Segmenting Freight Forwarders in Turkey

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Abstract
Container lines have been facing tough market conditions in recent years. Although the market has become more concentrated, the competition among container lines keeps its pace. In such a competitive and challenging environment, container lines need to better understand their customers' needs and wants to achieve customer retention. Freight forwarders are major customers of container lines. However, most of the studies in container shipping literature focused on shippers when studying customer selection or segmentation in container shipping. Therefore, it is crucial to reveal container line selection criteria of freight forwarders. However, the expectations of customers are also heterogeneous and specific needs of different groups of customers must be identified for a more effective marketing offering. Accordingly, the purpose of this study was twofold. First, this paper aimed to investigate selection criteria of freight forwarders when choosing a container line. Second, the study aimed to classify freight forwarders based on their container line selection criteria. This paper conducted a survey study on freight forwarders in Turkey. Exploratory factor analysis and cluster analysis were carried out. According to the results, freight forwarders consider that cost and availability of shipment are the most important factors while the information technology factor is the lowest important one. The results of exploratory factor analysis revealed a total of 5 constructs that explain container line selection criteria of freight forwarders in Turkey. The cluster analysis, based on factor scores of each respondent, produced two clusters, which are Service-Focused segment and Cost-Focused Segment. Significant differences are found between the two segments.

1. Introduction

The competition between container lines has been escalating and the container shipping market has become very challenging due to recent developments in the market. The market has become more concentrated after the recent mergers and acquisitions, but the competition is still keen as conferences are not allowed anymore. On the other hand, freight rates have plummeted significantly especially in the main East-West routes, despite some modest recoveries in 2017 and 2018 (UNCTAD, 2019). Thus, global container lines have been suffering low profitability, while many of them have experienced a net loss for at least one year in the last decade. The commoditization of port-to-port transportation in container shipping even aggravates the situation for container lines (Balci et al., 2018). The price wars worsened by commoditization also severely affects the business.

The current situation in the market prompts container lines to look for solutions to sustain their businesses. One of them is cost minimization, and in fact, cost-cutting measures such as slow steaming and network improvements are already being implemented by container lines. One of the other solutions is to increase perceived customer value and enhance customer retention. Understanding, creating and delivering customer value is inevitable for container lines – just as other B2B companies – to be competitive and survive in the market (Woodruff, 1997). Understanding and delivering value depends on perceiving the needs and wants of customers. g.balci@hud.ac.uk

Container lines have basically two types of customers: Cargo owners and freight forwarders. As outsourcing and one-stop-shopping have increased among the firms, today many cargo owners work with freight forwarders rather than directly working with container lines. Many container lines are also willing to serve cargo owners – especially the ones with smaller shipment volume – through freight forwarders because doing so eases selling and promotion organization. Freight forwarders are able to bring too many small shipments of different exporters and importers

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at once. As a result, freight forwarders have become major customers of many container lines today.

Considering the importance of understanding specific needs and wants of customers and the fact that freight forwarders are major customers of container lines, it is crucial to understand the specific needs and wants of freight forwarders. Understanding current needs and wants of shippers can be accomplished by revealing and perceiving selection criteria of them. The literature in container shipping includes ample number of selection criteria studies (Brooks, 1995; Collison, 1984; Kannan, Bose, & Kannan, 2011; Thai, 2008; Wong, Yan, & Bamford, 2008). However, the literature has limited number of studies focusing on container line selection criteria of freight forwarders (Fanam et al., 2016; Ho et al., 2017; Sevgili and Nas, 2017; Song, 2011; Wen and Lin, 2016).

Despite the existence of some academic papers investigating container line selection criteria of freight forwarders, only one of them attempted to classify freight forwarders based on their selection criteria (Wen and Lin, 2016). Classifying freight forwarders plays an essential role to better understand and deliver customer value because their expectations and priorities are not homogenous. Theory of imperfect competition proposes that the expectation of customers are heterogeneous (Smith, 1956). Based on this fact, market segmentation suggests that heterogeneous needs and wants of customers should be identified and market offerings should be customized accordingly. By doing so, companies can achieve several benefits such as more efficient use of marketing resources and effective use of differentiated marketing by focusing on target groups and customized communication tools (Weinstein, 2004).

In container shipping, several studies indicated that different customers' expectations vary significantly between different customer groups. For instance, Balci and Cetin (2020) conducted a survey study on 356 shippers in Turkey and found out 6 different customer groups in terms of their priorities in container shipping service. Maloni et al. (2016), on the other hand, found out 3 different shipper groups in the USA and Canada in terms of their buying behavior. Several other studies also applied market segmentation on shippers with different purposes and identified different segments in container shipping (Collison, 1984; Lu et al., 2005). Wen and Lin (2016), on the other hand, have implemented market segmentation on freight forwarders and identified different groups among forwarders. The authors conducted a survey study on freight forwarders carrying out shipments between Taiwan and China. Based on the cluster analysis, they identified two groups of freight forwarders. One group particularly attaches importance to freight related and information technology related criteria while the other group prioritize service related criteria.

In parallel to the findings of Wen and Lin (2016), container line selection criteria of freight forwarder studies had different results in terms of priority of freight forwarders. The results of selection criteria studies also help proving heterogeneous expectations of freight forwarders. Sevgili and Nas (2017) conducted a survey study on freight forwarders in Izmir and found that freight is the most important determinant when selecting a container line. Ho et al. (2017) conducted a DEMETHAL study on freight forwarders in Taiwan. They identified a total of 12 relevant variables. Among the variables, the authors found that integrated logistics and timely delivery are the most influential factors. Fanam et al. (2016), on the other hand, conducted a study on freight forwarders in Ghana. They particularly underlined the importance of customer service and document accuracy when selecting a container line. Hence, different results of studies in different geographies also indicate that freight forwarders are not homogenous in terms of their expectations from container lines.

The current practical requirements and the lack of studies for segmenting freight forwarders clearly show that container line selection criteria of freight forwarders should be identified and different forwarder segments should be explored to enable container lines to better understand forwarders' specific requirements and deliver more effective services to them. Thus, the main purpose of this study is to determine the line selection criteria of freight forwarders and classify them based on their service requirements. The paper first explains the methodology in which the details of exploratory factor analysis (EFA) and cluster analysis are presented. Then, descriptive results of the survey study and findings of EFA and cluster analysis are presented. In the end, discussion and conclusions are provided.

2. Methodology

This paper conducts a survey study on freight forwarders in Turkey. The paper applied multiple analyses (exploratory factor analysis and cluster analysis) to investigate selection criteria of freight forwarders when choosing a container line and classify freight forwarders. The exploratory factor analysis is applied to find out selection criteria factors which represent selection criteria variables. In other words, exploratory factor analysis is used to explore underlying structure of variables under constructs which is considered as summary of the large number of

variables (Hair et al., 2013). These factors demonstrate container shipping service attributes evaluated by freight forwarders. Upon the exploration of selection criteria factors, a cluster analysis is implemented to group respondents, which are freight forwarders in our case. The cluster analysis in our research segments freight forwarders based on their scores on the selection criteria factors.

Based on the literature on carrier selection criteria and 5 expert interviews, we have found total 19 variables to measure freight forwarders' carrier selection criteria. 5 expert interviewees consist of 3 managers in freight forwarding companies and 2 managers in container lines. The experts have at least 10 years of experience. The selection criteria list (See Table 1) was adopted from the study of Wen & Lin (2016), which has 23 variables, but we have made modifications and reductions based on the comments of expert interviews. We asked respondents these questions on 5-point scale: 1 means little importance while 5 means extreme importance.

Primary data of this study was collected through self-completion internet-based questionnaires. Member list of International Association of Forwarders and Logistics Service Providers (UTIKAD) in Turkey was used for sampling of freight forwarders. We adopted a non-probabilistic approach and received a total of 86 responses, which equals to 19% of UTIKAD list.

Table 1. List of selection criteria variables and their abbreviations.

Selection Criteria Variables
1. FREIGHT (Freight level of line)
2. FLEX (Price flexibility of line)
3. EQUIPMENT (Equipment availability)
4. SPACE (Space availability on ship)
5. SOLVE (Line's willingness to solve problem)
6. SCHEDULE (Schedule reliability on arrival and departure of the ships)
7. DAMAGE (Damage and loss free transport)
8. RESPONSE (Quick response to requests)
9. CUTOFF (Flexibility in cut-off time)
10. LOCALS (Local charges applied by line)
11. SPECIAL (Ability of line to provide special equipment)
12. FREQUENCY (Voyage frequency of line)
13. DOCUMENT (Fast and error free documentation service)
14. ATTITUDE (Attitude of line's personnel)
15. KNOWLEDGE (Professional knowledge of lines' personnel)
16. TRACKING (Effectiveness of container tracking system)
17. ONLINE (Ease of use of websites)
18. FREETIME (Free time provided by line)
19. REPUTATION (lines' reputation in market)

3. Findings

3.1. Descriptive Statistics

First of all, the reliability of 19 variables are found to be quite satisfactory (Cronbach's alpha = 0,890). The descriptive statistics such as experience of respondent, annual TEU volume of responding freight forwarders, and number of employees are displayed in the Table 2. According to the results, 76% of the respondents have at least 2 or more years of experience. The respondents' companies also show great variety in terms of annual volume of shipment. 16% of the respondents load less than 3000 TEUs per year while 60% of the respondents load between 3001 and 25000 TEUs on average per year. 24% of our respondents ship more than 25K TEUs per year. The respondent companies show variety in terms of number of employees in their companies. Over 80% of our respondents employ 11 or more employees in their companies.

Table 2. Descriptive statistics.

Experience of respondents		Annual TEU volume of companies		Number of employees	
	Percentage %		Percentage %		Percentage %
0-2years	24	<3000	16	<10	18
2-5 years	44	3001-12000	32	11-25	30
6 and more	32	12001-25000	28	26-50	32
		250001>	24	50>	20
N: 86					

3.2. Exploratory Factor Analysis

Exploratory factor analysis is applied on 19 selection criteria attributes to reduce the large number of variables into smaller meaningful factors. Principal component analysis with eigenvalues greater than one was chosen as extraction method while Varimax with Kaiser Normalization was chosen as rotation method. Factor loadings less than 0,50 are not displayed in the rotated component matrix. As suggested by (Hair et al., 2013) two variables (FREETIME and CUTOFF) were deleted since they had high cross-loadings on more than one factor.

Table 3. Exploratory factor analysis.

Factors	Variables	1	2	3	4	5	Of total variance explained %
Customer Service α= ,841	KNOWLEDGE RESPONSE SOLVE ATTITUDE REPUTATION DOCUMENT	,790 ,764 ,739 ,709 ,671 ,651					33,680
Operations α = ,767	SCHEDULE DAMAGE FREQUENCY SPECIAL		,819 ,769 ,628 ,580				11,540
Cost α = ,658	FREIGHT FLEX LOCALS			,869 ,779 ,612			10,629
Availability α = ,799	EQUIPMENT SPACE				,839 ,815		6,650
IT α = ,808	ONLINE TRACKING					,865 ,823	5,976
					Total variance explained % =		68,460

As Table 3 illustrates, a total of 5 factors, consisting of 17 variables, derived from the factor analysis. The factors explain 68,5 percent of the total variance. These factors are named as customer service, operations, cost, availability of shipment, and information technologies. Cronbach's alpha level of all factors are quite satisfactory and above 0,7 except one factor named as cost, which has 0.658 alpha level. However, this level is also considered as acceptable as Bagozzi and Yi (1988) also state that Cronbach's Alpha is considered to be sufficient if it is between 0.6 – 0.7.

Among the five factors explaining container line selection criteria of forwarders, the most important factor overall is Cost. Availability factor, which includes the availability of space and empty equipment, is ranked as the second with a very close score to cost factor. The lowest overall mean score belongs to information technology factor. These are the overall scores and this study anticipates that relative importance rate of these factors varies among different segments of our sampled freight forwarders.

Table 4. Overall mean score of factors.

	Mean	Rank
Customer service	4,30	3
Operations	4,32	4
Cost	4,75	1
Availability	4,73	2
IT	4,01	5

3.3. Cluster Analysis

We applied cluster analysis to classify freight forwarders based on their factor scores. We followed the procedure suggested by Hair et al. (2013) when applying the cluster analysis. First, we applied hierarchical cluster analysis to determine how many clusters we should have. We used Ward's method as clustering method with squared Euclidian distance. This study uses Ward's method for clustering because it produces clusters with similar sizes

(Malhotra and Birks, 2007). Ward's method is also suggested by Sarstedt and Mooi (2014) to be able to have more balanced cluster sizes. Ward's method is also applied by many other segmentation studies (Balci and Cetin, 2020).

One of the most critical parts of conducting cluster analysis is to decide the number of clusters. Several methods exist for determining the number of clusters, but none of the methods provides a completely objective or certain solution (Hair et al., 2013). However, some recommendations are provided in the literature. One of the suggested methods is to exploit dendrogram (Forina et al., 2002). A dendrogram demonstrates the distance and dissimilarity of objects and graphically shows where the objects and clusters merge (See Appendix 1). The objects in this study are freight forwarders. Considering the dendrogram, 4-cluster or 2-cluster solutions seem to be suitable. However, 4-cluster solution would not result in an optimum solution considering the relatively small number of our sample and the unbalanced distribution of objects among the clusters. Therefore, we decided to retain two-cluster solution which has more balanced clusters in terms of number of objects.

Upon deciding on the number of clusters, or segments in other words, it should be ensured that they are significantly different than each other in terms of the selection criteria factors. The two clusters show significant differences in terms of factor scores according to Independent Sample T-test (P<0.05). The only factor that the two clusters do not show significant difference is "operations". The regressed factor scores are displayed in Table 5.

Table 5. Factor scores of cluster centres.

Factors	Cluster centres based on factor scores*	
	Cluster1	Cluster 2
Customer Service	,60576	-,88268
Operations	,03534	-,05149
Cost	-,23218	,33831
Availability	,25322	-,36898
IT	,21484	-,31305
No of members	**51**	**35**

*Regressed factor scores are used in this analysis.

The next step in our analysis is to name the segments found out by the cluster analysis. To be able to do that, final cluster centres will be exploited which is illustrated in Figure 1. Based on the Figure, relative importance given to "customer service" factor is significantly higher compared to Cluster 2. The relative scores of "availability" and "IT" are also higher than those in Cluster 2. Accordingly, Cluster 1 is decided to be named as "Service Focused Segment". On the other hand, relative importance given to "cost" factor in Cluster 2 is significantly higher than Cluster 1. In fact, this is the only cluster regressed average of which is above zero (One thing should be considered is that overall factor scores of each variable, including the two clusters, equals to zero). Considering this distinguished feature of Cluster 2, it is named as "Cost Focused Segment". As a result, the freight forwarders sampled in our study consist of 2 segments named as Service Focused Segment and Cost Focused Segment.

Figure 1. Illustration of factor scores of the two clusters' centres.
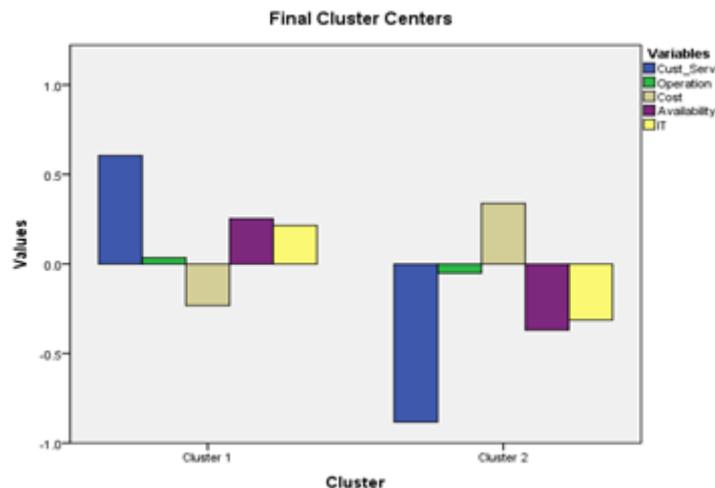
4. Discussion and Conclusions

The purpose of this study is to investigate freight forwarders' selection criteria when choosing a container line and classify the freight forwarders based on their ratings on container shipping service attributes. The main objectives of the study are first to reveal the factors through principal component analysis and to classify freight forwarders based on their factor scores through hierarchical cluster analysis technique. The results reveal total five different factors explaining container line selection criteria of freight forwarders: Customer service, operations, cost, availability of shipment, and information technologies. The cluster analyses classified freight forwarders into two: Service-Focused Segment and Cost-Focused Segment.

The overall results suggest that the most important factors are cost-related and availability of space and empty equipment. The least important factor, on the other hand, is information technology which include effectiveness of online tracking systems and ease of use of container line website. Compared to previous results, the overall results show similarities to Sevgili and Nas (2017) who found the freight cost as the most important criterion. This result is also in line with the findings of some shipper based studies (Brooks, 1995; Kannan et al., 2011). However, the overall results are not parallel to findings of Fanam et al. (2016) who did not indicate costs as the most important criterion.

Considering the only segmentation study on freight forwarders that we detected in the literature, our results are quite similar. Wen and Lin (2016) found two different freight forwarder segments one of which scores high on cost and IT while the other segment scores particularly high on customer service. These two segment characteristics are quite parallel to the segments in our study. Although the studies were conducted in different geographies, same number of cluster solutions with similar characteristics were achieved. One difference exists between the findings of these two studies though. Unlike the study of Wen and Lin (2016), he forwarders who attach more importance to IT are located in the Service-Focused Segment rather than the Cost-Focused Segment.

Significant differences are found between two clusters based on their ratings on factors. This ensures that the segments are differentiable and likely to react differently to service offerings of container lines. The fact that the two segments score on selection criteria differently proves that the priorities of freight forwarders are heterogeneous. This result strengthens the proposition that container lines should provide customized marketing offerings to freight forwarders. The customized marketing offerings ensure that the right customers receive the right offering. The marketing offering can be in the form of customized marketing communication or customized services. By this way, their marketing efforts can be much more effective and efficient. For instance, if a container line has strengths on user friendliness of IT structure supported by effective customer service, then the line should underline these strengths in a marketing communication with Service-Focused Segment.

This paper subjects to several limitations. First of all, it does not have large number of respondents to properly segment the market. By having larger number of respondents, we could have achieved more segments which have more homogenous characteristics internally but more heterogeneous characteristics in relation to other segments. One of the important limitation of this study is that it could not identify the two segments with readily available firm characteristics such as firm size and origin. One of the reasons could be limited number of respondents. A future study can mitigate this problem by collecting more data and including more detailed firm characteristics. By this way, an inferential reasoning between the profile questions and cluster membership can be detected. For instance, a future study can examine the association between the industry of forwarders' customers and segment memberships. Examining such relationship would also reveal how much forwarders' customers influence their prefer.

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Appendix I

Dendrogram display of hierarchical cluster analysis (Ward's Linkage).

Dendrogram using Ward Linkage