

A LONGITUDINAL STUDY OF THIRD PARTY LOGISTICS SERVICES

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ABSTRACT

This paper analyzes the scope of services offered by the third-party logistics providers in the United States from 2002 to 2010. The purpose of this study is to investigate the strategic service development in the third-party logistics industry. The results show broadened service offerings and industry coverage over the years. The service offerings differ among various asset ownerships, and global 3PLs offer more logistics, transportation, and special services.

Keywords: third party logistics services

INTRODUCTION

In order to remain competitive in today's changing business environment, more and more companies focus on core competencies. As companies expand into the global marketplace, logistics becomes critical in support of the global supply chain. Inventory carrying cost, transportation, and warehousing are the largest components of the logistics bill in the United States (Wilson, 2004). Instead of developing in-house capabilities in the various logistics disciplines such as transportation planning, warehouse management, and information technology, companies are opting to outsource to third party logistics (3PLs) providers. Those firms are able to concentrate on their own core business, while the 3PLs providers concentrate on inflows and outflows of the global supply chain activities. Boyson et al. (1999) showed that the outsourcing of logistics functions had proven to be effective in helping firms to achieve competitive advantages, improve their customer service levels and reduce their overall logistics costs. Berglund et al. (1999) found that 3PLs can add value by creating operational efficiencies and by sharing resources between customers.

Third-party logistics is the use of contracted firm(s) to supply services in the planning, implementation and controlling of the flow and storage of raw materials, in-process inventory, finished goods, and related information throughout the supply chain. They may handle all or part of the distribution of merchandise along the supply chain to the consumer. Third party logistics was identified as a separate industry and service in the late 1980s, and started to gain market share in the U.S. only

since early 1990s (Ashenbaum, et al., 2005). However the 3PL industry has grown rapidly from about \$6 billion in 1991 to \$107.11 billion in year 2009. The growth rate is estimated to be steady at around 18% to 22% annually. The largest vertical industry-wide expenditures on 3PLs are from retailing, technology, and automotive industries (Armstrong report, 2010). In U.S. 3PLs account for 16% of total logistics spending in 2008 and 77% of Fortune 500 companies outsourced some portion of logistics function in 2008 (Coyle, et al., 2009). Lieb and Bentz's study (2004) found out that the average 3PL user paid approximately one-third of the company's logistics operating budget to 3PL providers in 2003.

3PL relationships are more complex than traditional logistics supplier relationships, which are often transaction based and focus on single function (Simchi-Levi, et al., 2009, p. 149). As 3PLs providers become more vital to a company's operations, these arrangements require active participation by both parties. In contracting out the logistics operations, the third party provider is now a significant partner which has significant impacts on the company's quality, service, and dependability. This paper investigates the strategic development of American 3PLs services in recent years and studies how 3PLs fulfill their roles in today's global supply chains.

LITERATURE REVIEW

In earlier years, companies chose 3PL providers mainly by cost. However Millegan (2000) noted that more meaningful relationships had been emerging since late 1990s. Bhatnagar et al. (1999) found that other than cost, customer service, and flexibility (customization) were the most important factors for selecting logistic outsourcing. For example, shippers are now choosing their providers based on their emphasis on value, innovation and performance in an increasingly global context. This trend presents a problem for the provider. Millegan's study (2000) indicated that customer demands for performance and sophistication had been accelerating; and in many ways, the 3PLs are not keeping pace.

Lieb and Bentz's (2005) surveyed the use of 3PLs services by large American manufacturing firms. They found that eighty percent of sixty Fortune 500 manufacturers indicated that they



had used 3PL services in 2004. Sixty percent of the users reported using multiple 3PL providers, reflecting the difficulty encountered by individual providers in meeting the broad service requirements of many large 3PL customers. According to a similar report by Armstrong & Associates, over eighty percent of *Fortune* 100 companies use 3PLs for logistics and supply chain functions. According to their report, General Motors and Wal-Mart each use over 30 third-party logistics service providers. Traditionally, turnover rate was high in 3PL market. Study shows that more than one-third of users have cancelled at least one 3PL contract (Mottley, 1998). However Lieb and Bentz's survey (2004) showed seventy-two percent of the users identified in their survey had used 3PL services for more than five years, which is the highest percentage ever reported in this category in their surveys. This indicates that the relationships between customers and some 3PLs are stabilized over time and may be changing from adversary to partnership.

Various strategies are utilized by 3PL providers. Other than serving the needs of individual customer, some 3PLs take multiple customers within a particularly focused industry sector, yielding greater efficiencies and cost savings. Some 3PLs spend great resources to develop competitive specific channels and then use the channel throughout their customer base. Industry-specific 3PLs often use the same supply chain design and channels for clients that are competitors (Burnson, 1999).

Another strategy for 3PLs is to consolidate or form alliances with other 3PLs. As mentioned earlier, most of these 3PLs offer a variety of services from transportation management, contract carrier, warehouse management, and information technology, but no one company dominates the market share in all of these areas. Consolidation or multiple partner alliances are sometimes the only way to provide the range of diverse geographic services demanded by customers (Cook, 1998). Current trend in consolidation and strategic alliances comes from the pressure of 3PL users to extend global capabilities and provide one-stop-shopping. Cost efficiency can be improved as the benefit of scale. Some examples of consolidation include UPS's acquisition of Fritz, which allowed freight forwarding to be added to the expertise of the transportation and warehousing giant. Fritz Companies were also significant ocean NVOCCs as well as charter agents. Thus UPS was able to move beyond the small parcel dimension of global trade. Exel, a warehousing and freight-forwarding leader, acquired Mark VII so that it could add domestic surface

transportation management to its offered services. In addition to partnerships with other service providers, 3PL providers also enhance and expand partnerships with their users. Furthermore, as globalization escalates, the 3PL providers seek international partners for overseas coverage.

The other option for 3PL providers is to target a specialized niche market to differentiate them and then form alliances with other players. HUB Group is a good example of this strategy. Hub Group has decided to focus on intermodal transportation due to its strong relationship with the nation's railroad services. When a niche player has a customer that is looking for a more comprehensive service, they may partner up with another niche player that complements their own service. HUB Group partnered up with TMM Logistics in Mexico in order to be able to increase their presence in Mexico. TMM Logistics is the dominant logistic provider in Mexico. With this strategic partnership Hub, a niche 3PL player, is able to provide cross-border transportation.

Most of the extant literature focuses on the perspectives from the customers/users of 3PLs services. For examples, Murphy and Poist (1998) examined third-party logistics usage among a group of small to large manufacturers and non-manufacturers. Vaidyanathan (2005) proposed a conceptual framework using IT as the focus to evaluate the core functionalities of 3PL providers for the users. Moberg and Speh (2004) surveyed the warehouse customers to compare the selection criteria of a regional warehouse and a national warehouse. Some literature study 3PLs within a specific country context. For example, Lieb and Bentz (2004, 2005) and Langley et al. (2004) repeatedly surveyed the use of 3PL services among large American manufacturers over the years. Separate studies by Piplani et al. (2004) and Wilding and Juriado (2004) investigated customers' perceptions of 3PLs in Singapore and Europe, respectively.

Murphy and Poist (2000) compared the perspectives of 3PL providers and 3PL users on most commonly provided/used service. They found some overlap and mismatch between the 3PL services offered and used. There are overlaps on five of the ten most commonly provided/used services: EDI capability, freight consolidation, warehousing, consulting, and freight bill payment. The customers tend to be interested in operational services such as customs clearance, pick and delivery, freight charge auditing, intermodal service, and order picking and packing. However, their sample

size was rather small—thirty-seven 3PL providers and sixty-eight 3PL users and the comparisons are not from paired samples.

There is very little research from the perspective of the 3PL service provider. Hertz and Alfredsson (2003) followed the strategic development of four different types of logistics firms into 3PLs. They found that the existing network of these firms' customers, customers' customers and partners seemed to have played an important role for the development into a 3PL and also in the continued development. Larson and Gammelgaard (2001) studied Danish logistics providers and found them to be more niche firms, focusing on the domestic market and limited sets of customers by industry. Lieb and Kendrick (2003) provided some macro level insights into the third-party logistics industry; but their results were based on a survey of a small sample of twenty CEOs of the largest 3PL companies in the U.S.

RESEARCH QUESTIONS AND HYPOTHESES

This research explores service offerings of one hundred 3PL providers in the United States for four years to investigate how 3PL service scope has been strategically developed in response to the customers' growing needs in global supply chain management. As more diverse industries use 3PLs and outsource more logistic functions, the scope of services provided by 3PLs shall be broadened. Hence the following hypotheses are proposed.

- H1: The scope of services provided by the third-party logistics providers gets broader over time.
- H2: 3PLs serve more industry types over time.
- H3: 3PLs serve more global region over time.
- H4: Asset ownership of 3PL does not change over time.
- H5: 3PL services vary among asset ownership.
- H6: The scope of services differs between global 3PLs and domestic 3PLs.

METHODOLOGY

This research uses secondary data published by Inbound Logistics on their annual survey of one hundred American 3PLs from 2002 to 2010. Unlike Lieb and Bentz's survey (2003), which contains CEOs' comments from only the largest twenty 3PLs in U.S., this survey data consist of a mix of large, public companies and small, niche providers. This database includes information such as regions and industry sectors served by 3PLs, asset or non-asset based

ownership, services in six categories, and membership in ISO certification, SmartWay, and C-TPAT.

Table 1 provides a list of these six categories and their specific services. Services listed on this database were much broader in scope and in industry coverage comparing to the ones listed on Lieb and Bentz's (2005) survey. Their survey contained only 26 services for sixty large manufacturing companies.

Table 1: Major 3PL services categories

Category	Service Types
Logistics Services	Inbound Logistics, Integrated Logistics, Warehousing, Lead Logistic Provider, Inventory Management, JIT, Process Re-Engineering, Vendor Management, Payment Audit Processing, Product Life Cycle Management, Global Trade Services
Transportation Services	Small Package, Air Cargo, LTL, TL, Intermodal, Ocean, Rail, Bulk, Dedicated Contract Carriage, Fleet Acquisition, Equipment/ Drivers, Final Mile
Warehousing Services	Pick/Pack Sub-Assembly, Cross docking, DC Management, Location Services, Vendor Managed Inventory, Fulfillment
Special Services	Direct to Store, Direct to Home, Import/Export/Customs, Reverse Logistics, Marketing Customer Service, Logistics/Transportation Consulting, Global Expansion (sourcing/selling), Security Analysis, Contingency/Crisis Planning, Labor Management
Technology/ Web Services	EDI, Satellite/Wireless Communication, Enterprise Web Enablement, Product Visibility, Customer Relationship Management

Source: Inbound Logistics, various issues 2002-2010

Radar diagrams are drawn to show the levels of the five service categories over the years. ANOVA tests are conducted to analyze service category and industry breadth over years as well as the asset ownership impact on service categories. Chi-square tests are conducted to show changes on region served and asset ownership over years. Independent t test is done to see the regional impact on service offerings. In addition, nonparametric Spearman's corrections are calculated to see the relationships between service category and industry.

ANALYSIS RESULTS

There are six strategic service categories provided by 3PLs--logistics, transportation, warehousing, special service, technology and internet-based services. Each category contains four to twelve specific services for a maximum of 48 possible services. Figure 1 shows the percentages of the aggregated counts and Figure 2-Figure 6 show the percentage of specific service offered by 3PLs from 2002 to 2010.

Over the years, higher percentages of 3PL services are offered, especially on technology/web related services such as enterprise web enablement, product visibility, etc. For logistics services, the most commonly offered services are inbound logistics and integrated logistics, but only about 50% of them offer global trade service and product life cycle management. For transportation services, TL, LTL, and intermodal are offered by almost all 3PLs. New services such as bulk and final mile are growing in recent years. For warehousing services, over 80% of the companies offer cross docking and pick/pack subassembly and more companies offer vendor managed inventory and location services in recent years.

Special service and technology related service are the two categories that show many changes over the years. Logistics/transportation consulting was offered by 40% of the companies in 2002, but in 2010 that number increased to 93%. Reverse logistics was offered by 78% of the companies in 2002 and 93% of the companies in 2010. Deliver directly to store service was offered by 69% in 2002 and 86% in 2010. New services such as global sourcing and market expansion, security analysis, contingency & crisis planning, and logistics labor management were added to the list in 2007. On the technology side, EDI link has been offered by almost all 3PLs since 2002. However, all other technology related services are growing rapidly. For examples, enterprise web enablement service was increased from 52% in 2002 to 92% in 2010, while product visibility service was increased from 39% in 2002 to 96% in 2010. These results, in general, are consistent with the trend findings from Persson and Virum (2001) and Lieb and Bentz (2003).

ANOVA analysis (Table 2) on the aggregated numbers of total services show significant growth at $p=.000$ level. Hence Hypothesis 1 is supported. Further analyses on each service category find that transportation service, special services, and technology based service show significant growth over the years, with p values of .028, .001, and .000, respectively. The technology related services show double digit growth in most of the years. Although not at the significant level, logistics services are also growing at a steady rate. The service categories that have more future growth potentials are in the transportation and special service areas.

Four industry sectors—manufacturing, retail/e-tail, distributor, and services—are reported in the survey. Most 3PLs serve more than one industry sector. Table 2 also shows that 3PLs are serving more industries over time at

significant level of .000. Hence hypothesis 2 is supported. Further analyses on each industry sector reveal that all growth comes from the retail sector, distribution sector, and service sector, with p values of .006, .018, and .001, respectively. Manufacturing sector is already saturated, and service section still has room to grow.

(Insert Table 2 here.)

As the supply chains getting global, one would expect the 3PLs will also expand their services to global regions. However Chi-square test (Table 3) does not show significant difference over the years. Hence Hypothesis 3 is rejected. However there is a noticeable increase on global region in 2010. The database provided more detailed region breakdown data in 2010. While all 3PLs serve North America region, 58% serve Asia/Southeast Asia/India, 57% serve Europe/Eastern Europe/Russia, 54% serve South America, and 48% serve Middle East/North Africa.

Table 3 shows significant changes on asset ownership of 3PLs over the years. The p -value is at .033, hence Hypothesis 4 is rejected. According to the surveyed companies, pure asset-owned 3PLs are going down from 23% in 2002 to only 6% in 2010, while non-asset owned 3PLs grow from 44% in 2002 to 50% in 2010 and the number of 3PLs leverage both asset and non-asset capabilities grows from 32% in 2002 to 44% in 2010.

(Insert Table 3 here.)

Asset ownership varies among the 3PL companies. In general asset-based providers offer dedicated services, primarily through owned or leased assets. Non-asset-based providers offer administrative management services, and tend to subcontract for the necessary logistics assets which are not available in-house. ANOVA tests are conducted on the four years data and find significant difference ($p=.000$) in the total service levels among the three types of asset ownership. Non-asset based 3PLs offer an average of 69.42% of all service surveyed. Asset based 3PLs offer an average of 66.07% of all services and the both non-asset and asset based 3PLs offer an average of 75.7% of all services. Hence Hypothesis 5 is supported. In fact 3PLs that leverage on both non-asset and asset based capabilities provide more service in all service categories, the averages ranging from 68.01% in special service to 81.89% in logistics. They also serve more industry section, but the difference is not

significant. This result is consistent with Stank and Maltz's study (1996), but it is different from Murphy and Poist's study (1998). Murphy and Poist conclude that there are no differences in the number of services offered by either asset-based or non-asset-based providers. However, their study compares customers' reported usage of services from asset-based and non-asset-based providers, not the actual services offered by 3PLs.

(Insert Table 4 here.)

Table 3 shows no significant difference in regions served by 3PLs over the years. However Table 5 indicates that the level of services differs between the global players and domestic players significantly ($p=.000$). Hence Hypothesis 6 is supported. Global 3PLs provide significant broader level of services in all categories except the technology category. They also serve more industry sectors (all p values= $.000$).

(Insert Table 5 here.)

IMPLICATIONS AND CONCLUSION

Using services profiles gathered from one hundred American 3PLs from 2002 to 2010, analyses are conducted to provide a comprehensive study on the strategic development in this industry. Six hypotheses are proposed based on extant literature. Hypothesis 1 anticipates broader service scope over the years. Out of the six service categories, two categories—logistical services and warehouse services—seem to reach maturity. This is consistent with Van Hoek's (2000) findings that traditional third-party logistics services such as warehousing and logistics have become commoditized. Hence the growth of overall service offerings have come from transportation services, special services, technology related services. As the complexity and size increase with global business, the customers have demanded more service offerings in order to organize and structure their supply chains and logistics. The growth of the third-party logistics industry makes both the formation and dismantling of supply chain arrangement easier. This offers the opportunity for supply chain participants to concentrate on their core capabilities.

Hypothesis 2 proposes that more industry sectors are served by 3PLs over the years. Both hypotheses are supported by this study. Third-party logistics are most popular in manufacturing sectors. However, this research

find that industry sectors such as retail and e-tail, distribution and wholesale, and service are more important than manufacturing sectors in expanding 3PL service scope.

Asset based companies are typically larger firms. They usually enjoy economies of scale, own warehouse or transportation assets, have broader industry knowledge, and have a larger customer base. However non-asset based firms are more flexible and more able to tailor services with specialized industry expertise. This study finds that there are fewer pure asset based 3PLs over the years. Asset-based companies are tapped into the non-asset based capabilities to serve their customers. They have been expanding the service scope to satisfy customer's desire for "one-stop" shopping.

According to Lieb's 2003 user survey, users of 3PLs generally did not see 3PL providers as leading edge suppliers of information technology. Lieb and Bentz (2004) indicated that 3PLs must decide upon appropriate strategies for strengthening their technology capabilities to convince potential users. This research shows that 3PLs have been consistently and significantly improved their technology and web service offerings since 2004. Special services such as logistics and transportation consulting, reverse logistics, and delivery to store are now commonly offered, and new services like delivery directly to home and import/export service and custom clearances are gaining ground. In 2007 novel services on global sourcing, contingency planning for crisis, logistics labor management are offered. In 2010 security analysis are listed the first time and 35% of the companies has offered this service. These new capabilities will strengthen the strategic position of this industry.

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Table 2: ANOVA tests on service category and industry served by year

Service Category	2002	2004	2007	2010	F		02_04 Growth	04_07 Growth	07_10 Growth
					Statistic	Sig.			
Total services	63.54	74.02	73.11	74.36	9.567	.000	16.5%	-1.2%	1.7%
Logistics services	71.81	73.55	75.56	76.46	0.923	.482	2.4%	2.7%	1.2%
Transportation services	62.53	70.34	70.98	69.44	3.071	.028	12.5%	0.9%	-2.2%
Warehouse services	69.53	76.43	76.43	77.10	1.270	.284	9.9%	0.0%	0.9%
Special services	55.72	69.70	60.49	64.14	5.792	.001	25.1%	-13.2%	6.0%
Tech/Web services	53.54	74.34	82.42	87.27	48.768	.000	38.8%	10.9%	5.9%

Industry served	2002	2004	2007	2010	F		02_04 Growth	04_07 Growth	07_10 Growth
					Statistic	Sig.			
All Industry served	78.03	86.11	87.63	91.16	7.196	.000	10.4%	1.8%	4.0%
Manufacturing	98	97	98	99	.338	.798	-1.0%	1.0%	1.0%
Retail/e-retail	77	87	92	91	4.168	.006	13.0%	5.7%	-1.1%
Distributor	83	89	92	96	3.385	.018	7.2%	3.4%	4.3%
Service	53	71	69	78	5.257	.001	34.0%	-2.8%	13.0%

Table 3: Chi-square tests on region and asset ownership by year

Region	2002	2004	2007	2010	Chi-Square		02_04 % changed	04_07 % changed	07_10 % changed
					Square	Sig.			
North America	42	51	46	40	2.862	0.4	21.4%	-9.8%	-13.0%
Global	58	49	54	60		13	-15.5%	10.2%	11.1%

Asset Ownership	2002	2004	2007	2010	Chi-Square		02_04 % changed	04_07 % changed	07_10 % changed
					Square	Sig.			
Non-Asset	44	44	49	50		0.0	0.0%	11.4%	2.0%
Asset	23	20	13	6	13.714	.33	-13.0%	-35.0%	-53.8%
Both	32	36	38	44			12.5%	5.6%	15.8%

Table 4: Service category means and ANOVA tests by asset ownership

Service Category	Non-Asset based	Asset based	Both non-asset and asset based	F Statistic	Sig.
Total services	69.4236	66.0768	75.7016	9.199	.000
Industry served	85.7713	81.0484	87.3333	1.887	.153
Logistics services	73.8691	64.4144	78.1884	9.681	.000
Transportation services	67.9532	58.8105	72.1525	7.863	.000
Warehouse services	66.4889	83.0639	81.8886	13.001	.000
Special services	59.2672	57.7061	68.0149	6.495	.002
Tech/Web services	71.8085	71.6129	78.5333	3.418	.034

Table 5: Service category means and independent t tests by region served

Service Category	Domestic	Global	t Value	Sig.
Total services	67.01458	74.69697	-4.536	.000
Industry served	83.93855	86.99095	-1.412	.159
Logistics services	68.00972	78.89412	-5.166	.000
Transportation services	61.79598	73.22557	-5.115	.000
Warehouse services	74.48777	75.11244	-.195	.845
Special services	57.20654	66.4357	-3.722	.000
Tech/Web services	74.52514	74.11765	.160	.873