WHAT DO THIRD PARTY LOGISTICS BUYERS REALLY WANT? AN EMPIRICAL ANALYSIS UTILIZING BENEFIT BASED MARKET SEGMENTATION

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During the last decade the third party logistics market has grown significantly in the United States. While a degree of uncertainty continues regarding the definition of third-party logistics, a reasonable consensus of the concept has been described as

> a relationship between a shipper and third party which, compared with basic services, has more customized offerings, encompasses a broader number of functions and is characterized by a longer-term, more mutually beneficial relationship (Afrik and Calkins, 1994).

Competitive conditions have forced many firms to revise their priorities and focus resources on a limited number of key activities. Business process redesign has revealed the in-house Currently there exists a paucity of empirical research concerning the intrinsic drivers underlying the purchase of third party logistics services. The identification of market segments and the design of successful marketing strategies rely on understanding the benefits desired by existing and potential customers. provision of logistical services to be less than critical in the creation of customer value for a growing number of organizations. Thus, the U.S. third party logistics market now accounts for $85 billion of the $1.015 trillion total market for transportation, warehousing, and related supp-ort services (Langley, van Dort, Ang, and Sykes, 2005). The level of interest in logistics outsourcing can be further gauged by recent survey responses from chief logistics executives of the 500 largest American manufacturers. The participants currently reported spending 40 percent, on average, of their entire annual logistics budget with third party logistics providers. A consensus of the respondents indicated an expectation to increase this amount to 46 percent within three years (Lieb and Bentz, 2005).

Past research has found the benefits derived from products and services to be prominent discriminatory vari-ables in market segmentation (Haley, 1968; Wind, 1978). The principle underlying benefit-based segmentation is that buyers are not seeking a product or service per se, but the value

represented by the acquisition. In other words, how does the product help meet needs or provide benefits?

The present literature does not reveal an attempt to empirically determine the benefits sought by firms seeking to outsource logistics or whether homogeneous buyer segments exist in this market. Further, suppliers appear deficient in their understanding of the inherent value industrial buyers are seeking from the acquisi-tion of third party logistics services. Current marketing strategies use broad based approaches in an attempt to reach potential customers based upon traditional measures of in-dustrial segmentation, i.e., geographical location, decision making process, SIC code or industry, etc. Thus, these shortcomings highlight the need to determine the benefits desired by the purchase of third party logistics services and whether the buyers of these services can be segmented into homogeneous groups based on the unique benefits sought by each group. Further, third party logistics firms may gain a sustainable competitive advantage via innovative industrial buyer market segmenta-tion.

STRUCTURAL UNDERPINNING FROM EXISTING LITERATURE

Segmentation is a process that subdivides markets into potential customers with similar traits likely to exhibit comparable purchasing behavior. Most firms cannot pursue each and every market opportunity, as resources are routinely limited. However, in practice, many organizations ignore this fact and treat the entire market as potential customers for their products or services. This approach to marketing is known as aggregation and employs an undif-ferentiated strategy. Industrial markets are more difficult to segment than consumer markets as industrial products are often employed in multiple applications or different products may be used in similar applications. Also, industrial purchasers differ greatly and it is arduous to determine which differences are meaningful and those that are trivial when developing a marketing strategy. Researchers have identified five general segmen-tation criteria, arranged in a nested hierarchy, as bases for industrial market segmentation. These are demographics, operating variables, purchasing approaches, situational factors, and personal characteristics. Variables that are more easily observed, such as demographics or operating

Aggregation is akin to a shotgun approach to marketing while segmenta-tion can be likened to a rifle shot methodology (Weinstein, 1987).

There are a number of requirements surrounding effective market segmentation. Chief among these are the need for measurability (segment size, purchasing power, customer profile), access-ibility (ability to reach and serve), and size (large enough to warrant a tailored marketing pro-gram). Other segmentation requirements include differentiability (market segment must be distinguishable and respond differently to elements of the marketing mix) and actionable (effective marketing programs may be derived to attract and serve the segment) (Armstrong and Kotler, 2000).

Numerous methods have been employed to identify market segments, e.g., by geographic regions, by demographics, via product usage, by the decision process employed in purchasing, using firmgraphic variables such as SIC codes, revenue and number of employees, by adoption propensity (early vs. late), and by the meeting of needs or the provision of benefits (Market Vision Research, 1998). However, segmentation via the meeting of needs or benefits derived from a purchase is the only method based on buyers' underlying motives. Meeting needs provides benefits and is the genesis of purchasing be-havior. Benefits are the sum of advantages derived or satisfaction resulting from the fulfill-ment of perceived needs or desires (Weinstein, 1987). For example, logistics mangers do not buy freight transportation to merely transfer their firm's goods; they complete this transaction as a means of providing customer service.

variables, compose the outer nests while criteria that are more specific and difficult to determine constitute the inner nests. Outer nest variables are usually held to be inadequate for industrial segmentation in all but the most simple or homogenous markets, as they do not consider the differences among industrial buyers or their purchasing motivations (Shapiro and Bonoma, 1984).

Once market segments are identified they must be evaluated to determine whether they are viable. Prior research has revealed three factors critical in the evaluation of market segments. These are (1) the overall size of the segment and its propensity for growth, (2) the structural attractiveness of the segment regarding revenue and profit and (3) the selling organization's long-run objectives and resources. Firms are cautioned to enter only segments in which they are likely to develop sustainable competitive advantages (Armstrong and Kotler, 2000).

While the existing literature includes much previous work concerning the segmentation of consumer markets, research involving industrial applications is limited. This is likely because industrial purchasing often involves a team approach and results in a much more chal-lenging arena for investigation. Also, the use of benefit-based approaches to industrial market segmentation, as described in existing literature, is scarce probably due to the rigor associated with these methodologies. However, the advant-age of industrial market segmentation using benefit-based methods is potentially more beneficial than other techniques routinely employed.

The advantages associated with benefit-based segmentation methods include the identification of market segments based on causal factors, a revealing of opportunities for new product/ service development, an effective approach to reaching homogenous buyer groups, and an efficient use of marketing resources (Kerin and Peterson, 2004). Benefit-based market segmenta-tion can provide the above referenced advantages to third-party logistics firms seeking to differ-entiate themselves by meeting the specific needs of industrial buyers. This strategy may also lead

to a sustainable competitive advantage in a significant and growing industrial market.

RESEARCH APPROACH

The nature of this study should be considered exploratory since there has been no previous published research regarding benefit based segmentation of the third party logistics market. The methodology employed to address the questions of desired benefits and the potential segmentation is an adaptation of the approach used by Moriarty in his study of the potential for buyer segmentation in the data terminal market (Moriarty, 1983). This design was particularly appropriate as third party logistics services, like data terminals, are purchased for a wide variety of industrial applications.

The initial research phase involved the use of a focus group to generate constructs and provide pre-scientific knowledge. Insights from the focus group were used to prepare a cross-industry mail survey of experienced third party logistics buyers. Focus group participants were recruited from a group of senior logistics, purchasing, financial, manufacturing and human resource managers. Candidates were identified using three sources, i.e., recommendations from a major U. S. based supplier of third party logistics services, an experienced logistics academic, and several industrial directories.

Structure for the focus group interview was provided by a topical outline developed from a literature review and preliminary interviews with experienced third party logistics buyers. Interview questions examined the perceived need for third party logistics services, the advantages and disadvantages of logistics outsourcing, benefits resulting from successful logistics outsourcing, buyer perceptions of current providers and the procurement process. The focus group was conducted by an experienced moderator at the facilities of a professional marketing company located in a large mid-western city. Analysis of the recorded focus group data followed the method prescribed by

Krueger (Krueger 1988). An interpretative summary derived from a synthesis of the focus group data was used in the development of a mail survey.

The second phase of the research utilized supplier selection data obtained from a nationwide, cross-industry mail survey of experienced third party logistics buyers. In an effort to obtain responses reflective of a broad spectrum of third party logistics buyers, three sources were used to construct a potential participant database. The first entailed a recent review of well-known logistics popular press articles. The second relied on promotional material distributed by third party logistics providers. The final source entailed the member-ship roster of a very large industry association composed of transportation / logistics and supply chain professionals, consultants and academics. This database was modified to include only the most senior logistics or supply chain managers representing U.S. manufacturing and mer-chandising firms. A total of 1,279 potential respondents were identified from the three sources.

A pilot test of the survey instrument was conducted to ensure relevance, clarity and completeness of questions. The pretest involved a number of experienced third party logistics buyers representing large and small manufacturing and merchandising firms. The refined questionnaire was used to obtain quantitative measurements on thirty supplier selection variables. As presented in Table 1, survey participants were asked to rate the importance of each supplier selection criterion and the amount of perceived variability associated with said criterion.

A final set of determinant variables was con-structed across all respondents by multiplying each importance rating by its variability rating. The new variables were created to ascertain the criteria most determinant in third party logistics supplier selection decisions. Research has revealed that a selection variable is determinant only when it is perceived to be important and variability, surrounding the variable, is acknowledged (Kerlinger, 1986). The thirty determinant variables served as surrogates for the benefits sought in the procurement of third party logistics services. The determinant var-iables were analyzed via two multivariate statistical techniques, i.e., factor and cluster analysis.

Factor analysis was used to examine the relationships among the determinants for each of the thirty supplier selection benefits across all survey respondents. The principal components model was used to extract factors and the Scree Test (Cattell, 1966) was employed to identify the number of non-trivial factors. The principal components method was chosen as it yields a mathematically unique solution to a factor problem (Kerlinger, 1986). The Scree Test was selected as it provides the minimum number of factors accounting for the maximum amount of variance (Gorsuch, 1974).

The principal components method requires an unrotated solution to determine the starting point for factor rotation. Factor (axes) rotation facilitates the derivation of simple structure, i.e., a condition in which each variable “loads” on as few factors as possible. This step assists in the interpretation of factor analytic results. A varimax rotation was selected for use in this study as it provides the best means of reaching a simple structure solution and is usually regarded as the optimum orthogonal rotation technique (Rummel, 1970).

TABLE 1
MAIL SURVEY INSTRUMENT—IMPORTANCE AND VARIABILITY QUESTIONS

Variable	**Importance Rating** Please rate the importance of each of the following selection criteria to you during the time you were making your most recent third party logistics acquisition decision. *(Circle a number from 1 to 7 to show how important each factor was to you personally.)*	**Variability Rating** Also, please rate your opinion of how much difference there is among suppliers in the industry. *(Circle a number from 1 to 7 to show huch much difference you think there is among suppliers in the industry on each factor.)*
	Importance to You	**Suppliers in the Industry**
	Not Important **Very Important**	**All about the Same** **Differ Widely**
Provision of integrated logistics services	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Single contact point	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Continuous improvement	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Direct control of all services provided	1 2 3 4 5 6 7	1 2 3 4 5 6 7
International capabilities	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Breadth of service	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Required services at lowest price	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Quality of service	1 2 3 4 5 6 7	1 2 3 4 5 6 7
EDI capabilities	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Confidentiality during negotiations	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Warehouse mgmt. system	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Software/systems capability	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Proven track record of experience	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Financial strength	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Asset ownership	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Depth of management expertise	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Experience in your industry	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Time in business	1 2 3 4 5 6 7	1 2 3 4 5 6 7
References from current customers	1 2 3 4 5 6 7	1 2 3 4 5 6 7

Variable	Importance Rating	Variability Rating
	Please rate the importance of each of the following selection criteria to you during the time you were making your most recent third party logistics acquisition decision. *(Circle a number from 1 to 7 to show how important each factor was to you personally.)*	Also, please rate your opinion of how much difference there is among suppliers in the industry. *(Circle a number from 1 to 7 to show huch much difference you think there is among suppliers in the industry on each factor.)*
	Importance to You	**Suppliers in the Industry**
	Not Important 1 2 3 4 5 6 7 **Very Important**	**All about the Same** 1 2 3 4 5 6 7 **Differ Widely**
Strategic partner potential	1 2 3 4 5 6 7	1 2 3 4 5 6 7
ISO 9000 certification	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Gain sharing from productivity improvements	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Compatible culture	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Skill level of workers	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Quick response to customer requests	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Non-union work force	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Contract/pricing flexibility	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Willingness to assume existing assets	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Overall cost of service	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Operational flexibility	1 2 3 4 5 6 7	1 2 3 4 5 6 7

To investigate the existence of benefit based buyer groups, the determinants composing the non-trivial factors served as input to a cluster analysis algorithm. Cluster analysis is a multivariate statistical method similar to factor analysis. In essence both of these techniques assist in identifying groups in data, especially when more than three dimensions are considered. Whereas factor analysis is routinely used to group variables, cluster analysis is more commonly used to combine cases.

The purpose of cluster analysis is to classify a group of objects or variables into a mutually exclusive assembly based on some statistical rule. Discriminant analysis is another technique used to differentiate between groups. However, this procedure differs from cluster analysis in that it identifies differences between groups on an a priori basis. Cluster analysis does not assume any previous knowledge concerning the number and/or types of groups existing in a dataset. It is a technique used to initially identify groups.

There is no universally accepted definition of a cluster. The term usually refers to a group of objects that are similar in some manner. However, research has revealed that clusters have identifiable characteristics, the most significant of which are density, variance, dimension, shape and separation (Sneath and Sokal, 1973). Numerous cluster analysis tech-niques exist and the selection of an appropriate model is an important decision in classification research.

A number of simulation studies have been conducted to determine which clustering algorithms are better at recovering known clusters in a dataset (see Milligan, 1981; Kuiper and Fisher, 1975; Blashfield, 1976). A synthesis of these tests revealed that Ward's minimum-variance clustering method is highly accurate and provides above average performance. This method was also used successfully in previous research to identify benefit based market segments (Moriarty, 1983). As a result of the validation tests and evidence of successful use in the identification of buyer segments, Ward's method was chosen for this research.

Ward's minimum-variance model is an agglomer-ative hierarchical method of cluster analysis. It is based on the premise that the most accurate representation of a dataset, i.e., the one containing the least error, exists when each object forms a cluster. Therefore, as the number of clusters decreases from k, k-1, k-2 …1, the groupings of increasingly dissimilar objects yield less precise information. At each level of the clustering process the objective is to create a group such that the sum of squared within-group deviations about the group mean, for each object, is minimized for all objects at the same time. The value of the objective function is expressed as the error sum of squares, i.e., the within-group sum of squares. Each reduction in the number of clusters is accomplished by considering all possible N(N-1)/2 object pairs and selecting the pair for which the increase in the error sum of squares is the least. As the clusters are combined they are treated as one unit, i.e., a new cluster (Lorr, 1983).

When the complete hierarchical solution has been attained and only one cluster remains, the error sum of squares history may be examined to determine the relative homogeneity of the clusters formed. This progression may be visualized by plotting the increase in the sum of squares at each iteration of the clustering process against the number of clusters formed. A sharp increase in the error sum of squares indicates that accuracy has been significantly compromised and the clustering process should be terminated (Lorr, 1983). The "natural" number of groups for the dataset is identified in this manner.

RESULTS OF THE RESEARCH

Data from the mail survey were used to determine the benefits desired by individuals involved in third party logistics services procurement process. Market segments were derived by combining buyers seeking similar benefits. A total of 263 completed surveys were return by the designated research deadline. A list of respondents by industry is presented in Table 2. The completed questionnaires provided an overall response rate of 21.3 percent.

The respondents to the mail survey were not required to identify themselves. This was done to ensure respondent anonymity and encourage participation in the study. However, this practice precluded a comparison of those electing to complete the questionnaire and the population from which they were drawn. This fact has implications for the findings drawn from this research.

In essence, the results must be considered representative of the industrial buyers com-pleting the survey and not necessarily reflective of general practice for all third party logistics buyers.

Factor analysis was used to derive the benefits desired by the industrial buyers participating in this study. A correlation matrix of the thirty

determinant variables served as input to the principal components model. The Kaiser-Meyer-Olin (KMO) test was used to ascertain the applicability of factor analysis to the correlation matrix (Kaiser,n.d.). KMO values in the 0.90's are considered exceptional and values in the 0.80's as very good. The KMO statistic calculated for the correlation matrix employed in this study was 0.875; therefore, factor analysis was considered appropriate for the dataset.

TABLE 2
MAIL SURVEY RESPONDENTS BY INDUSTRY

Industry	Percentage of Respondents
Appliances	0.80
Automotive and Transport Equipment	9.90
Building Materials/Lumber Products	1.90
Chemicals and Plastics	11.40
Clothing and Textiles	5.70
Computer Hardware and Equipment	8.00
Construction and Farm Equipment	2.70
Department Store / General Merchandise	2.70
Electronics and Related Instruments	10.60
Electrical Machinery	3.00
Food and Beverage	18.60
Furniture	0.00
Hardware	0.80
Machine Tools and Machinery	3.40
Fabricated Metal Products	0.80
Mining and Minerals	0.00
Office Equipment and Supplies	3.00
Paper and Related Products	3.80
Petroleum and Petrochemicals	0.00
Pharmaceuticals	11.40
Primary Metals	0.00
Rubber Products	1.10
Other	0.40
Total	**100.0**

TABLE 3
VARIMAX ROTATION: INITIAL CORRELATION MATRIX

Variable	Factor 1 "Reliability"	Factor 2 "Synergy"	Factor 3 "Economy"
Track Record	.73097		
Time in Business	.69073		
Industry Experience	.66845		
Financial Strength	.61583		.33222
Management Expertise	.58735		.52092
Skilled Work Force	.54815		.44948
EDI Capabilities	.53826		
Software/Systems	.52170	.44107	
Customer References	.48049	.42501	
Quality of Services	.47789		.34105
Integrated Services		.74548	
ISO 9000		.69708	
Breadth of Services			.67042
International Capabilities		.59826	
Assume Assets		.57012	
Asset Ownership	.35148	.52592	
Strategic Partner	.31626	.48673	
Continuous Improvement		.45420	.34485
Warehouse Mgmt. System	.41308	.41408	
Direct Control	.40696		
Confidentiality		.36113	.30032
Total Cost			.72569
Operating Flexibility			.70288
Contract Flexibility			.67287
Lowest Price			.59087
Non-union Operation			.57243
Quick Response	.42363		.52075
Compatible Culture	.35729		.46483
Gain Sharing		.36580	.46201
Single Contact Point		.38614	.40400

The thirty determinants were standardized about a mean of 1.0 before application of factor

analysis to simplify interpretation. The principal components method was employed for factor extraction. A Scree plot was used to determine the number of non-trivial factors for the dataset. The Scree Test results revealed a three-factor model to be appropriate. The results of applying the principal components model while specifying the extraction of three factors, followed by a varimax rotation, are presented in Table 3. Coefficients below 0.30 are not displayed, as any loading less that 0.30 was not considered salient to a factor in this study.

The three factors accounted for 44.2 percent of the total variance. The communalities for the variables indicated the three factors did not fully explain the variance related to some of the variables. While higher communality values were desired, the level of resolved variance reported here is not uncommon in exploratory research. The unexplained variance my be unique to specific variables and caused by measurement error or due to chance, i.e. random error.

Fifteen of the selection determinants experienced cross loadings greater than 0.30. Significant cross loadings inhibit meaningful factor interpretation. In an effort to improve interpretation and obtain a simpler structure, all determinants loading on two or more factors at a level greater than 0.30 were removed. The revised fifteen variable correlation matrix was subjected to the KMO test. The results of this test confirmed that factor analysis was appropriate for the revised matrix. An application of the principal com-ponents model followed by a varimax rotation yielded a much simpler structure. However, one variable displayed a cross loading greater than 0.30. After eliminating this variable, the revised fourteen variable matrix was tested for sampling adequacy and the KMO index was revealed to be 0.80. Thus, the revised matrix was subjected to factor analysis as outlined above.

Simple structure was accomplished at this point as no variable loaded on more than one factor with a coefficient greater than 0.30. The rotated factor matrix appears as Table 4. The three extracted factors resolved or explained 53.1 per-cent of the total variance and the communalities were slightly improved from the first two iterations of factor analysis.

TABLE 4
VARIMAX ROTATION: FINAL CORRELATION MATRIX

Variable	Factor 1 "Economy"	Factor 2 "Synergy"	Factor 3 "Reliability"
Total Cost	.80560		
Operating Flexibility	.73550		
Lowest Price	.69435		
Contract Flexibility	.66791		
Non-union Operation	.56452		
Integrated Services		.75390	
Breadth of Services		.72378	
International		.70030	
ISO 9000		.68511	
Assume Assets		.54348	
Time in Business			.81945
Track Record			.75195

Experience	.70608
EDI Capabilities	.53571

The first factor was noted to describe the cost and flexibility associated with logistics out-sourcing and was renamed "Economy." It explained 31 percent of the total variance and was composed of the linear combination of five variables. The second factor, labeled "Synergy" was also composed of five variables and resolved 12.6 percent of the total variance. This factor was observed to reflect buyers' perceptions regarding the provision of multiple or integrated services by a single provider. The final factor, entitled Reliability, was made up of four variables and accounted for 9.6 percent of the total variance. This factor was found to relate to supplier longevity and proven competence.

An internal consistency test, Cronbach's Alpha, was performed on the determinants constituting the three factors. This test was conducted to determine the reliability of the variables composing each factor. A Cronbach Alpha score of 0.70 is considered satisfactory for basic research (Nunnally, 1978). The tests resulted in scores of 0.77 for the Economy factor, 0.75 for the Synergy factor and 0.72 for the Reliability factor. These results provided a satisfactory level of assurance concerning the use of the fourteen determinants as input to the cluster analysis algorithm.

The final research step employed the reduced set of fourteen variables to determine whether benefit based market segments could be identified from the dataset. While component scores may have been calculated for the three factors and used as input to cluster analysis, a decision was made to employ the original four-teen determinants. This decision was predicated on the knowledge that component scores are not easily interpreted and the correlation matrix of the fourteen original determinants was more suitable to cluster analysis.

Ward's minimum-variance agglomerative me-thod was used to cluster the third party logistics buyers with respect to their ratings of the fourteen determinant variables composing the Economy, Synergy and Reliability factors.

Ward's algorithm requires that the correlation matrix be transformed into a dissimilarity matrix before submittal to the model. Further, a method must also be specified to calculate dissimilarities among the objects. Squared Euclidean distance was the method selected for use in this research.

The object of cluster analysis is to find some intermediate stage in the grouping process resulting in a meaningful number of clusters. An agglomeration schedule may be used to assist in locating this point. The coefficients appearing in this schedule may be examined to determine the initial point at which the increase between two adjacent agglomeration stages becomes large. In Ward's method this increase indicates that the members of the joined clusters are no longer similar since a substantial increase in the overall sum of the squared within-cluster distances has occurred. Statistics from the final ten stages of the clustering process for the industrial buyers are presented in Table 5.

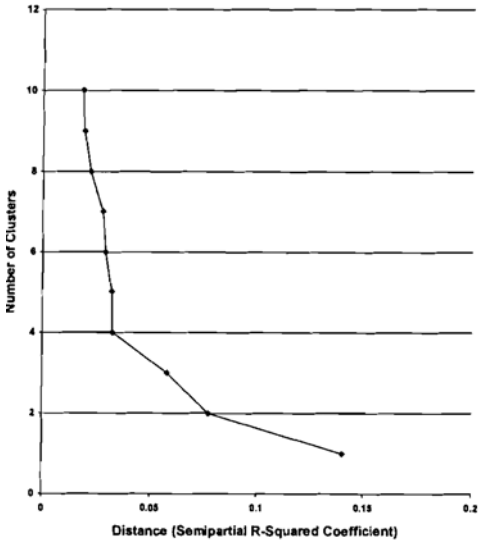
One method of detecting the appropriate cluster stopping point is to plot distance levels (Semi-partial R-Squared coefficients) against the number of clusters formed at each stage in the grouping process. This method was first set forth by Thorndike and later addressed by Kowalski and Bender (See Thorndike, Kowalski and Bender). Using this procedure, a four-cluster configuration was noted to produce the most "natural" number of groups for the buyer dataset. These four clusters represent third party logistics buyer segments.

Figure 1 displays a plot of the data appearing in Table 5, in accordance with the procedure described immediately above. The goal of this procedure is to identify the clustering stage at which the curve initially changes slope or radically "flattens out." The plot reveals a "break" or flattening of the curve at the point between the formation of the fourth and third clusters. As can be observed from the values of the semipartial R-squared coefficients appearing

TABLE 5
ABBREVIATED CLUSTER ANALYSIS AGGLOMERATION SCHEDULE
THIRD PARTY LOGISTICS BUYERS

Number of Clusters	Cluster (CL) Joined	Semipartial R-Squared Coefficient
.	.	.
.	.	.
.	.	.
10	CL 18 & CL 13	.017889
9	CL 20 & CL 16	.018827
8	CL 12 & CL 27	.022178
7	CL 15 & 9	.027775
6	CL 10 & CL 17	.028859
5	CL 8 & 14	.031825
4	CL 11 & CL 6	.032520
3	CL 4 & CL 7	.057917
2	CL 3 & CL 28	.077395
1	CL 5 & CL 2	.139972

FIGURE 1
PLOT OF THE DISTANCE REQUIRED TO FUSE CLUSTERS FOR THE SAMPLE POPULATION
WARD'S MINIMUM SQUARED ERROR CLUSTERING OF THIRD PARTY LOGISTICS BUYERS



on the X-axis, it is apparent that a significant increase in distance was required to form the three cluster configuration.

The dataset was also clustered using the Average Linkage Between Groups method to validate the four-segment configuration. The results of applying this model also revealed a four-cluster configuration to be appropriate for the data. The groups formed by the Average Linkage method were also found to be very similar to those formed by Ward's minimum-variance method.

The reliability of the four-cluster configuration was tested. The sample population was randomly split in half and the resulting datasets were clustered via Ward's algorithm. The results of these groupings revealed that a four-cluster grouping was appropriate for both of the randomly formed buyer datasets. The buyers grouped in the split-half analyses were also noted to possess characteristics, e.g., mean evaluations of the supplier selection deter-minants, similar to those combined in the original clustering of the sample population.

The four clusters derived via the Ward algorithm varied in size. The last two groups formed (CL 5 & CL 2) consisted of 39 percent and 61 percent of the respondents respectively. These two clusters defined the two major market segments appearing in the dataset. The remaining two clusters were found to be subdivisions of the largest buyer group (CL 2). Behavioral profiles of the buyers forming each of the four segments were developed and compared to determine how the clusters

differed. Differentiation between the two major and two minor market segments was examined by comparing mean determinacy scores for each group across the fourteen purchasing attributes. Table 6 displays this comparison for the two major market segments.

Buyers in both major markets segments ranked operating flexibility, a supplier's track record of experience and overall cost as their top three selection variables. These rankings implied that a supplier desiring to participate in both markets must, at a minimum, provide the benefits of Economy and Reliability. However, Segment 2 buyers, composing 61 percent of the sample population considered EDI capabilities, a supplier's willingness to assume assets and the provision of integrated services to be more determinant in their third party supplier selection decisions. Thus, the buyers in Segment 1 can be characterized as "traditional" buyers." They are concerned primarily with efficiency and dependability. Whereas Segment 2 buyers may be more appropriately considered "innovative" purchasers as they are seeking more synergistic benefits from logistics outsourcing.

The two minor market segments were also compared in the manner described above. These two groups were noted to be sub-groups of the largest major market segment, i.e., Segment 2. One sub-segment was very small, containing only 4.4 percent of the total sample population. It is highly unlikely that a marketer would develop a separate strategy for a segment this small unless it represented an unusually high profit opportunity. Buyers in the second minor market segment represented 14.4 percent of the total sample population. They differed from Segment 2 buyers in their ratings of the following determinants: use of a non-union workforce, overall cost of services, and contract and operating flexibility. Thus, buyers in this subgroup placed more importance on the determinants relating to the Economy factor. The individuals in this group may most appropriately be considered "Cost-Sensitive" buyers.

FINDINGS AND IMPLICATIONS

This research provides third party logistics marketers with a methodology for identifying customer segments based on benefits rather than descriptive measures. It applied the concept of benefit segmentation first posited by Russell Haley to the third party logistics market and identified two major and two minor market segments. Benefit based segmentation is an effective method of segregating customers as it yields a substantive basis for the existence of

TABLE 6
COMPARISON OF MEAN DETERMINACY SCORES ACROSS THE FOURTEEN SERVICE ATTRIBUTES MAJOR MARKET SEGMENTS NO. 1 AND NO. 2

Service Attribute	Overall Sample Stack Ranking	Sample Mean	Segment 1 Mean	Segment 2 Mean
		100%	**39%**	**61%**
Track Record	3	29.4	24.0	32.8
Time in Business	9	22.0	17.3	25.0
Experience	4	28.3	24.0	31.0
EDI Capabilities	7	24.6	16.2	29.9
Integrated Services	8	22.8	16.4	26.8
ISO 9000	12	14.9	12.7	16.4

Breadth of Services	6 **	24.8	20.5	27.6
Int'l. Capabilities	11	20.4	20.3	20.5
Assume Assets	13	14.7	10.1	17.6
Overall Cost	2	29.6	25.3	32.4
Operating Flexibility	1	30.5	23.8	34.7
Contract Flexibility	5	25.4	19.8	29.0
Low Price	6 **	24.8	21.5	26.9
Non-Union	10	20.8	18.1	22.6

* Mean Index = Segment mean divided by sample mean.
** Tie

customer groups. This type of customer aggregation provides the springboard for successful marketing strategy development and the efficient use of resources. The research results revealed that suppliers cannot consider all third party logistics buyers similar when formulating their service offerings and marketing strategies.

The two market segments identified were based on the bundle of service attributes desired by third party logistics buyers. Fourteen selection criteria were found to be critical in supplier choice. The criteria were condensed, using factor analysis, into three major benefit areas (Economy, Reliability and Synergy). Both of the major market segments The two minor market segments were found to be sub-segments of the largest major market segment. One of these segments was very small, representing only 4.4 percent of the total population. It is highly unlikely a third party logistics supplier would target a market this small unless the potential for profit was extremely high. However, the buyers in this small group were noted to differentiate among potential suppliers regarding benefits relating to financial stability and international service capabilities. The largest sub-group, constituting 14.4 percent of the buyer dataset, highly valued low price and supplier flexibility in their choice of a third party logistics supplier. Obviously, marketers must emphasize these two attributes to appeal to this segment.

were found to highly value benefits relating to Economy and Reliability. However, buyers in the largest segment, constituting 61 percent of the total population, were found to differentiate among third party logistics suppler candidates by selecting suppliers that provided integrated services. The results reveal that suppliers cannot consider all third party logistics buyers homogeneous regarding desired benefits. Providers attempting to serve both market segments must offer economy and reliability at a minimum. However, when it is time to make the final purchasing decision, many industrial buyers appear to favor suppliers that offer synergistic benefits in addition to economy and reliability.

An ongoing "shakeout" continues among third party logistics suppliers in the United States. However, competition is likely to be rigorous for the foreseeable future. Third party suppliers must become adept at matching their service offerings to customer needs to gain a competitive advantage. This research provides insight into the purchasing preferences of industrial buyers regarding desired benefits and critical supplier selection factors. This insight may be used by industrial buyers to more effectively and efficiently select third party logistics providers. It can also assist suppliers in their efforts to segment the overall market, target clients, successfully formulate strategy, and properly allocate their resources.

The purchase of third party logistics services involves multiple representatives from buyer and seller organizations. A dyadic or network rela-tionship exists. The perspective of the seller was not evaluated in this research. It is important to broaden the research to include this viewpoint to more fully characterize the purchasing process. Also, the benefit factors derived from this research resolved approximately one-half of the variance represented by the supplier selection variables. This is not uncommon in an explora-tory study; however, future research is needed to substantiate the results. Measurement error may have served to limit the explanatory ability of the factors and additional supplier selection criteria and benefit factors likely exist. The provision of additional benefit factors may also assist in refining or expanding the market segments identified in this research.

Additional empirical research is needed to more fully characterize the true "drivers" underlying the ongoing demand for third party logistics services. Much of the existing work has been descriptive and based on subjective information. The third party logistics market continues in the growth stage of its "product" life cycle. It has been described as a dominant trend at the very least and perhaps a "megatrend" (Murphy and Poist, 2000). Further study is needed, as proper market segmentation is the basis of loyalty focused, customer relationship marketing. This is a salient point as mutually beneficial relationships are critical in the provision and ongoing use of third party logistics services.

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