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**TRANSITION OR TRANSFORMATION? EMERGING FREIGHT
TRANSPORTATION INTERMEDIARIES**

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ABSTRACT

During the past two years, traditional freight transportation intermediaries, which include freight forwarders, brokers and third party logistics providers have been joined by a large number of new intermediaries. The main drivers of the development of these new companies are advances in information and communications technologies, the development of web-based or on-line freight transportation marketplaces and the emergence worldwide of business-to-business (B2B) electronic marketplaces and business-to-consumer (B2C) e-tailers. Advances in Information Technologies make possible many new operational paradigms and potentially enable the efficient integration of supply chains. In this paper we examine these new companies, discuss the potential benefits and costs of shifting from traditional 3PLs to these on-line service providers and illustrate the extent to which changes in the industries appear to be more of a transition than a large scale transformation.

Key Words: Freight Transportation, Intermediaries, Supply Chain Management, Third Party Logistics, 3PL, E-commerce, Information Technology

INTRODUCTION

Freight transportation intermediaries have historically played an important role in facilitating the reliable and fast movement of goods. The increased adoption of logistics outsourcing by manufacturing companies led to the steady growth of the third party logistics (3PL) industry over the past few years. 3PLs have steadily increased their service offerings. Most recently, a new type of freight transportation intermediaries have emerged. These on-line logistics providers are using advances in information and communications technologies and the opportunities provided by emergence worldwide of business-to-business (B2B) electronic marketplaces and business-to-consumer (B2C) e-tailers. A variety of new business models have emerged. Though it is too early to tell which of these companies will be successful, it seems likely that these will eventually facilitate seamless interaction between shippers, carriers and traditional 3PLs. The potential impact on the visibility and efficiency of supply chains is considerable. In addition, efforts of the new market entrants will drive existing freight transportation intermediaries to transition to incorporate information technologies more widely in their operations.

The on-line logistics providers are attempting to use the power of the Internet and emerging software tools to interact efficiently with shippers, carriers and traditional third party logistics providers. Some of these are online freight marketplaces that web-enable the purchase and sale of freight transportation capacity. These range from simple load posting boards to sophisticated online exchanges. Some are developing software tools to optimize freight operations or to integrate web based merchant's shipping solutions. Others provide information on container ports or other intermodal facilities while some aggregate buying power for the logistics industry. On one hand, these "disintermediate" 3PLs by providing many of the services previously handled by those companies. On the other hand, they provide a forum for 3PLs to operate more effectively and to provide more lucrative value-added services to their clients. There appear to be five types of companies emerging: online freight marketplaces, application service providers (ASP), purchasing consolidation markets, infomediaries and e-fulfillment companies. Within each category a variety of business models are being tested. We define each of these below:

1) Online freight marketplaces: Online freight marketplaces provide online transportation procurement services and/or other web-hosted logistics management services. These aim to match freight transportation demand and capacity to reduce costs and to increase equipment and facility utilization. These can be characterized, based on their business models, in the following way:

Spot market: A spot market allows shippers and carriers to post available loads or capacity on the web. In a passive spot market shippers and carriers "post and browse" for matching capacity/loads. Such sites are simply bulletin board services. More sophisticated sites manage notification of matching capacity/loads. Shippers/carriers can select the best carrier or load from the list. Some of these sites also provide services to

pre-select carriers or to rate them according to predefined criteria. In an active spot market the equipment/load is matched automatically.

Auction: An auction space enables the purchase and sale of freight transportation capacity online based primarily on price. For example, shippers post loads and define some selection criteria, and carriers make bids on these loads. There are also reverse auction sites in which the shippers and carriers switch roles in the auction.

Exchange: An exchange may provide spot market and auction capabilities but must also provide creative solutions for shippers, carriers and 3PLs to handle logistics processes and facilitate transactions. It must do more than move paper or telephone based processes to the web. It should be an active participant in the business processes of its partners and members and should drive the creation of new, more efficient business practices.

2) **ASPs:** Application service providers are developing web enabled sophisticated supply chain solutions for the logistics industry. Some are helping web merchants to develop their shipping solutions and to optimize their freight movements and to integrate rate quotes, tracking and tracing and other logistics functions with the merchant's web sites. Other ASPs aim to develop sophisticated web-based transportation or inventory management software, which can be leased to small to medium-sized shippers, 3PLs and carriers at an affordable fee. Many of these are also developing spot and auction markets and some are hosting exchanges themselves, though it seems likely that the most successful will either give up their own marketplaces and partner with companies whose primary product is a marketplace or simply provide software to many of the successful marketplaces.

3) **Purchasing consolidation sites:** These sites provide an opportunity for member companies (typically small carriers) to aggregate buying power to purchase logistics-related equipment and supplies at bulk rates over the internet.

4) **Infomediaries:** These web sites are pure information providers. They seek to facilitate efficient operations, for example container port operations, or to provide real-time traffic information, both to passengers and commercial vehicle operators. Some online freight marketplaces also have information services that provide their members with transportation equipment acquisition information (fuel and tires, for example). These are also sometimes referred to as portals.

5) **E-fulfillment Companies:** Another type of intermediary includes those companies providing web-enabling technology to handle the package and LTL shipments generated by e-commerce companies.

In this paper we examine the development of this new industry, discuss its promise and potential impact, and examine hurdles to its success.

BACKGROUND

Freight transportation intermediaries provide a bridge between shippers and carriers to facilitate the flow of information and goods and to leverage economics of scale. Prior to 1978 the U.S. for-hire transportation industry was subject to significant economic regulation. Rates charged, market entry and exit and service levels were monitored by the Interstate Commerce Commission for trucking and rail and by the Civil Aeronautics Board for air cargo. Since deregulation, third party logistics companies have emerged as providers of a wide variety of logistics and supply chain management functions.

Some 3PLs grew out of the shipper's agents and freight brokerages that existed under regulation. The term freight broker applied to ICC licensed truck brokers that handled general commodity freight. These brokers acted primarily as marketing agents and load matchers for smaller trucking companies while shippers agents were intermediaries who bought intermodal capacity from railroads and then sold this to shippers[1]. Until very recently most 3PL companies were affiliated with a parent transportation or warehousing company, many operating as subsidiaries of that company. Based on the ownership of transportation equipment or warehouse facilities, 3PL providers were historically divided into two categories: asset-based and non-asset based[2]. Today, the vast majority of 3PLs appear to be non-asset based. These tend to be either management or knowledge-based consulting companies. Rather than handling the physical distribution themselves, these companies mainly focus on strategic or tactical level activities. However, many work closely with asset based carriers or warehouse managers.

These firms typically provide some of the following services: freight consolidation and transportation procurement, freight payments and auditing, carrier selection and rate negotiations. In addition, these firms may develop information systems and manage inventory and customer order fulfillment[3]. The rapid growth of international trade activities has been followed by the birth of strategic channel intermediaries, such as foreign freight forwarders, non-vessel-owning common carriers, trading management companies, customs house brokers, export packers and port operators. Several recent studies have addressed the issue of growth in the 3PL market and other freight intermediaries in detail. A study by Murphy and Poist provides a review and synthesis of research on this topic[4].

Lieb and Peluso[5,6] and Lieb and Randall[7] discuss insights gained from a multi-year survey of chief executive officers of the largest 3PL providers in the United States. Key findings reported in the paper are the following: most of the companies surveyed are autonomous subsidiaries of companies in the transportation and warehousing business; most have significantly increased their international operations in the past few years; most are increasingly forming strategic alliances with other 3PL companies as well as companies primarily involved in warehousing, trucking, freight forwarding, and customs brokerage. That study followed an earlier study by Lieb that had as its focus large manufacturers, users of 3PL services[8]. Similarly, Leahy, Murphy

and Poist examined the determinants of successful third party relationships from the provider perspective[9]. More recently, Sankaran and Charman performed an exploratory study of the effectiveness of 3PL contracts as well as the process by which buying firms purchase services[10].

The benefits of outsourcing logistics services in some cases can be considerable. For example, 3PL's have made "build to order" manufacturing systems possible in the computer industry where there would have been otherwise infeasible[11]. Rapidly changing markets suggest that the industry should see continued growth in the next several years.

In a last few years, on-line freight transportation intermediaries have emerged. Some of them entered the market as a neutral party providing spot markets or online freight exchanges. One example is NTE, formally known as National Transportation Exchange. This type of model attracted substantial funding from venture capitalists in a short time. After a while some carriers and 3PLs found it necessary to open their own online business so as to protect their interests. Transplace, developed from the merger of J.B. Hunt Logistics and the logistics arms of five other major carriers, is one example. With more companies entering this new market, online freight exchange sites have found it hard to attract the significant volume they had expected. Therefore, new business models are emerging such as ASP-based solutions and private collaborative logistics networks. An early review of these e-logistics companies can be found in a report by Wolfe, Wadewitz, and Combe [12].

POTENTIAL BENEFITS

The potential benefits of on-line freight transportation intermediaries are enormous. For small carriers, convenient access to spot markets could make a huge difference in profitability – providing the cost to access these markets is reasonable. More than 70% of trucking companies operating in the U.S. in 1998 had six or fewer trucks[13]. Access to inexpensive tracking and tracing and automated billing and freight payment systems will allow small carriers to operate with little administrative overhead. Many small carriers were already acting as sub-contractors to larger carriers, the fact that these relationships are moving on-line should only make these relationships more efficient. Medium sized carriers could also benefit from participating in markets that encourage groups of shippers and carriers to collaborate. So-called collaborative private logistics networks in which one or more shipper and one or more carrier cooperate to create a more dense network could provide significant added efficiencies. If issues related to proprietary information and competitive issues can be resolved, truckload carriers in particular could benefit through scheduling loads for multiple shippers simultaneously. Large carriers will benefit most from participation in closed networks which facilitate improved communication (web based EDI rather traditional EDI) and which allow them to subcontract sub-optimal loads in (either public or private) spot markets.

Shippers may benefit from opportunities to transform significant portions of their less-than-truckload moves to truckload moves. Small and medium sized shippers should have significantly reduced search costs when they require access to spot markets. The cost of services provided through both the spot markets and auctions should be low. When price is the main concern these markets may be very attractive. These shippers may also benefit from creative contracting arrangements being offered by some of these companies. For example, at least one company is offering a variety of contracting arrangements. These include: spot markets in which loads are tendered and trucks are offered for a single predetermined date; forward markets in which loads are tendered or trucks are offered for a single pickup within a predetermined week or month, but the specifics of the contract are to be completed at a later date; series markets in which loads are tendered or trucks are offered for periodic pickups on more than one predetermined day, week, or month; shorthaul markets in which loads are tendered or trucks are offered for any number of pickups and deliveries to be completed on a single day such that the trucks can return to their depot on the same day[14].

Shippers will also benefit directly from new software made available by Application Service Providers. For example, transportation management software should make their operations more efficient. Bidding and contract management software will also help shippers, particularly large ones, as will software designed to allow large shippers to develop private exchanges.

Finally, traditional 3PLs will benefit from access to technological improvements without heavily investing in development. Large 3PLs, with relationships to a large number of carriers should be able to leverage significant economies of scale. With the increase in global commerce, 3PLs as well as shippers and carriers will need to find efficient solutions to expedite complied with internal trade rules. Customs clearance services from online communities should simplify and automate the cross-boarder movement of goods. One example of an effort to provide these services is Arzoon which recently acquired From2.com, a provider of global trade software and consulting solutions which enables its members to be informed of online, real-time sourcing information related to import and export.

POTENTIAL DRAWBACKS

Major carriers already enjoy competitive advantages due to long-term contracts with high volume shippers. They view their companies as providing significant value added services, particularly to their core customers. There is a danger that on-line exchanges will view goods movement as a commodity rather than a complex service. The carriers also worry that the online business model will further curtail their already thin profit margins. Shippers will want to maintain their existing long-term relationships with reliable carriers – these have been nurtured and developed over a number of years. Indeed, reliable transportation services rather than low prices alone assure the success of shippers' operations. In addition, traditional 3PLs risk being disintermediated out of business or will at least face increased competition from these e-logistics firms. They

have benefited for years from possessing information that was difficult to obtain. In today's information rich environment they will be forced to find new ways to provide value added services to their clients.

Finally, security of proprietary information and on-line transactions and reliability of supply chains involving one more layer of intermediation is of grave concern to carriers, shippers and 3PLs. On-line intermediaries are finding creative solutions to all of these worries, nonetheless, there is a risk that carriers and shippers will be slow to join these marketplaces and that many will not become profitable before they run out of startup funds. This creates one more serious concern – carriers, shippers and 3PLs will be reluctant to sign on with companies that have a tenuous future. They will be trying to work with the clear market leaders, though these are very difficult to identify at this stage.

MARKET GROWTH

The freight transportation intermediary market includes third party logistics or contract logistics firms, customs brokers, freight forwarders, freight consolidators and shippers associations who arrange and manage the movement of goods between shippers and carriers. In addition it includes the new on-line services and e-commerce fulfillment companies. Here we consider only the third party logistics market and the new on-line marketplaces altogether. The service offerings of these new companies have considerable overlap with the traditional 3PL industry.

One of the difficulties in estimating the size and scope of the 3PL industry is that it is hard to draw the line between 3PLs and other freight intermediaries. There are various estimates of the total size of current 3PL market in the U.S., and the emergence of the online logistics providers complicates matters further. A fairly reliable estimate is that the revenue of third party logistics market is currently approximately \$64 billion in U.S. with another \$75 billion globally in 2000[12]. The annual revenue growth rate has been in the 10-20% range over the last five years. It is not clear how many firms exactly are providing third party logistics services currently in U.S., one source listed over 400 3PLs[15]. If we include the roughly two hundred online logistics providers that have emerged in the last few years, we estimate that there are roughly 600 ~ 700 3PLs operating in U.S.. These companies vary widely in size. Among them, big players like C.H. Robinson and Ryder logistics have annual revenues of billions of dollars with thousands of employees, while hundreds of small companies only have a few millions of dollars of revenue and less than 100 employees.

Though the third party logistics industry emerged in U.S. during the 1980's and 1990's and is still relatively young; it has a bright future with huge potential. Optimistic estimates expect 3PL, and especially the e-logistics market to increase significantly in the near future[12]. The predicted increase in the size of the 3PL market is well founded. Logistics costs continue to increase and logistics services continue to be more and more complicated. This has led to an increase in logistics services out-sourcing. In 1994,

business spent \$421 billion on transportation costs to move 3.5 trillion tons of freight across U.S., this number increased to nearly \$562 billion in 1998[13, 16]. In 1999 total U.S. logistics costs, including carrying costs and other logistics-related costs, reached \$921 billion, 9.9% of U.S. economy[12]. While not all of this market is appropriate to be outsourced to third parties, many logistics services are. This point is further supported with data from an annual survey of U.S. Fortune 500 manufacturers. The study indicates the rate of 3PL service usage among businesses increased to 77% of respondents in 2000, from 69% and 65% in 1999 and 1998 respectively. 75% of respondents also indicated that they expected to at least moderately increase the use of 3PL services[17].

The development of E-commerce and participation of new online transportation intermediaries will likely add to the growth of third party logistics market. While the B2B and B2C e-commerce markets are still growing, many of these companies lack the necessary resources to handle logistics services, and some have a changed freight pattern with increase of smaller and expedited shipments, so it seems natural for them to outsource their logistics function. Ecommerce logistics costs in the U.S. were about \$42 billion in 2000, and are expected to grow up to \$274 billion in five years [12].

Despite the current (early 2001) dip in demand for freight transportation services, due to the overall decline in demand for high tech and other durable goods, over the next several years, the steady growth of total logistics costs and trends of outsourcing, as well as the development of e-commerce and the plethora of online logistics providers, will help freight transportation intermediaries, particularly those with reliable web-based solutions to increase their market penetration.

MARKET TRENDS

During the last few months this new industry has witnessed rapid changes. Some online freight exchanges ceased operation or merged with other companies; many announced changes in their top management; others formed strategic alliances with new partners. New players continue to enter the already congested market. For example, just a short time after FreightWise, a relatively well funded online multi-modal freight marketplace backed by BNSF rail, suspended operation last year, and iCargo, an online air freight marketplace shut down early this year, a U.K. based web transportation marketplace, eLogistics opened for trucking business in March of 2001. Most recently, in April, 2001 Trantis, "a new type of online transportation trading system" and a potential heavy hitter in the industry, launched its beta-operations.

Though the shakeout and consolidation of online logistics providers was anticipated by many analysts, the number of e-business completely shutting their doors has been so far, unexpectedly small. Last year, several industry observers identified more than one hundred online logistics providers (for example [18]). Armstrong & Associates, a logistics consulting firm, maintains a current list[19]. Most of them are still operating though some have slowed their initial launch plans or shifted their focus. Despite this,

there are numerous indications that the online freight transportation markets are undergoing important changes.

The most frequently observed change is that both the e-businesses and the mainstream freight transportation industry have begun to realize the limitation of pure online public freight exchanges. The pure online public freight exchanges were originally targeted towards matching freight and transportation capacity with access to the general public. The main idea is that these can leverage economies of scale, reduce search costs and disintermediate redundant links in the logistics supply chain. Nonetheless, the actual transaction volumes on online exchanges to date have been far short of expectations. While most exchanges do not disclose their transaction volumes for competitive reasons, according to an article published last year, NTE, the oldest online U.S. freight exchange in U.S. “gives shippers access to 400 trucking companies”, while C.H. Robinson, which claims to be the largest traditional 3PL has connections with 24,000 carriers [20]. As a result, we will continue to see more closures during the next year. NeoModal, an application service provider closed its online load-matching and rate-negotiation site – eRateRequest, and Celarix, one of the apparent market leaders, also closed its Celarix Marketplace very recently.

The reasons why shippers, forwarders and carriers hesitate to participate in online freight exchanges were discussed earlier in this paper. Those have lead many on-online marketplaces to shift their focus. One shift is from the public online freight marketplace to the private collaborative network. Instead of being open to any shipper and carrier, the private marketplace is a platform with access only for one or small group of companies and their transportation partners to trade on the Internet. This model allows shippers maintain the long-term relationships with their transportation providers, gets rid of “unqualified” traders but continues to aggregate volume and automate the transaction process. Companies like Nistevo, 3Plex, and even NTE, which began as the first public spot market offer technologies to help customers to set up their own private exchanges with their carriers.

Recent data also indicates that online logistics providers are making efforts to offer integrated supply chain solution and one-stop shopping. Single functions are not very attractive to the shippers, 3PLs and carriers, they not only want to use the online freight exchange to trade with their partners, but also wants sole sites to provide ASP (application service provider) based software to optimize their routing and scheduling and manage their orders and billing processes. Several consolidations and acquisitions during recent time reflect this tendency. For example, last year I2 Technology, one of the world’s largest logistics software vendors invested an online transportation service marketplace FreightMatrix to broaden its service offerings. Descartes Systems Group, a Canadian supply chain management software company bought Sameday.com after its acquisition of another online transportation service company to help it to develop online freight exchange and e-commerce fulfillment software. In addition to merging with ASPs, the online freight marketplaces are taking steps to evolve into true multi-modal transportation service providers. Logistics.com, the online transportation software and marketplace company acquired Quoteship, an online air-cargo load-matching site and

expect to provide online transportation service in air, ocean and the trucking industry. RightFreight.com, an air cargo transportation exchange site recently teamed with trucking focused NTE. Their partnership will create a seamless real-time exchange for air and ground freight used by member shippers, third-party logistics firms and carriers. In addition to adding value to its service and products, strategic alliances also increase access to new market channels. For instance, most recently Transportation.com, an online transportation marketplace funded by Yellow Freight Corp., has formed an alliances with the Used Equipment Network (UEN) to provide transportation services to more than 10,000 used machinery and equipment dealers worldwide.

Another observation related to this e-business evolution is that logistics expertise is at least as important as new technologies to ensure the success of online freight transportation industry. Indeed, transportation is not a pure commodity, rather a service in which expertise and relationships are very important. The issue of how on-line intermediaries will be profitable is a key issue here. Subscription fees do not appear to be a workable model. Fees collected on a transaction basis can be no more than a small percentage of the price charged in this already thin-profit margin business. Therefore, only companies with very high transaction volumes will be profitable based on fees collected on each transaction. Providing value added services including logistics consulting and software support for fees will likely be the surest route to near term profitability. Companies will only be able to provide these services if they have seasoned transportation and logistics specialists on staff, and enough of them available to meet customer needs quickly. The recent shift of top management in several online freight transportation ventures clearly demonstrates this point. Online exchanges are increasingly seeking senior logistics professionals to fill important management positions.

Recent activities in this young market lead to several observations. The market will continue to weed out businesses that lack competitive advantage. However it is difficult to predict at this time how many players will survive. The 3PL industry has historically supported large numbers of small companies, in addition to larger industry leaders. These small 3PLs possess skills and knowledge that is difficult to develop and many have very secure long-term relationships with shippers and carriers. It seems unlikely that they will be forced out by the newer on-line players in the near future. However, it does seem likely that even if small 3PLs continue to thrive, that they will participate in collaborative, on-line intermediaries.

CONCLUSION

Freight transportation intermediaries have entered a period of rapid expansion and transition. The number of market entrants is enormous, particularly among on-line service providers. Stability will elude this market for several years at least. Many companies will quickly exit the marketplace as new entrants continue to stream in. Market leaders will soon emerge. The traditional distinctions between asset and non-asset owning 3PLs are not fine enough to describe today's intermediary industry which

includes a wide variety of both asset and non-asset owning companies. The rapid development of information technologies and e-commerce initiatives may render current optimization and supply chain management tools obsolete. New optimization tools and integrated management systems as well as new business models, especially for the online brokers, will need to be developed and implemented. The freight transportation industries have traditionally been slow to change. Despite the emergence of many web based companies and tools, changes in the industry will look much more like a transition than a rapid transformation.

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