Volume - 5, Issue- 8, August 2017 IC Value : 56.46 e-ISSN : 2347 - 9671| p- ISSN : 2349 - 0187
EPRA International Journal of Economic and Business Review SJIF Impact Factor(2016) : 6.484
ISI Impact Factor (2013):1.259(Dubai)

Research Paper

www.eprawisdom.com

OPINION OF LOGISTICS INTERMEDIARIES ON THE SUPPLY CHAIN INTEGRATION OF PORTS

Mr.G. Dinesh Kumar[1]	*[1]Research Scholar, Department of Commerce, Chikkanna Govt Arts College, Tirupur, Tamil Nadu, India*
Dr.GB.Karthikeyan[2]	*[2] Head- Department of Commerce (International Business) Chikkanna Govt Arts College Tirupur, Tamil Nadu, India*

ABSTRACT

The ports of India have been the major indicators of growth. The transport and logistics sector are fundamental to the development of a country, especially so in India where it is estimated to provide employment for 45 million people. Multimodal logistics serves to interconnect different modes of transport – road, rail, air, water – and therefore improve efficiency and speed of goods movement. The economic growth in India has increased the demand for practically all transport services and further underlines the importance of providing an efficient multimodal logistics infrastructure in India.

KEY WORDS: *Supply chain integration, Logistics Intermediaries, Information sharing and ICT, Value-added Logistics Service, Intermodal Transport Service, Supply Chain Integration practices.*

1.1 INTRODUCTION

India is one of the largest economies in the world and a major emerging market that has a young population, rising investment rates, large domestic demand and globally competitive firm. Even though, the unexpected global crisis has taken its toll on the economy, it is predicted that India will become the third largest economy by the year 2025 after China and the USA and has awakened the interest of significant investors.

Ports are also important for the support of economic activities in the hinterland since they act as a crucial connection between sea and land transport. As a supplier of jobs, ports do not only serve an economic but also a social function. In terms of load carried, seaway transportation is the cheapest and most effective transportation system compared to other systems. Industries require a safe and cheap means of exporting finished goods and importing raw materials. Hence the majority of industries in the world are located in the coastal belts, in the vicinity of major ports. These industries in turn, influence the lives of the employees and indirect benefactors. (Multimodal Logistics, Transport News, 2013).

1.2 Need for the Study

The ports of India has been integrated with the supply chain management, in order to have greater sights of improvements in the dimensions pertaining to Lead time, Fulfilling customer satisfaction, Effectiveness, Uninterrupted services, and Efficiency. This article is intended to analyse the performance of the ports in India.

1.3 Study Area

This research is carried in the Coimbatore district as it comprises of many traders who were involved in export and Import of various products such as textiles, engineering and other related products.

1.4 Objectives of the study

- To analyse the logistics intermediaries opinion towards the supply chain orientation in ports.

1.5 Statistical Tools Used : Factor Analysis, Cluster Analysis, Discriminant Analysis

PORT PERFORMANCE - Factor Analysis

Before performing PCA (Principal Component Analysis) for factor analysis, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity are performed.

Table 1 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.782
Bartlett's Test of Sphericity	Approx. Chi-Square	1836.554
	df	153
	Sig.	0.000

Table 1 indicates that KMO measure of sampling adequacy test is significant (because the test value is greater than 0.700 at 0.782) and Bartlett's Test of Spherecity is also found to be significant (approx. Chi-square = 1836.554, df = 153, Significance = 0.000). This indicates that the dataset is fit to perform factor analysis. Varimax Rotation Technique is used to examine the obtained factors, and all item loadings above 0.40 are considered for the scale in factor analysis.

Initial communalities are the estimates of the variance in each variable accounted for by all the components or factors. For Principal components extraction, this is always equal to 1 for correlation analysis. Extraction communalities are the estimates of the variance in each variable accounted for by the component. The Communalities in Table 4.14 are all high above 0.329, which indicates that the extracted components represent the variable well.

Table 2 Communalities

	Short Description of Variables	Initial	Extraction
PP1	We provide a consistent reliable service	1.000	0.586
PP2	We handle cargoes on quoted or anticipated time	1.000	0.609
PP3	We handle cargoes on customers' time requirements	1.000	0.720
PP4	Our service lead-time is appropriate	1.000	0.675
PP5	We provide shipment information accurately	1.000	0.660
PP6	We respond promptly to customer needs	1.000	0.770
PP7	We have quick decision making process	1.000	0.757
PP8	We are flexible in terms of volume and type of cargo handling	1.000	0.766
PP9	We have excellence in dealing with unexpected events or situations	1.000	0.754
PP10	Our total service price,cargo handling charges and auxiliary services are highly competitive	1.000	0.632
PP11	Our cargo through per crane	1.000	0.761
PP12	Our cargo throughput per acre	1.000	0.604
PP13	Our ship waiting time	1.000	0.659
PP14	Our ship turnaround time	1.000	0.538
PP15	Our time for loading/uploading cargo	1.000	0.781
PP16	Our time for mode transit	1.000	0.630
PP17	Our time for truck entry	1.000	0.703
PP18	Our time from cargo's entry to its exit	1.000	0.625
Extraction Method: Principal Component Analysis.			

Table 3 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.481	36.003	36.003	6.481	36.003	36.003	3.618	20.102	20.102
2	1.870	10.387	46.391	1.870	10.387	46.391	2.808	15.597	35.700
3	1.577	8.763	55.154	1.577	8.763	55.154	2.414	13.409	49.109
4	1.296	7.198	62.352	1.296	7.198	62.352	1.824	10.134	59.243
5	1.007	5.596	67.948	1.007	5.596	67.948	1.567	8.704	67.948
6	.915	5.081	73.029						
7	.851	4.729	77.758						
8	.706	3.924	81.682						
9	.561	3.115	84.796						
10	.518	2.877	87.673						
11	.484	2.689	90.362						
12	.397	2.207	92.569						
13	.331	1.836	94.405						
14	.261	1.450	95.855						
15	.249	1.383	97.238						
16	.210	1.166	98.404						
17	.156	.865	99.269						
18	.132	.731	100.000						
Extraction Method: Principal Component Analysis.									

Only those components are considered as principal components which have an eigen value greater than one. Here, the first four components have an eigen value of more than 1, which explains 67.948% of total variance, and the remaining components explain 32.052% of total variance. Table 4.15 presents the total variance of the observed variables explained by each of the principal components / factors. For arriving at possible factors from total 18 variables, rotation was converged in 8 iterations through Varimax Rotation Technique (Table 4).

Table 4 Rotated Component Matrix

Short Description of Variables		Component					Labeled as
		1	2	3	4	5	
PP4	Our service lead-time is appropriate	0.807					Lead time
PP15	Our time for loading/uploading cargo	0.804					
PP12	Our cargo throughput per acre	0.724					
PP16	Our time for mode transit	0.650					
PP1	We provide a consistent reliable service	0.584					
PP17	Our time for truck entry	0.564					
PP3	We handle cargoes on customers' time requirements		0.810				Fulfilling Customer satisfaction
PP2	We handle cargoes on quoted or anticipated time		0.757				
PP6	We respond promptly to customer needs		0.611				
PP11	Our cargo through per crane			0.837			Effectiveness
PP9	We have excellence in dealing with unexpected events or situations			0.710			
PP13	Our ship waiting time			0.546			
PP5	We provide shipment information accurately			0.541			
PP7	We have quick decision making process				0.790		Uninterrupted service
PP14	Our ship turnaround time				0.523		
	Our time from cargo's entry to its exit	Not Rotated					
PP8	We are flexible in terms of volume and type of cargo handling					0.862	Efficiency
PP10	Our total service price, cargo handling charges and auxiliary services are highly competitive					0.560	
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 8 iterations.							

Factor I : Lead time

The variables PP4 - Our service lead-time is appropriate, PP15 - Our time for loading/uploading cargo, PP12 - Our cargo throughput per acre, PP16 - Our time for mode transit, PP1 - We provide a consistent reliable service and PP17 - Our time for truck entry constitute factor I which accounts for 20.102%.

Factor II : Fulfilling Customer Satisfaction

The variables PP3 - We handle cargoes on customers' time requirements, PP2 - We handle cargoes on quoted or anticipated time and PP6 - We respond promptly to customer needs constitute factor II which accounts for 35.700%.

Factor III : Effectiveness

The variables PP11 - Our cargo through per crane, PP9 - We have excellence in dealing with unexpected events or situations, PP13 - Our ship waiting time and PP5 - We provide shipment information accurately constitute factor III which accounts for 49.109%.

Factor IV : Uninterrupted service

The variables PP7 - We have quick decision making process and PP14 - Our ship turnaround time constitute factor IV with 59.243%.

Factor V : Efficiency

The variables PP8 - We are flexible in terms of volume and type of cargo handling and PP10 - Our total service price, cargo handling charges and auxiliary services are highly competitive constitute factor V with 67.948%. The study revealed that factors like Top management support, Organisational relationships and Financial & Human resources.

Table 5 Ranking of port performance factors

Port performance	Mean	Rank
Lead time	3.6525	IV
Fulfilling Customer satisfaction	3.9100	I
Effectiveness	3.7575	III
Uninterrupted service	3.5975	V
Efficiency	3.8900	II

It can be inferred from the above table that the mean value in respect of Fulfilling customer satisfaction is the highest. This implies that the Fulfilling customer satisfaction seems to be most dominant factor among the port performance factors.

SEGMENTATION OF PORT PERFORMANCE FACTORS

Ports have been segregated depending on the similarities exhibited by them regarding the five factors of performance which includes Lead time, Fulfilling customer satisfaction, Effectiveness, Uninterrupted service and Efficiency. Cluster analysis is used for segmentation of ports based on the degree of performance possessed by them. Final cluster centers of ports performance are displayed in the below table. Ports surveyed are segmented into three groups. The first segment is labeled as "moderate peformance group" as the performance of ports comprising this cluster is moderate. The second segment is termed as "high performance group" because their mean value is high as they rank high in a five point scale. The third segment is designated as "Less performance group" as their mean value is less.

Table 6 Final Cluster Centers

Supply chain orientation of ports	Cluster		
	1	2	3
Lead time	3.93(II)	4.39 (I)	2.85 (III)
Fulfilling customer satisfaction	4.29 (II)	4.30 (I)	3.20 (III)
Effectiveness	3.90 (II)	4.66 (I)	3.02 (III)
Uninterrupted service	4.31 (I)	3.45 (II)	2.81 (III)
Efficiency	3.92 (II)	4.73 (I)	3.32 (III)
Average	4.07	4.31	3.04

Anova results of performance of ports clusters are displayed in Table 7

Table 7 ANOVA

Port performance	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Lead time	38.219	2	.405	197	94.386	.000
Fulfilling customer satisfaction	27.509	2	.325	197	84.639	.000
Effectiveness	37.882	2	.271	197	139.888	.000
Uninterrupted service	44.385	2	.379	197	117.243	.000
Efficiency	26.788	2	.444	197	60.309	.000

The above table displaying the Anova values depicts that all the five port performance factors are playing strong role in bifurcating the ports performance into three groups. The Significant difference in the mean scores of all the three groups in respect of the five port performance factors namely Lead time, Fulfilling customer satisfaction, Effectiveness, Uninterrupted service and Efficiency suggests that the five factors have aptly contributed to the grouping of ports performance into three clusters. Characteristics of the three clusters of "moderate performance groups", "High performance groups" and "Less performance groups" are briefly explained in the forthcoming paragraphs.

Moderate performance groups

The port performance of this group is moderate among all the three segments. Mean values for the five port performance related factors is in the middle on the five point scale, signifying that they rank the moderate among all the port performance factors and also moderate in the overall mean values in respect of all the five port performance factors. Among the 200 ports surveyed, 86 units constitute this segment, implying that 43.0% of the ports performances were moderate.

High performance groups

The second segment of ports with respect to performance of ports factors is termed as "High performance groups". The overall mean score value in respect of the five port performance factors is 4.31 which is the high level in the five point scale. Almost 22 percent of the ports constitute this segment.

Less performance groups

The third segment of ports with respect to ports performance factors is termed as "Less performance groups". The overall mean score value in respect of the five ports performance factors for this segment is 3.04. As the mean is equal to three on a five point scale, which is the lowest level, this segment is treated as "less performance groups". Almost 35.0 percent of the ports constitute this segment. Number of ports constituting each cluster are displayed in the below table.

Table 8 Number of cases in each cluster

Cluster	1	86.000	43%
	2	44.000	22%
	3	70.000	35%
Valid		200.000	100.000

It can be inferred from the above that the moderate performance and less performance of ports together account for more than three-fourth (78%) of the total ports surveyed.

TESTING SUITABILITY OF PORTS PERFORMANCE SEGMENTATION USING DISCRIMINANT ANALYSIS.

The ports are grouped into three clusters based on their level of performance in supply chain management. The three identified clusters are "Moderate performance", "high performance ports" and "less performance ports". 43 percent of the ports constitute moderate performance, 22 percent of the ports constitute high performance and 35 percent constitute less performance of ports.

The next important issue is to assess whether the segmentation is valid, and whether each of the clusters significantly vary among each other, and whether the five port performance factors play a role in segregating ports into three clusters. For this purpose, sample stability and cluster classification reliability has to be verified by Discriminant analysis. The equality of group means in respect of performance of ports can be inferred from the below table.

Table 9 Tests of Equality of Group Means

Ports performance	Wilks' Lambda	F	df1	df2	Sig.
Lead time	0.497	99.809	2	197	0.000
Fulfilling customer satisfaction	0.547	81.606	2	197	0.000
Effectiveness	0.588	69.118	2	197	0.000
Uninterrupted service	0.695	43.268	2	197	0.000
Efficiency	0.790	26.139	2	197	0.000

It can be observed from the above table that Wilk's lambda value is very small in respect of Lead time implies that there is a very strong group difference among the three clusters grouped. Mean values in respect of this factor were significantly different among the three segments. Wilk's Lambda for Fulfilling customer satisfaction factor is high suggesting that there is no significant difference among the other clusters factors. Similarly, the value of Wilk's Lambda in respect of the Effectiveness factor is relatively high suggesting that there is no significant difference among the other segment. Wilk's Lambda in respect of the Uninterrupted service factor is relatively high suggesting that there is no significant difference among the other segment. Wilk's Lambda in respect of the Efficiency factor is very high suggesting that there is no significant difference among the other segment.

The value of F ratio in accordance to the degrees of freedom is very significant. Low significance value implies prevalence of significant difference in performance of ports among the three groups. Based on the above two facts, it can be concluded that the process of grouping has been completed aptly. Eigen values and canonical correlation coefficient have been displayed in the below table.

Table 10 Structure Matrix

Port performance	Function	
	1	2
Lead time	0.648*	-0.284
Fulfilling customer satisfaction	0.579*	0.433
Effectiveness	0.531*	-0.431
Efficiency	0.333*	-0.096
Uninterrupted service	0.399	0.626*

It can be inferred from the above table that two functions can be formed from the three clusters. The population characteristics may be explained through these two functions. The two domain functions of discriminant analysis along with standardized beta value are

Z1 = 0.648* Lead time + 0.579*Fulfilling customer satisfaction + 0.531* Effectiveness + 0.333* Efficiency and Z2 = 0.626* Uninterrupted service. Degrees of success based on the performance of ports are depicted in the below table.

Table 11 Extent of Correct classification

	Segmentation of ports performance	Predicted Group Membership			Total
		Moderate performance groups	High performance groups	Less performance groups	
Count	Moderate performance groups	40	0	0	40
	High performance groups	20	86	24	130
	Less performance groups	0	0	30	30
%	Moderate performance groups	100.0	.0	.0	100.0
	High performance groups	15.4	66.2	18.5	100.0
	Less performance groups	.0	.0	100.0	100.0

The above table displays the number of cases constituting each cluster and the percentage of proper classification and unclassification of the items. It can be observed that 100 percent of moderate performance groups are correctly classified as 20 case is included into high performance segment. In the case of high performance segment 86 case with 66.2 percent are correctly classified. In the case of less performance ports 100 percent of the ports are properly classified. Hence, it can be concluded that segmentation of ports based

on performance of ports significance is correct by more than 78.0%.

CONCLUSION

When analysing the port performance it was understood that the port performance was categorised as to Lead time, Fulfilling customer satisfaction, Effectiveness, Uninterrupted services, and Efficiency. The analysis further proved that the performance factor could be grouped under two heads by the contributing value of Z, Z1 = 0.648* Lead time + 0.579* Fulfilling customer satisfaction + 0.531* Effectiveness + 0.333* Efficiency and Z2 = 0.626* Uninterrupted service.

REFERENCE

1. *Multimodal Logistics in India : An Assessment, Transport News, 25 July 2013.*