans. Brokers seem to prefer this type of marketplaces since it reduces search costs — loads or empty trucks can be easily posted or searched for a match — and pricing information is kept confidential by virtue of offline negotiations. Sites usually derive revenues from subscriptions.

Auction models attempt to maximize returns for either the seller (forward auctions) or the buyers (reverse auctions). Marketplaces that use auctions are often perceived as biased by bidders. Ebay has popularized auctions for consumers, allowing sellers to take advantage of the Internet's reach to bring a large number of buyers. Auctions are a

popular form of yield management for fixed schedule transportation modes such as airlines and ocean carriers. Carriers are concentrated and shippers are fragmented. The Global Freight Exchange (gf-x.com) and Rightfreight provide a forward auction mechanism for freight forwarders. Forwarders commit to volume from passenger airlines but only pay for space used. An active secondary market already exists among forwarders for unused cargo space; these new B2B marketplaces are attempting to facilitate the transaction. GoCargo.com employs a reverse auction model for container shipping, ocean carriers must bid anonymously for shipments and shippers may view only the lowest priced bid. Logistics.com and i2 currently provide strategic auctions for shippers to bid entire networks of truckload origin-destination lanes using combinatorial bid optimization. Both firms are attempting to use the web to facilitate such auctions.

Exchange models require a real-time, bid-ask matching process, marketwide price determination, as well as a settlement and clearing mechanism. The exchange model works best for near-commodity items that can have several attributes, but are easy to specify. Exchanges create significant value in markets where demand and prices are volatile by allowing businesses to manage excess supply and peak-load demand. National Transportation Exchange, CarrierPoint and OpenShip are all examples of marketplaces that employ exchange models. Logistics.com and i2 (freightmatrix) also provide exchanges as part of their offerings.

B2B marketplaces are now offering more than one market-making mechanism, allowing buyers and sellers to choose the appropriate market-making mechanism. Technology platforms are now widely available to facilitate marketplace site design. However, technology providers have tended to focus on a single trading model — catalog (Ariba, Commerce One, IBM), auction (Moai Technologies, Trading Dynamics, OpenSite Technologies), or exchange (Tradex Technologies) models. (In an attempt to become the dominant supplier of B2B marketplace infrastructure, Ariba has recently acquired Tradex and Trading Dynamics and formed an alliance with i2 and IBM.)

Increasingly, marketplaces are evolving to provide a blend of trading models for different types of transactions (i.e., spot vs. systematic purchasing). Sawhney and Kaplan (1999) proposed a classification based on bias of the market-maker and the pricing mechanism employed.

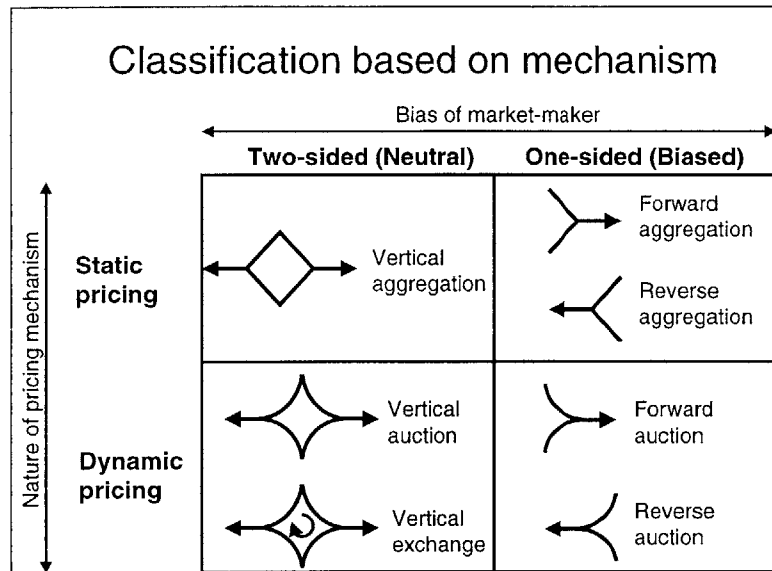


Figure 2-1 Classification of B2B Models

Source: Sawhney and Kaplan (1999)

2.1.2 Revenue Sources

B2B marketplaces primarily derive revenue from the following sources: (1) transaction fees; (2) auction-driven commissions; (3) benefit sharing (cost-savings compensation); (4) advertising; (5) content subscriptions and (6) software licensing.

Many companies that host or manage a B2B marketplace take a percentage of the aggregate sales conducted through the marketplace. Those companies that host auctions through their marketplace also take a percentage of the revenues from the auction-driven transactions. Furthermore, companies generate revenue through advertising fees for online storefronts, sponsorships, and banner ads. Some companies also aggregate compelling content to which they sell subscriptions. Initially, subscriptions are often given away to attract a community of members. Finally, B2B companies that develop and

market proprietary software solutions generate revenue through software licensing fees. (Goldman Sachs, 1999; Sculley and Woods, 1999).

% of Sales Analysis

	200X E
Revenue line items	
<i>Auction commissions</i>	30%
<i>Electronic Commerce</i>	25%
<i>Software Licenses</i>	20%
<i>Content Subscriptions</i>	15%
<i>Advertising</i>	10%
Total Revenues	----- 100%
Gross Margin by line item	
<i>Auction commissions</i>	80%
<i>Electronic Commerce</i>	10-15%
<i>Software Licenses</i>	90%
<i>Content Subscriptions</i>	50%
<i>Advertising</i>	90%
Blended Gross Margin	----- 55%
Sales & Marketing	25%
Product Development	10%
G & A	5%
Operating Margin	10-15%

Figure 2-2 Hypothetical Income Statement for B2B Company

Source: Goldman Sachs (1999)

2.1.3 Potential Market Size

By migrating from paper, phone, fax and EDI to Internet-based technologies and market mechanisms, B2B marketplaces such as the National Transportation Exchange and Nistevo claim that shippers can achieve cost savings of 15-20% on freight transportation. Goldman Sachs Investment Research estimates that 11% of freight transportation sales will be conducted on the Internet by 2004; while AMR Research predicts 34%. In the same period, AMR Research estimates that total revenues for B2B marketplaces for transportation services will grow to \$2.5 - \$3.0 billion (Fontanella, 2000).

2.2 Categorizing Current B2B Players in Truckload Transportation

Since it represents the largest market and has the highest degree of bilateral fragmentation (i.e., many shippers and many carriers), truckload transportation has attracted the largest number of B2B players and the most transaction activity so far.

2.2.1 Strategic Group Map

Porter (1980) proposed the use of *Strategic Group Maps* to “graphically display competition in an industry.” Strategic groups are collections of firms that follow the same or similar strategies. The axes represent *key mobility barriers* — those factors that deter a firm from entering into or shifting to a strategic group. The mobility barriers for transportation marketplaces are domain expertise and channel mix (i.e, inclusion or exclusion of existing intermediaries). In transportation, domain expertise is relatively mode specific and is not regarded by many as readily transferable. For B2B marketplaces, technology matters less than domain expertise and cultivating trust. However, technology leadership is a proxy for domain expertise. Transportation management benefits greatly from optimization models developed by experts in Operations Research with applications in yield management, truckload assignment, shipment consolidation, mode selection and combinatorial bidding. Technology leadership in these areas will largely determine a company’s ability to differentiate its offering and form a broad versus narrow product line. Companies such as i2, logistics.com and Manugistics hold technology leadership positions in the important area of *Decision Support Systems (DSS) and Transportation Management Systems (TMS)*. Real-time status information about inbound shipments or “rolling stock” can be included in supply chain management systems that provide constraint-based “available-to-promise” and “capable-to-promise” order commitments to customers. These companies along with firms that supply *Workflow Solutions* — software for interactive collaboration between shippers and carriers for pickup entry, status updates and appointment scheduling — are leveraging their superior value propositions to attack the *Pure Exchanges*.

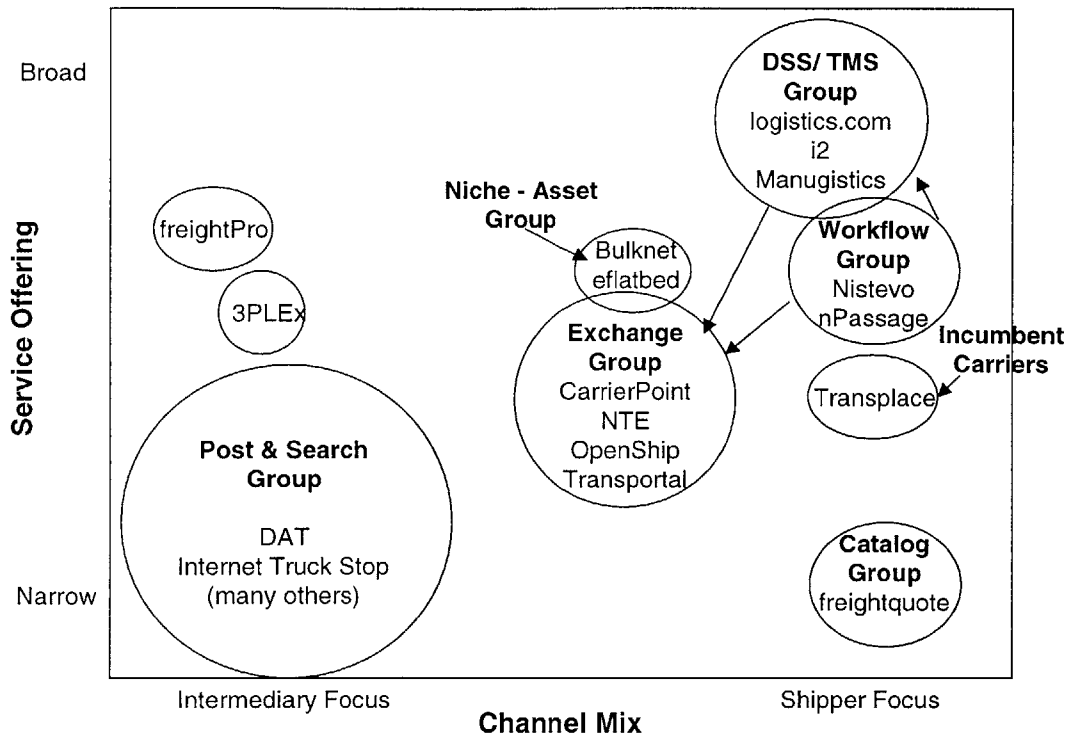


Figure 2-3 Strategy Map for Truck Transportation Marketplaces

Truckload and Less-Than-Truckload — 5-10% of carrier revenues are derived from intermediaries.

In theory, if a B2B exchange is neutral and independent an existing intermediary can play both sides as a seller (carriers) or as a buyer (shipper). Potentially, the intermediary can become a market maker within an exchange. However, transportation exchanges that derive revenue from transaction fees for shipments tendered through the exchange compete directly for the intermediaries' margin. Such exchanges are unlikely to attract intermediaries — unless fees are waived or equity participation is offered for order flow. Therefore, marketplaces must make strategic decisions early about whether to tailor their offerings to intermediaries or not.

2.2.2 Case Studies

Figure 2-4 provides a direct comparison of B2B players in truckload transportation (CH Robinson, the largest property broker in the US, is listed for comparative purposes only). In-depth research of these companies is problematic since nearly all are privately held and most have yet to conduct a single transaction. Currently, none of the firms employing

an exchange model process enough shipments to constitute critical mass or a self-sustaining business. Without liquidity, the pure exchange firms cannot present a viable alternative to existing transportation intermediaries, such as brokers, since shippers' orders cannot be frequently matched with carriers' capacity. All of the truckload carriers that were interviewed for this thesis were using DAT Services at the time of the interview and most of the executives had considered or were at least familiar with the National Transportation Exchange though none were currently using it. Bulknet is an example of a niche strategy derived from the asset specificity of bulk transportation. It may be indicative of the effort and focus required to attract a community of members. Transplace amounts to a collective response by the six largest publicly traded truckload carriers to the proliferation of independent B2B marketplaces.

Company	CH Robinson	DAT / IFS	National Transportation Exchange	Bulknet	Transplace
Revenues (millions)	\$2,260 (gross) \$246 (net)	~\$20	N/A	\$10 (2000E)	\$650 (gross)
Operating Margin	3%	N/A	N/A	N/A	3%
Members / Customers	10,000	10,000	500	40-50	N/A
Shipments	1.5 M	8.3 M	125,000-175,000	30-50 (daily)	N/A
Transaction Fee	12% *	None	Undisclosed	8%	N/A
Strategic Group	Traditional Broker	Post & Search	Exchange (quasi)	Niche-Asset	Incumbent

Figure 2-4 Comparison of B2B Marketplaces for Truckload Shipments

* Net revenue margin. N/A-not available

DAT Services / Internet Freight Services

DAT was started 20 years ago by a truck stop chain that posted loads from truckload property brokers for independent owner-operator truckers. The company migrated this service to a computer system and now broadcasts load postings to television monitors in 1,100 truck stops via satellite. Recently, the company has made its load matching service available on the Internet (www.DATInternet.com) and also reaches owner-operators using the Park 'N View company's phone and cable TV connections at truck stops.

How It Works

Carriers and intermediaries use a dedicated computer terminal and VSAT antenna, dial-up connection or web browser to post and search for loads and available trucks. Corresponding matches are identified and interested parties negotiate price and payment offline; that is, usually by phone.

DAT claims a subscription base of 10,000 registered customers with an average subscription rate of \$50 per month. Other revenue sources include credit reports and advertising space on its load monitors. (DAT claims an average of 1,000 views per day at each truck stop.) Due to its longevity and the fact that there are no transaction fees, transaction volume is significant with 8.3 million load postings in 1999.

DAT specifically targets intermediaries, carriers and private fleets. The service is purposely not offered to shippers to avoid alienating brokers. Contrary to many proposed exchanges, DAT does not impose any changes in the existing channel structure. DAT's value proposition is the use of technology to reduce transaction costs by providing faster matching through a critical mass of customers. DAT does not reduce factor or shipment costs to either party and allows intermediaries to make markets with private negotiations. Intermediaries must trade off the access to more carriers with the increased competition that it entails. Smaller brokers find the service more appealing than larger firms such as C.H. Robinson that can leverage direct relationships with carriers through greater volume. It is unlikely that DAT would be able to migrate its customers to a pure exchange environment since its member brokers would not invite such competition.

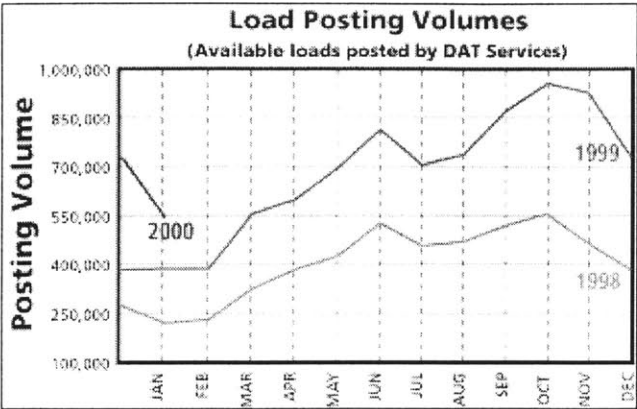


Figure 2-5 DAT Services, Load Postings by Month, 1998-2000

Source: DAT Services

The Transportation Intermediaries Association and the National Private Truck Council partnered with Internet Freight Services (IFS), an affiliate of DAT, to provide the two associations combined membership of 1,400 with a private load matching site that also provides access to public load posting on IFS (Transport Topics, 1999). The company is rapidly expanding internationally: adding Mexico, Canada and recently Europe with an office in Belgium and a web site in four languages.

All of the truckload carriers that were interviewed for this thesis were currently utilizing DAT Services to a limited extent.

National Transportation Exchange (NTE)

The National Transportation Exchange (NTE), founded in 1994, was the first business-to-business marketplace for transportation; the company launched its online service in 1995. NTE claimed 500 members in January 2000, up from 350 in December 1999. Clients, including 3M, Menlo Logistics, and Thrall Car, represent approximately 2,500 active origin and destination points. Carriers include J&R Schugel, Skyway Logistics,

Chillicothe and Motor Express. Total transactions for 1999 were approximately 125,000 – 175,000.

"Our exchange is very dynamic with 70% of postings trading within three hours."

Jim Davidson, CEO and president of NTE.

Mr. Davidson proudly reported that more than 50% of the space and shipments that were posted on NTE resulted in actual placements.

Revenue Sources

Initiation fee: shipper: \$2,500 / carrier: \$50/vehicle, no subscription fees

Transaction fee: undisclosed

Much like a broker, NTE sets the price for each shipment offered by a shipper and therefore also sets its commission. It notes that users may only offer shipments at or above this minimum. Shippers may also dictate a price ceiling and then set the time to fill the order or designate the carriers.

According to NTE, the company's Exchange (1) expands the marketplace for both shippers and carriers, (2) creates visibility of a shipper's supply chain, (3) reduces transaction cost and time, and (4) improves service performance.

NTE has built strategic alliances with companies that provide enterprise software to carriers — Tom McLeod Software, TMW Systems, Creative Systems and Innovative Computing Corp — as well as software vendors for shippers — Manugistics and SAP.

Investors in NTE include FDX Corporation, Dell Computer, AT&T Ventures, Hummer Winblad Ventures, Platinum Ventures, Bessemer Ventures, Crosspoint Ventures, and Kappa Ventures. NTE secured \$52 million in financing for a fourth round in January, 2000.

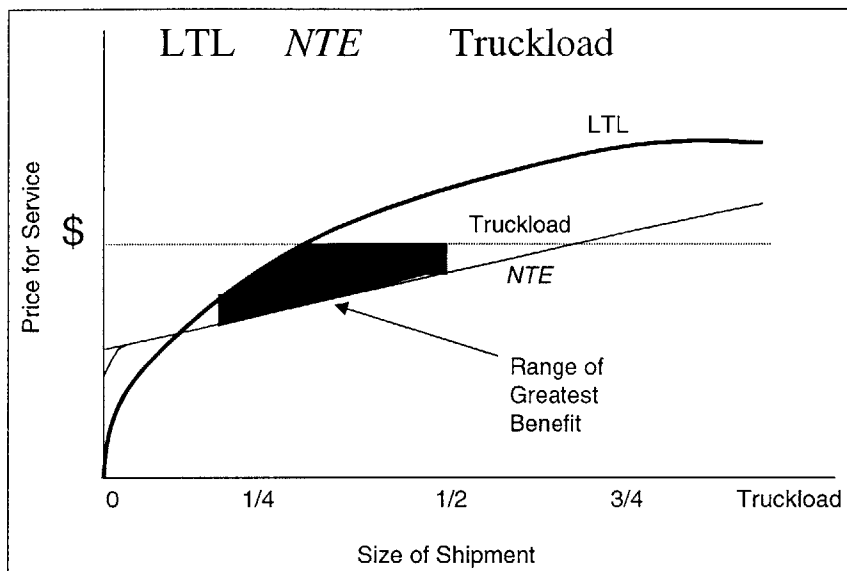


Figure 2-6 NTE Value Proposition: Large LTL shipments (3,500 – 10,000 lbs)

Handled by truckload carriers with extra cargo capacity

(Source: NTE web site)

How It Works

To the shipper, NTE guarantees the quoted rate and the “quality of service” from its member carrier. By using empty space on truckload carriers’ equipment, NTE claims that shippers can achieve savings of 15-30% on large less-than-truckload (LTL) shipments from 3,500-10,000 lbs. as compared to LTL rates. Eighteen percent of shipments are full truckload for which NTE claims the shipper can expect “market” rates. (Gentry, 2000).

NTE has established very specific rules for its members. Shipment requirements are defined in detail and many of the concerns of both shippers and carriers for contingencies are addressed. Shippers may not tender shipments more than 48 hours prior to pick-up. Freight must be palletized or unitized so that it can be easily loaded and easily unloaded. NTE does not currently service refrigerated, frozen, hazardous, bulk or specialized freight. Carriers must insure for full invoice value; the value of the freight may not exceed \$250,000, values over \$100,000 must be declared. (One of the carriers

interviewed for this research failed to reach an agreement with NTE due to this provision). Carriers must call to arrange appointments with the shipper and with the consignee. Carriers must arrive within one hour of the appointment time. Rules are also established for additional charges such as cancellation by either party and detention. Like a property broker, NTE invoices shippers (“member consignors”) and pays carriers. NTE guarantees payment to the carrier in 7 days (based on carrier update of shipment status, no invoices). Carriers also receive a guarantee: after six months, a carrier may elect a refund of subscriptions fees and applications software modules.

NTE offers free analysis to carriers to determine the impact on profitability of shipments offered through the exchange. Another truckload carrier interviewed for this research, Carrier X [a large publicly held truckload carrier], submitted information but was dissatisfied with the results. No extra cargo space (excess capacity) was considered due to seal and security issues with shippers for exclusive use.

NTE’s value proposition represents a discontinuous innovation: it requires shippers to substantially alter their purchasing pattern and carriers to adopt new utilization measures. To use the service effectively, shippers must consider an alternative when trading off LTL and truckload service. As much as the company has mitigated concerns, NTE becomes another point of interaction for the shipper that requires management attention. These factors may explain the relatively slow rate of adoption: in a highly fragmented sector, NTE has attracted only 500 shippers and carriers and 175,000 annual transactions over a period of five years.

BulkNet.com

By limiting the type of shipments that it will consider, NTE and others have opened niche opportunities for other B2B marketplaces. Bulknet.com addresses dry and liquid bulk shipments by truck for the chemical industry. This sector of the trucking industry is highly specialized and employs very specific assets — the different types of tanker

trailers used in bulk transportation cost \$250,000 and higher or approximately 10 times the amount for trailers used in general freight.

Bulknet counts 41 bulk truck carriers as members. The seven largest trucking companies — Groendyke, Liquid Transport Corp., Matlack, Miller Transporters, Quality Carriers, Schneider and Trimac — have combined revenues of \$1.7 billion which, according to Bulknet, represents 45% of the bulk truck transportation in the United States. The company has signed up Sunoco and is negotiating with six to 10 major chemical companies and several online chemical auction sites to provide load management services.

The Web site arranges freight deliveries through load-by-load matching of registered shippers and carriers, allowing both parties to negotiate anonymously. Bulknet.com bills the shipper and pays the carrier, collecting its transaction fee in the process.

How It Works

Carrier: posts a description of their equipment in any region and the equipment's time of availability

Shipper: posts data describing available loads, their origins, destinations, dates and the shipper's pricing for line haul and tank washing.

Carrier: accepts price offered by the shipper or bids new price

Both parties negotiate anonymously.

Bulknet emphasizes that negotiations take place anonymously which promotes “neutrality and confidentiality”. Every transaction is monitored on a load-by-load basis through completion, with Bulknet.com handling all paperwork, billing and quality metrics.

Revenue Sources

- Subscription: \$35/month shipper or carrier
- Transaction fee: 8% of linehaul
- Advertising

- Software for shippers and carriers.

Bulknet provides specific applications for transportation departments of chemical manufacturers to help manage loading schedules and to automate tendering of shipments to carriers. Another service, BulkBids, helps shippers facilitate long-term contract negotiations with carriers by distributing bid packages on the Internet.

Other services:

- Tank washing facility locator.
- Detailed shipper and carrier profiles.

Transaction Volume (2000 E)	
Average Carrier Revenue per Shipment ¹	\$ 1,100.00
Transaction Fee ²	8%
Revenue per shipment	\$ 88.00
Revenues (2000E) ²	\$ 10,000,000
Gross Transactions (Dollar amount)	\$ 125,000,000
Annual shipments required	113,636
Shipments per day	316
Shipments per day (Current)	30-50
Implied Market Share	
<i>Bulk Transportation Market</i> (\$ MM)	
7 largest carriers ²	\$ 1,700
Per cent of total ²	45%
Total Market Size	\$ 3,778
Implied Market Share for Year 1 Revenue	3.3%
Percent of purchases thru Internet ³	2.5%

Notes: (1) Matlack - company reports (10K); (2) Bulknet.com press releases; (3) Goldman Sachs, forecast of 2.5% in 2000 for freight transportation

Figure 2-7 Bulknet.com, implied market share and shipment transactions

Currently, Bulknet.com processes 30-50 shipments per day through its site for which it charges a transaction fee of 8% to the carrier. The company has projected revenues of \$10 million in its first year of operation. Assuming this amount represents revenues from transaction fees, using average revenue per shipment from public carrier Matlack of \$1,100., the company will need to process 316 shipments per day or ten times its current amount (based on 360 days/year).

In order to determine an implied market share, a simplistic model was used. Using data supplied by Bulknet, the market size for bulk transportation by truck (exclusive of gasoline) was estimated at \$3.8 billion. To achieve its revenue objective for 2000, Bulknet will need to levy its transaction fees on over \$125 million in gross sales (3% of all carrier revenues for this sector). Apparently Bulknet believes it can beat analysts' predictions that only 2.5% of freight transportation sales will be done on the Internet in 2000. Recently, Bulknet.com secured \$30 million in financing. The company's investors are betting on a fast adoption rate for radical change in shipper purchasing patterns and for Bulknet to be the only player in this market segment.

Transplace

"Capacity is the key in this marketplace. We have 7% non-revenue miles, which is less than other truckload carriers because of our longer average length of haul. But we think we can improve on that." — Joey B. Hogan, Chief Financial Officer, Covenant Transport.

Transplace, announced on March 14, 2000, is a combination of the brokerage operations of six of the largest publicly traded truckload carriers — Covenant Transport, JB Hunt, MS Carriers, Swift Transportation, US Express and Werner Enterprises. Total revenues for these carriers amount to \$6 billion or approximately 9% of the truckload sector revenues. Transplace's carriers represent 38,264 tractors, 91,531 trailers and 22,152 intermodal containers operated by 47,981 drivers. Combined brokerage revenues for the group were \$650 million in 1999. In addition, each carrier contributed \$5 million in funding. According to an executive of one of the founding companies, Transplace was

concocted over a two-month period in early 2000. Dr. Jun-Sheng Li (PhD) of JB Hunt Logistics, formerly of Schneider National and director of operations research at CAPS Logistics, is CEO and president of Transplace. In his first teleconference, Dr. Li emphasized that the auction platform that his company will provide “doesn’t mean that carriers will have to lower prices.” Rather, he suggested that optimization models would match freight with carrier capacity. Dr Li asserted that the industry could haul up to 20% more freight with the same number of drivers and trucks even though the average utilization (percentage of loaded miles to total miles traveled) for the carrier-investors of Transplace was 90% (see Figure 2-8). The web site will initially focus on truckload, refrigerated and intermodal services. Transplace.com will also function as a cooperative purchasing site for the carriers to negotiate prices on equipment, fuel, repair parts, insurance and other services.

Transplace.com						
<i>Carriers</i>	Covenant	JB Hunt	MS Carriers	Swift	US Express	Werner ¹
Revenues	472	2,045	620	1,061	708	1,052
Logistics (Brokerage) Revenues	60	388	68	30	18	86
Per cent of Carrier Revenue	13%	19%	11%	3%	3%	8%
Ownership in Transplace	13%	28%	14%	16%	13%	16%
Operating Margin	9%	4%	9%	11%	5%	10%
Per cent Loaded Miles / Utilization	93%	N/A	N/A	86%	91%	90%
Truckload Market (1997)	\$ 65.0 billion					
Combined Carrier Revenues	\$ 6.0 billion					
Combined Market Share	9.2%					

¹ estimate
Sources: Bearth, Daniel, "Six Big Truckload Carriers Form Joint Internet Firm", *Transport Topics*, March 20,2000; Company Reports (10K); 1997 Trucking Industry Structure, Standard and Poor's (1998)

Figure 2-8 Operating Data for Transplace Carriers

Many questions remain about how this alliance will evolve. Swift Transportation stands to benefit the most since it contributed the least in terms of revenues from brokerage operations compared to the equity stake it received. Will other carriers be offered equity ownership in the future? In what manner will the brokerage operations from these different carriers be integrated? How will revenue streams from the member carriers be directed through Transplace? How will benefits be shared from cooperative purchasing?

Whether or not supplier-based B2B marketplaces will raise anti-trust concerns remains to be seen.

2.3 Perspectives of Industry Players

Interviews were conducted with transportation professionals from 15 firms. The objective of the interviews was to understand the potential impact of B2B marketplaces for freight transportation on industry players. Truckload transportation was primarily considered since most of the activity in B2B marketplaces for transportation has thus far occurred in this sector. Interviewees were asked the same general questions that served as the basis for discussion. The perspectives of these key stakeholders provide insight into the adoption of these new intermediaries including management's concerns and desired outcomes.

Shippers

Amazon.com
Compaq Computer
Gillette
Iomega
Kraft Foods
Polaroid
Wal-Mart.

Carriers

Carrier X
CRST International
NYK Lines (ocean)
OTR Express
Werner Enterprises

Intermediaries:

Air Express International
CH Robinson
Ryder Integrated Logistics

2.2.3 Shippers

The common perception among large shippers was that the role of B2B marketplaces was limited to providing greater access to the spot market. Shippers were concerned with the possibility that shipments entered into a B2B exchange might not be tendered to carriers. Other concerns included the reliability of service providers and carriers, transaction fees, and data privacy. Shippers were most interested in more complex transportation management issues such as exception reporting, tracking and in-transit visibility for shipments with multiple carriers, appointment scheduling, dynamic merge-in-transit and integration with enterprise resource planning systems.

Since the Internet can have the effect of reducing transaction costs, the question arises whether all buying will shift to the spot market. Caplice (1996) concluded that shippers enter into contracts not only to reduce transaction costs but also to benefit from truckload carriers' economies of scope. Vos (1999) observed that shippers' concerns with covering surges in demand also lead to other strategic procurement practices in addition to the use of the spot market such as contractual equipment, carrier density per lane and variable or tiered pricing. Findings from the interviews were consistent with this research — there was no indication that large shippers were planning to alter their purchasing behavior in the near term.

In the context of truckload procurement, the value of a "relationship" to a shipper is determined by a carrier's willingness to supply equipment during periods of surges in demand. During periods of peak industry demand, carriers are forced to allocate equipment to shippers. It is the objective of many shippers to be high on the allocation list by providing a steady stream of business to the carrier. For example, Wal-Mart awards primary, secondary and overflow carriers for every lane. Management attempts to obtain volume commitments for end of quarter surges and peak demand. Carriers are rated on on-time performance, claims handling and "economic execution" or the ability to provide additional capacity when needed. Wal-Mart requires that 75% of the equipment used be owned and operated by the carrier.

Since only 10% of carrier revenues are currently directed through intermediaries, any margin extracted by new intermediaries beyond the current spot market will have to come from reductions in revenue to carriers or in increased costs to shippers. This observation has not escaped the notice of the world's largest retailer: "Even if we don't pay it [transaction fees], we get it back in rates from the carrier" explained Ted Wade, Vice President of Corporate Traffic, Wal-Mart. Mr. Wade would prefer to offer surge shipments to pre-qualified contract carriers using established prices (e.g., state to state rate matrix) in a private exchange run by Wal-Mart.

Large shippers are intrigued by the possibility of more visibility in the spot market. However, they are also concerned that exchanges will not guarantee that a shipment will be tendered to a carrier. This problem will remain until a B2B exchange has enough buyers and sellers to provide liquidity. NTE partially addresses this concern by routing shipments to a shipper designated core carrier after a pre-determined time has expired. However, shippers such as Kraft Foods view this issue as a key stumbling block since it inhibits their ability to "play the spot market".

Compaq was among the shippers most willing to adopt B2B marketplaces for transportation but is only interested in "end-to-end" or multi-modal solutions that provides visibility for all shipments:

"We'd be willing to use [a B2B exchange] so that we'd have more flexibility in the marketplace — access to available capacity and the best pricing on emergency freight... [in addition] we need end-to-end visibility of product"

— Thomas Day, Director of Global Distribution, Compaq Computer

Transportation managers are confronted with the problem of coordinating carrier pickup and delivery with appointment schedules at the receivers' facilities. For example, Polaroid receives purchase orders via EDI that represent over 60% of its sales. Pertinent delivery information is extracted and truckload carriers are called to arrange for pickup. The carrier must then schedule a delivery appointment with the receiver. If the requested delivery date is not met then Polaroid receives a charge-back from the customer. Polaroid

discontinued the practice of tendering shipments to carriers via EDI due to what it claimed were excessive response times from carriers. Although partially automated, the entire process is manually intensive for all parties and requires numerous phone calls and faxes.

Nearly all managers complained of poor visibility for inbound shipments for which another party paid the freight charges. The need to combine shipment tracking capability with purchase order information was cited as a priority by several companies.

2.2.4 Carriers

Carriers' primary concerns that would inhibit the adoption of B2B marketplaces were price erosion, transaction fees and data privacy. The most requested value-added service was a financial guarantee, which implies that marketplaces should handle payment processing.

“People putting up exchanges are the enemy... if they're successful they'll make trucking a commodity.” — John Smith, CEO, CRST International

Several executives from truckload carriers were fearful that B2B marketplaces will “commoditize” the service their companies provide through the use of reverse auctions. Marketers were disgusted with the possibility that only the lowest price offer would be made available and that brand recognition would be lost. (Some B2B Marketplaces have addressed this concern by allowing shippers to designate the carriers that are allowed to bid.) More than one carrier cited the possibility that anonymous spot market transactions might lead to a carrier offering lower prices to existing customers already under contract. Executives also feared that if spot market prices were made available, shippers would constantly demand to renegotiate long-term contracts.

Few carrier executives envisioned a wider role for B2B Marketplaces beyond the spot market or were willing to entertain the possibility that a larger percentage of industry

revenues might shift to the spot market. Those that currently use brokers only to find shipments to reposition equipment were price-insensitive with regard to transaction fees:

“We’re going to do it at any price the broker arranges.” — Bill Ward, CEO, OTR Express

Carriers with existing brokerage operations were concerned about transaction fees from B2B Marketplaces:

“We don’t want to pay \$5 per transaction.” — Keith Margelowsky, Senior Director of Business Development, Werner Enterprises

Claims by B2B Marketplaces that carriers will realize improved utilization were not particularly well received by executives of trucking companies:

“With less than 5% deadhead [empty mileage] we’re not going to save on utilization.” — John Smith, CEO, CRST International

Carriers also pointed out that while there may be some administrative savings due to decreases in transaction costs, most have already made substantial investments in EDI and web site development. Although EDI usage seems to have peaked at 30% of the customer base, there is high penetration among the large accounts. B2B Marketplaces also promise to increase the reach of suppliers by providing access to more potential customers. Large shippers and their buying patterns are already well known to carriers, which rely on direct sales for 90-95% of revenues. However, carriers were interested in access to smaller shippers that are too costly to reach through direct sales.

2.2.5 Intermediaries

As noted earlier, forwarders and brokers serve different roles and therefore have different perspectives with respect to B2B marketplaces for transportation. Forwarders are somewhat interested in single mode transportation exchanges, primarily those that provide a consolidation or distribution function. Brokers are more directly threatened.

Property brokers clearly perceive the threat of disintermediation presented by B2B marketplaces for truckload transportation. However, if companies are preparing a comprehensive defense, the exact measures are well-kept secrets.

“It [the web] could destroy the brokerage industry.”
— Meyer Bolnick, Vice President King Cos., Rogers, MN

[Referring to B2B marketplaces] “We can do the same thing... the web isn’t where we add value.”
On the prospect of being a market maker in an exchange: “There is no value equation for us in it [B2B marketplaces]” — Mark Walker, Vice President of Marketing, CH Robinson.

Freight forwarders see efficiency in “virtual integration” but are also concerned about eventual disintermediation:

“We will likely see the day where the customer will indeed perform functions we now think of as being ‘too specialized.’”
Eric S. Vargas, VP Logistics Applications, AEI

2.3 Emerging Trends

In the development of B2B Marketplaces for Transportation, two related trends have emerged: (1) the availability of hosted transportation management systems (TMS); and, (2) the importance of the technology supply chain. In order to appear independent and neutral, most B2B marketplaces attempt to give equal treatment to buyers and sellers in the design of their web sites. Many sites treat the web visitor like the customer of a retail stockbroker — assuming that the individual may want to buy or sell. In part this is due to the fact that software for trading systems is readily available and relatively easy to implement. In transportation, however, only intermediaries would likely be simultaneous buyers and sellers of cargo services and, realistically, only for scheduled transportation such as airfreight (passenger airlines) or ocean shipping. Much more is required to

replicate or replace the functions of existing intermediaries. Truly useful marketplaces are complex to develop and require substantial domain expertise.



Figure 2-9 Ventro: Complete Marketplace Solution

Ventro Corporation (parent of Chemdex) has identified several elements of a “complete marketplace solution” common to many marketplaces. The attributes in Figure 2-9 — payment systems, back office integration, co-marketing, etc. — form tight linkages with both buyers and sellers.

2.3.1 Hosted Transportation Management Systems

For B2B Marketplaces for Transportation, the way to improve the value proposition for shippers is by providing a Transportation Management System (TMS). Such systems can be hosted on the Internet and can provide better collaboration among shippers and carriers. In Figure 2-10, AMR Research has identified several desirable features from the shipper’s perspective of a “Full Transportation Exchange”— landed cost calculation, supply chain event management, strategic network auctions, request for proposals, international documentation requirements, routing and tendering, etc. The TMS would complement other elements of a B2B Marketplace including a spot market exchange and auctions for long-term contracts.

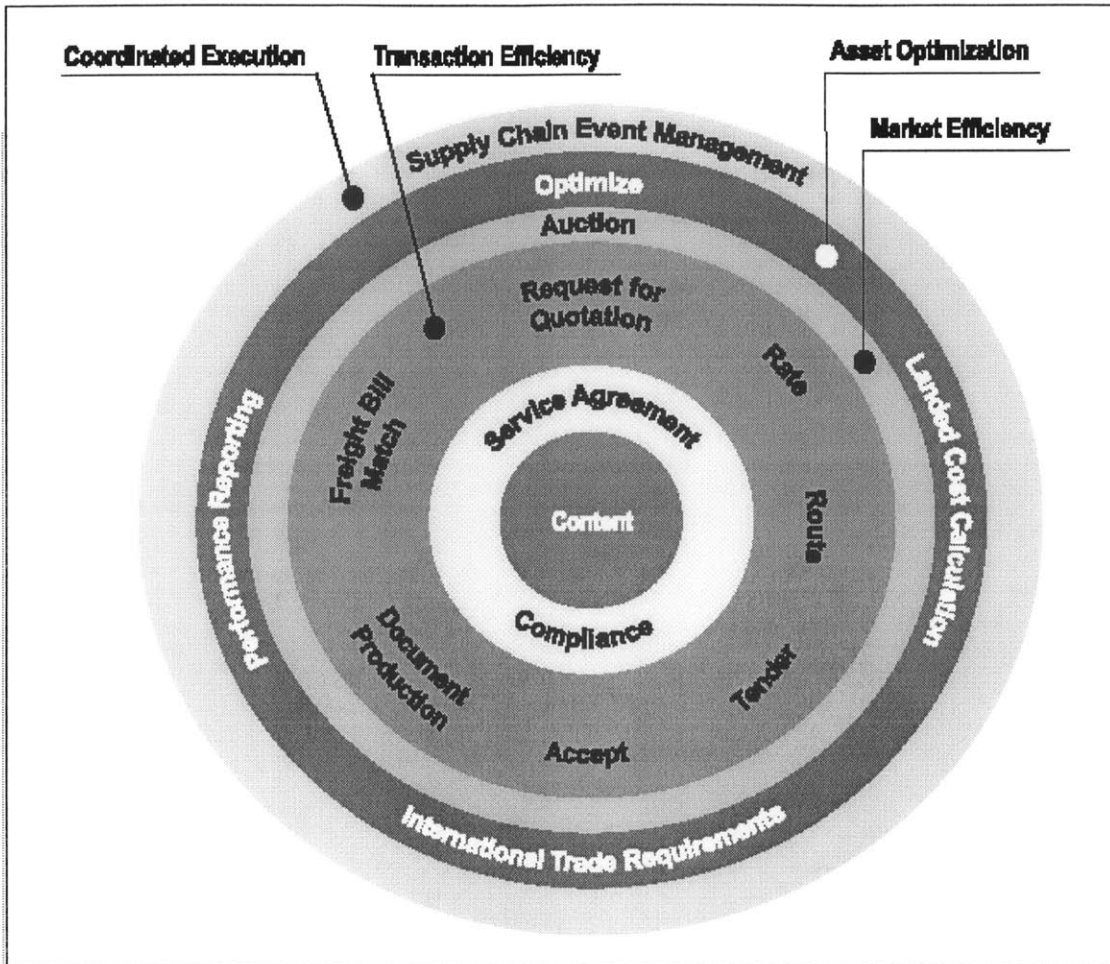


Figure 2-10 Full Function Transportation Exchange

Source: AMR Research (2000)

Benchmarking Partners (1999) estimates the total market for TMS solutions will grow from \$170 million in 1999 to \$600 million in 2002. So far the market has been limited to large shippers but hosting a system over the Internet makes it more cost-effective to serve small and medium-sized businesses. B2B Marketplaces that have revenue streams from software subscriptions will be better positioned than those that rely solely on transaction fees. Only a few companies such as i2, logistics.com and Manugistics have the skills in optimization techniques and an installed base of shippers and carriers to leverage.

2.3.2 Managing the technology supply chain

Fine (1998,2000) emphasized that “supply chain design is a strategic activity” and in addition to product supply chains, firms must carefully select organizational and technology supply chains.

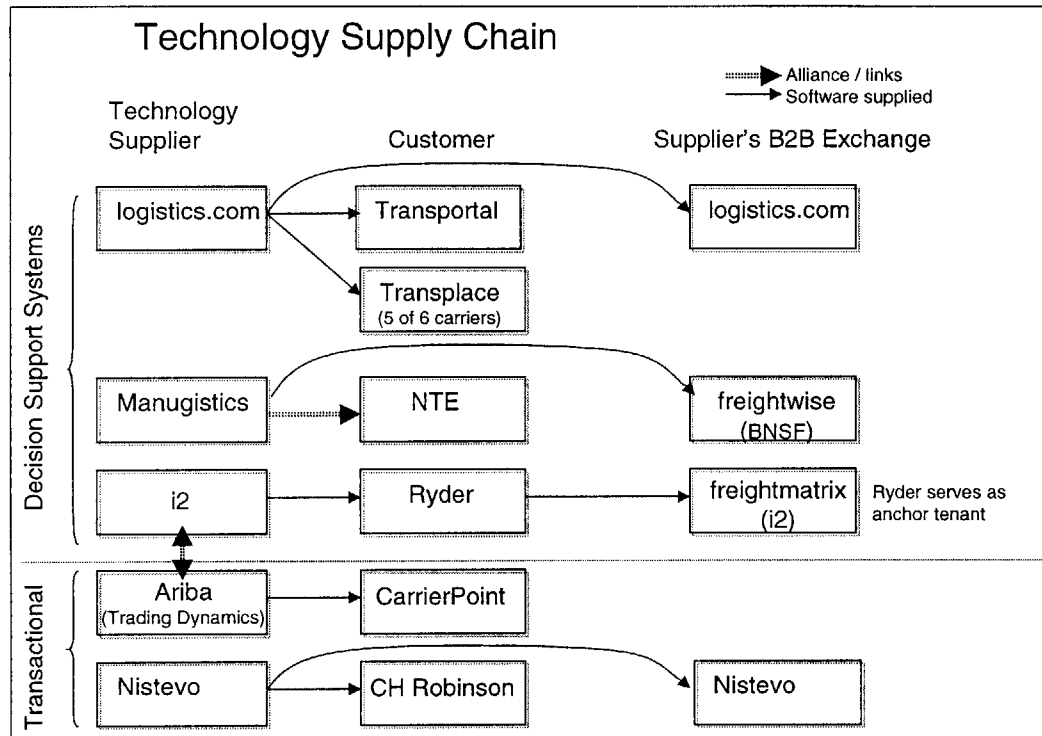


Figure 2-11 Technology Supply Chain

Logistics.com, the leading provider of decision support systems to motor carriers and strategic auctions for shippers’ networks of truckload lanes, has entered the B2B marketplace. The company supplies technology to another B2B marketplace, Transportal, as well as three of the carriers involved in Transplace. The leading supply chain management software provider, i2 has long supplied technology to Ryder Integrated Logistics. Ryder has become an anchor tenant on i2’s B2B exchange for transportation, freightmatrix. It remains to be seen what value will be usurped from an intermediary like Ryder in these new marketplaces. CarrierPoint a “pure” exchange is dependent on suppliers for knowledge and carriers (members) for capacity. The company relies on marketplace infrastructure from Trading Dynamics, a subsidiary of Ariba — one of the

leading procurement marketplace vendors. Nistevo a workflow or supply chain execution vendor originally provided its technology to CH Robinson and is now forming its own B2B marketplace that targets large shippers directly.

Another question also looms — whether the horizontal (or functional) marketplaces of transportation or logistics services will be relegated to a supporting role for the vertical market-based exchanges such as Cemdex or e-steel or the private procurement sites run by Ariba and Commerce One. Transaction standards will play a significant role as companies migrate from EDI to extensible markup language (XML). If users converge on one or a few standards, it will become possible to have more distributed transactions in a model analogous to the Internet itself. In this scenario, dozens of meta-search directories could displace centralized marketplaces and software agents could perform virtual one-on-one negotiations. Standards for data interconnections between single mode exchanges could parallel the physical intermodal connections and reduce the role of intermodal marketing companies and forwarders that don't perform consolidation.

3 Conclusion

3.1 Critical Success Factors

In order to be successful, B2B Marketplaces for freight transportation, like other marketplaces, must do the following nearly simultaneously: (1) achieve critical mass, (2) manage channel conflict, and (3) expand the service offering. Assuming the need for standardization (i.e., shippers are unlikely to use several marketplaces) and given the intense competition among firms for customers, it is unlikely that more than a few marketplaces will survive.

Achieving Critical Mass

“He who has the gold makes the rules” – Bobby Lent, co-founder Ariba (April 4, 2000)

“He who has the trucks wins” – VP, carrier-investor of Transplace.com

The more competing buyers and sellers that can be brought together, the more liquid the market becomes and the more efficient the price setting mechanism becomes, which, in turn attracts more buyers and sellers. This positive reinforcing loop, in combination with increasing returns to scale, leads to a winner takes most scenario for B2B Marketplaces. Therefore, the main objective for a firm is to attain liquidity as fast as possible. The difficulty lies in attracting both buyers and sellers almost simultaneously. Sawhney (1999, 2000) reasoned that firms should concentrate marketing efforts on the party that will receive the most benefit, either buyer or seller. Once this party participates, the other will be compelled to join.

Consider the strategy that priceline.com adopted in growing its market for airline tickets. It focused on getting buyers, who arguably receive the greater relative benefit, injecting liquidity by buying cut-rate airline tickets in order to attract buyers. Once it achieved critical mass, the incentives for airlines to cooperate increased. (Sawhney, 2000).

Another way that firms have tried to reach critical mass in a marketplace is by opening equity participation to shippers and carriers. The amount of ownership can be determined by the amount of spending that shippers are willing to commit to the marketplace and the carrier’s willingness to provide sales support and co-marketing as well as service

shipments offered by shippers. The popular use of revenue-based warrants by B2B Marketplaces is currently under investigation and this practice may be significantly curtailed in the future.

For truckload transportation, shippers not carriers will derive the greatest benefit from B2B marketplaces. Large carriers dismiss claims of improved productivity and have already invested in EDI and web sites for transactions. Shippers, however, need to manage several truckload carriers at a minimum. An infomediary can reduce transaction costs for the shipper by centralizing and standardizing interactions with many carriers. Initially, marketing efforts for B2B Marketplaces will require expensive direct sales. In order to reach critical mass, therefore, firms will be drawn to large shippers. For example, Wal-Mart controls 2.2 million truckload shipments annually. The dilemma for B2B Marketplaces is that large shippers are well known to carriers and prefer direct relationships.

In reaction to the increased buying power that marketplaces present through the aggregation of shippers, six of the largest publicly held truckload carriers have combined their brokerage operations to form Transplace.com. It remains to be seen whether such cartel-izing attempts will raise anti-trust concerns. Challenges from incumbents may also be unilateral: UPS or FedEx may leverage its brand, trust relationship, existing portals and large account base to resell other transportation services and capture more of a customer's freight spending.

Managing Channel Conflict

B2B marketplaces for freight transportation must make strategic choices early about whether to include or exclude existing intermediaries. The offering must either reinforce or replace the basic functions of intermediaries. None of the existing B2B Marketplaces, for example, comes close to replicating the services of a forwarder.

To reinforce existing intermediaries, B2B Marketplaces must be able to preserve existing relationships and provide further sales opportunities. Offerings might include “virtual private marketplaces” or co-marketing and co-branding. B2B Marketplaces may also provide certification of carriers and intermediaries and quality metrics such as on-time performance and ratios of damages and claims. Existing intermediaries may evolve to become market makers for particular commodities or geographic areas. By way of comparison, Nasdaq has at least two market makers for every stock in order to provide liquidity and some competition in the bid and ask spread.

In the case of trucking, B2B Marketplaces that intend to broaden their role beyond the spot market must bring more value to shippers and carriers than the existing direct sales channel. Large shippers appear unwilling to pay a premium over established rates, so intermediaries will need to derive revenues from other sources such as a fee or percentage of cost savings in negotiating long-term contracts. To improve the value proposition to carriers, B2B Marketplaces can help by providing access to higher margin small and medium-sized shippers that are too expensive to serve with direct sales. Potentially, B2B Marketplaces can become “virtual carriers”, displacing existing non-asset based carriers, by using independent owner-operators and agents. Carriers such as Landstar, which pays sales agents a 7% commission and owner-operators 70% of collected freight charges, are susceptible to Internet-based players that can operate with less overhead. B2B Marketplaces can also serve a more indirect channel role as a component to several vertical industry exchanges.

Expanding the scope of the offering

While attempting to achieve critical mass, firms also need to quickly develop and expand relationships with shippers and carriers. Pure exchanges that assume a growing spot market from which to derive transaction fees are headed for almost certain failure.

The objective is to raise switching costs so that members don't rush to the site charging 1% less for its transaction fees. Alliances can provide a means to expand the service offering by including services such as system integration and payment processing. In

addition, each alliance partner can provide cross-selling opportunities and referral revenue. Firms must take care when forming alliances especially for technologies considered critical by customers such as transportation management systems. Suppliers can use the opportunity to learn the business and make an end-run to the final customers.

To improve the value proposition for smaller carriers, B2B marketplaces might offer “private label” services such as access to web-hosted transportation operations systems (e.g., dispatch, billing, customer shipment tracking and pickup request). Access to more potential customers holds the greatest benefit to these firms. For LTL, marketplaces can facilitate interlining or the interconnections between carriers to help regional carriers expand their reach.

3.2 Future research

Certainly, B2B Marketplaces as a whole are in their infancy. As shippers, carriers and intermediaries gain more experience with these new infomediaries, more distinct preferences will emerge that can be quantified with traditional survey methods. Of particular interest is how such marketplaces will appeal to small and medium-sized businesses. Systems dynamics simulation models could also be developed to examine the effect on the spot market.

Due to the limited availability of data on marketplaces for other transportation modes, this thesis focuses on truckload transportation. Using the channel structure outlined in Chapter 1 and the Strategy Group Map described in Chapter 2 as frameworks, future research can analyze B2B Marketplaces for ocean, rail and airfreight.

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Exhibit 1

Market Fragmentation for US Freight Transportation

Trucking

<i>Sector</i>	<i>Total Revenues Billions (1997)</i>	<i>Sector</i>	<i>Total Revenues Billions (1997)</i>
Truckload	65.0	Less-Than-Truckload (LTL)	18.0
<i>Company</i>	<i>Revenues (1999)</i>	<i>Company</i>	<i>Revenues (1999)</i>
Schneider ¹	3.5	Yellow	3.2
JB Hunt	2.0	Roadway	2.8
Swift Transportation	1.1	Consolidated Freightways	2.4
Werner Enterprises	1.1	Con-way ²	1.9
<i>Highly Fragmented</i>		<i>Concentrated</i>	
C4	12%	C4	57%

Rail

	<i>Total Revenues Billions (1997)</i>
Railroads ³	35.3
<i>Carrier</i>	<i>Revenues (1999)</i>
Union Pacific	11.3
CSX Inc	10.8
Burlington Northern Santa Fe	9.1
Norfolk Southern	5.2
<i>Highly Concentrated</i>	
C4	99%

Air Freight

	<i>Total Revenues Billions (1997)</i>
US Air Cargo	22.7
<i>Scheduled Carriers</i>	
Percent of Total Revenues	25%
Revenues for scheduled carriers	5.7
<i>Passenger Airline</i>	<i>Cargo Revenue Millions (1999)</i>
UAL Corp	900
Northwest	720
AMR Corp	643
Delta Airlines	557
<i>Concentrated</i>	
C4	50%

Notes: 1. Schneider is privately held; revenue for 1999 is estimated. 2. Con-way is a subsidiary of publicly held CNF, Inc. 3. Carrier reported revenues include revenues from non-railroad activities.

Sources: Company Reports (10K); 1997 Trucking Industry Structure, Standard & Poor's (1998); Boeing 1997/1998 World Air Cargo Forecast; US Transportation Expenditures (1997), US Department of Transportation

Exhibit 2

Net Revenues for US Freight Forwarders

1998 in millions USD

<i>Company</i>	AEI	Circle International	Expeditors	Fritz	
Revenues					
Airfreight	1,158	483	686	577	
Ocean	202	112	237	374	
Net Revenue					
Airfreight	306	118	146	159	
Ocean	62	40	66	120	
Net Revenue Margin					<i>Average</i>
Airfreight	26%	24%	21%	28%	25%
Ocean	31%	36%	28%	32%	32%

Exhibit 3

Third-Party Logistics Providers

<i>Company</i>	<i>Net Revenues 1998 (in Millions USD)</i>	<i>Net Revenue Growth 1998 Over 1997 (%)</i>
Ryder Dedicated	851	3.5
Schneider Dedicated Operations	740	19.4
Penske Logistics	613	15.7
Tibbett & Britten Group N. America, Inc.	572	15.1
Fritz Companies, Inc.	558	9.6
AEI	486	-0.4
Exel Logistics North America	441	4.2
Customized Transportation, Inc.	337	10.1
Caliber*	310	16.1
UPS Worldwide Logistics Group	307	24.8
Expeditors International of Washington	303	4.4
Ryder Integrated Logistics	301	22.2
Circle International Group	268	2.1
Caterpillar Logistics Services	264	20
J.B. Hunt Dedicated Contract Services	254	50
Menlo Logistics	248	125.5
GATX Logistics, Inc.	246	-3.9
C.H. Robinson	243	18
DSC	215	3.6
Schneider Logistics	170	13.3
Werner Logistics Services	140	180
Rollins Logistics, Inc.	130	12.2
USF Logistics	125	20.2
Swift Transportation Co., Inc.	118	51.3
FedEx Logistics & Electronic Commerce	104	5.3
Mark VII Worldwide Logistics	92	8.9
MS Dedicated	50	92.5
J.B. Hunt Logistics, Inc.	16	22
MS Logistics Services	9.4	109.6
Hub Group Logistics	7.3	-26.3

* Acquired by FDX Corp.

Source: Who's Who In Logistics? Armstrong's Guide To Third Party Logistics Services Providers, Armstrong & Associates, Inc.