RESEARCH NOTE

SEGMENTING THE CRUISE MARKET: AN APPLICATION OF MULTIPLE CORRESPONDANCE ANALYSIS

CODY MORRIS PARIS* and VICTOR TEYE†

*Middlesex University Dubai, Dubai, United Arab Emirates
†School of Community Resources and Development, Arizona State University, Phoenix, AZ, USA

The cruise line industry is one of the fastest growing travel sectors, and an industry with a high rate of repeat business. This study contributes to the understanding of potential repeat visitors by segmenting cruise tourists based upon their intent to cruise in the future. The purpose of this research note is to reflect on the segmentation method applied. Respondents were asked to respond to questions about their intentions to cruise in the future, and were able to answer *yes, no,* or *not sure,* thus making a traditional factor-cluster approach using principal components analysis (or similar) not feasible. This study uses a two step method that combines Multiple Correspondence Analysis (MCA) with a k-means cluster analysis, to segment the sample based on responses to five questions about future cruising intentions.

Key words: Correspondence analysis; Market segmentation; Cruise tourism; Repeat visitors; Caribbean

Introduction

While the modern cruise industry is relatively young, it has been one of the fastest growing industries within the tourism and hospitality sector. The industry has consistently grown at about twice the average rate of traditional land-based leisure travel. Cruise Line International Association's (CLIA, 2007) data indicates a 2,100% growth rate between 1970 and 2006 for the North American cruise in-

dustry, annual passengers' expenditures of $14.7 billion on goods and services; and 316,000 people directly employed. Cruise lines have brought more than 90 new cruise ships into service since 2000, some of which carry more than 5,000 passengers and crew members. Cruise Lines International Association (2005) reported that around 100 million people took a deep-water cruise of 2 days or more between 1980 and 2004. Currently approximately 12 million people in North America go on a cruise

Address correspondence to Cody Morris Paris, Ph.D., Senior Lecturer, Middlesex University Dubai, Knowledge Village, Block 16, PO Box 500697, Dubai, United Arab Emirates. Tel: +971 04 433 1776; E-mail: c.paris@mdx.ac

each year. The future cruise market potential of new passengers is large. The cruise line industry also has a high rate of repeat business. Teye and Leclerc (1998) confirmed the importance of this repeat market, as only 10% of the respondents to their survey conducted on a 7-day Caribbean cruise were on their first voyage. The importance of the repeat market for the cruise industry can also be observed in the marketing and incentives offered to cruisers. These include loyalty programs as well as onboard awards for booking future cruises while on the ship. This study contributes to the understanding of potential repeat visitors by segmenting cruise tourists based upon their intent to cruise in the future. This study uses a two-step method, Multiple Correspondence Analysis (MCA) combined with a k-means cluster analysis, (Arimond & Elfessi, 2001; Pina & Delfa, 2005), to segment the sample based on responses to five questions about future cruising intentions.

The purpose of this research note is to reflect on the segmentation method applied. The data for this study was not collected for the purpose of this segmentation, but was collected for another study (Teye & Paris, *in press*). The segmentation of the respondents was based upon questions that asked if tourists would "cruise again in 1 year," "cruise again in 2 years," "cruise again in 3 years," "cruise again in 4 years," and "cruise again in 5 years or more." Respondents were able to answer *yes, no,* or *not sure,* thus making a traditional factor-cluster approach using principal components analysis (or similar) not feasible. First Multiple Correspondence Analysis (MCA) was used to find the spatial coordinate positions of responses to the questions. Next, a k-means cluster analysis is used to segment respondents based on the spatial coordinates of the MCA. Surveys were administered aboard a cruise on a 10 day Caribbean itinerary in January 2008. The cruise had 2200 passengers, of which 10 % were sampled based on the number of staterooms on each deck. There was a response rate of 76.8% providing 173 completed surveys for analysis. (Teye & Paris, 2011).

Method

Multiple Correspondence Analysis

Data-driven market segmentation has become a popular method of identifying market segments in tourism research. Many post hoc segmentation studies employ a factor analysis-cluster analysis approach. This is arguably a questionable standard, as the running of factor analysis in preprocessing of data eliminates part of the data structure (Dolnicar, 2002). Further, many of the applications of factor analysis or principle components analysis (PCA) are on ordinal data, which typically is inappropriate (Dolnicar, 2002).

Multiple Correspondence Analysis (MCA), also known as homogeneity analysis, is useful when traditional quantitative segmentation methods are not appropriate. For this study five simple (yes/no/not sure) questions are used in the analysis, but the two-step method is also valuable for segmentation of various types of categorical data (Arimond & Elfessi, 2001; Gonzales & Molina, 2009). Likert-type scales can often be tedious for respondents, and surveys used in many market surveys by tourism offices or businesses are often qualitative in nature. MCA can provide an alternative means for segmenting target populations based upon these data.

MCA uses alternating least squares with optimal scaling for estimation (Arimond & Elfessi, 2001). MCA quantifies the relationship between categories of each variable as well as between variables, and plots respondents who choose the same categories close to each other. Technical statistical details can be found in Carroll and Green (1986, 1987) and Carroll, Green, and Schaffer (1987). MCA has been used in several tourism studies. Arimond and Elfessi (2001) applied it to multistate categorical data from a bed and breakfast survey. Similarly, Gonzalez and Molina (2009) used it in a segmentation of Spanish tourists based on their travel behavior. The variables they used included travel destination, means of transport, type of lodging, theme of trip, and travel group size. Pina and Delfa (2003) also applied the two step procedure in the examination of rural tourism demand by accommodation type. The application of MCA in this study differs in that it applies the MCA to questions in which respondents can answer "yes," "no," or "not sure" instead of the multistate categorical data. While this is a slight difference in data type, this research note adds to the uses of MCA in segmentation studies.

Results

For this study, XLSTAT version 4.03 software was used for analysis. MCA can also be conducted using SPSS homogeneity analysis (HOMALS).

MCA was applied to a 173 × 5 matrix (respondents × variables). The variance accounted for was 35.9%, 58.4%, and 70.5% in two, three, and four dimensions, respectively. Figure 1 presents the map of the principal coordinates, each individual's position, and the cluster centers. The plot clearly shows the distance of each cluster, as well as the categories represented by each. Respondents' principal coordinates from the MCA were then used to run a k-means cluster analysis.

Three, four, five, and six cluster solutions were run to determine the optimal solution, which was four clusters. The resulting cluster sizes were 25, 53, 72, and 23. Cluster 1 is made up of individuals who are least likely to cruise in the future. Cluster 2 includes individuals who are mostly not sure about cruise in the future; with exception of indicating that 60% indicated that they would cruise between 1 and 2 years in the future. Individuals in Cluster 3 represent individuals who are likely to cruise again in the next year, but unsure about any future cruising beyond that. The fourth cluster represents the group most likely to cruise in the future.

There were significant differences in the household income and previous cruising experience for each segment (Table 1). Additionally, there were significant differences between each segment for their response to each of the future cruising statements (Table 2). These findings provide interesting information for the cruise industry, as they provide profiles of different segments based upon future intentions of cruising.

Discussion

The phenomenal growth of the cruise line industry in the last three decades has led to several recent studies that have examined a diverse range of aspects of the industry, including works by Dowling (2006) and Lück (2007). Two of the areas of cruise tourism research that have received considerable attention are passengers' motivations (Teye & Leclerc, 2003; Teye & Paris, 2011) for taking a cruise and their future intentions to cruise (Petrik, 2005; Teye & Leclerc, 1998). New mega-ships are designed to be "spaces of containment" (Weaver, 2005), and contain comparable amenities, services, and attractions of land based destinations. These new and unique shipscapes (Kwortnik, 2008) add increasing complexity to the already competitive
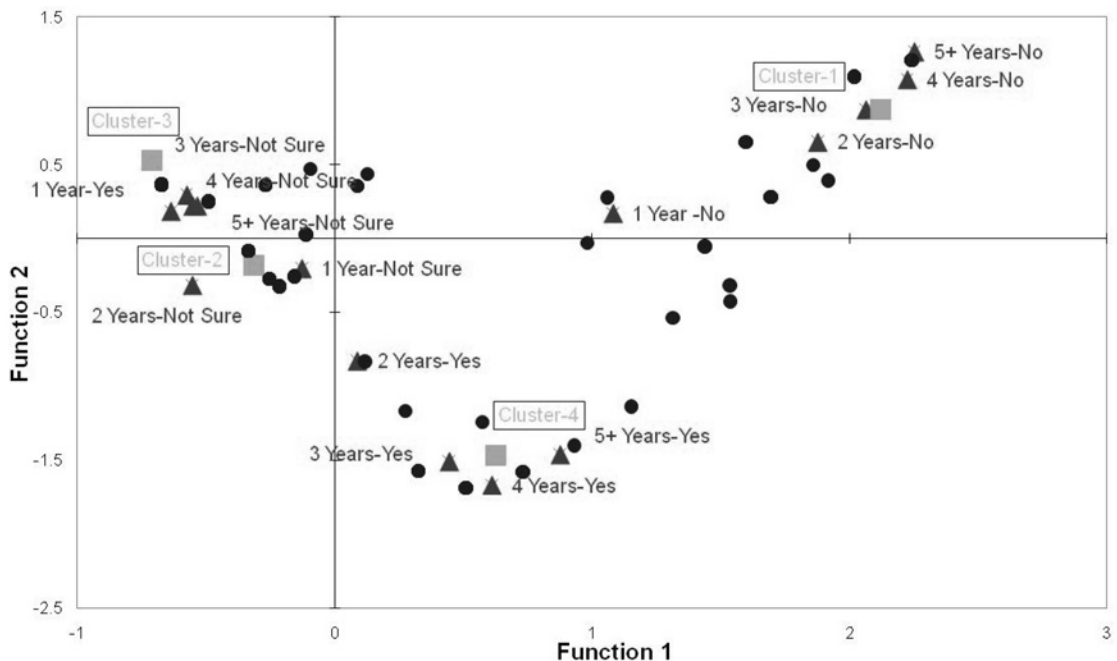

Figure 1. Plotted responses, clusters, and individuals.

Table 1
Income and Previous Cruise Experience of Clusters

Attribute	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Household income**				
<$30,000	6 (24.0%)	9 (17.0%)	4 (5.5%)	7 (30.4%)
$30,000–$59,999	7 (28.0%)	6 (11.3%)	10 (13.9%)	3 (13.0%)
$60,000–$89,999	8 (32.0%)	10 (18.9%)	15 (20.8%)	2 (8.7%)
>$90,000	3 (12.0%)	24 (45.3%)	39 (54.2%)	10 (43.5%)
No response	0	4 (7.5%)	4 (5.5%)	1 (4.3%)
Previous times on cruise**				
0	17 (68%)	20 (37.7%)	20 (27.7%)	6 (26.1%)
1–4 times	7 (28%)	20 (37.7%)	33 (45.8%)	9 (39.1%)
5–10 times	1 (4%)	10 (18.9%)	9 (12.5%)	7 (30.4%)
11 or more	0 (0%)	2 (3.8%)	10 (13.9%)	1 (4.3%)
No response	0 (0%)	1 (1.9%)	0 (0%)	0 (0%)

**$p < 0.01$.

cruise industry. Ship-based elements have been found to be a main motivator for individuals to travel on a cruise vacation (Teye & Paris, 2011). The ship's characteristics, in addition to itineraries, destinations, weather, and interactions with fellow passengers, can shape individuals' experiences and satisfaction during their cruise vacation (Kwortnik, 2008), and influence customers' intention to cruise in the future (Petrick, 2004). This current research note contributes to these current streams of cruise

tourism research by briefly examining the relationship between past cruise experience, household income, and the intent to cruise.

In addition to contributions to the literature on cruise tourism, this study also makes a valuable methodological contribution. This method can be useful for quantifying the spatial relationship between qualitative variables, and is effective in categorical data. Further it can be effective for examining Likert-type data when a "Not Applicable"

Table 2
Cruising in Future for Each Cluster

Attribute	Cluster 1	Cluster 2	Cluster 3	Cluster 4
1 year*				
Yes	0	0	56 (77.8%)	8 (34.8%)
No	12 (48%)	2 (3.8%)	8 (11.1%)	5 (21.7%)
Not sure	13 (52%)	51 (96.2%)	8 (11.1%)	10 (43.5%)
2 years*				
Yes	4 (16%)	32 (60.4%)	0	18 (78.3%)
No	20 (80%)	2 (3.8%)	1 (1.4%)	3 (13%)
Not sure	1 (4%)	19 (35.8%)	71 (98.6%)	2 (8.7%)
3 years*				
Yes	3 (12%)	10 (18.9%)	0	20 (87%)
No	22 (88%)	1 (1.9%)	0	1 (4.3%)
Not sure	0	42 (79.2%)	72 (100%)	2 (8.7%)
4 years*				
Yes	4 (16%)	5 (9.4%)	0	23 (100%)
No	21 (84%)	0	0	0
Not sure	0	48 (90.6%)	72 (100%)	0
5 or more years*				
Yes	8 (32%)	3 (5.7%)	0	23 (100%)
No	16 (64%)	0	0	0
Not sure	1 (4%)	50 (94.3%)	72 (100%)	0

*$p < 0.001$.

option is available for respondents in place of PCA factor analysis, which cannot take this into account. Using this two-step MCA and k-means method can be very useful for practitioners and researchers who wish to segment a population based on the more respondent friendly categorical data.

Conclusions

This article segmented the cruise market based upon respondents' intentions to cruise again in the future. This study applied a two-step segmentation process. First, MCA was used to plot the spatial co-ordinates of respondents to five questions (yes/no/not sure) about likelihood of cruising in the future. While this study resulted in some interesting findings, there were some limitations. One of the limitations was that the data used in this study was collected for another purpose. This also provides strength to the methodological contribution of the study, as academics, practitioners, and policy makers often have to use secondary data to make decisions. Future studies should further develop the applications of MCA and other similar analyses in tourism studies. Additionally, the relationship between survey design and data analysis procedures should be further developed.

References

Arimond, G., & Elfessi, A. (2001). A clustering method for categorical data in tourism market segmentation. *Journal of Travel Research, 39*, 391–397.

Carroll, J., & Green, P. (1986). Interpoint distance comparisons in correspondence analysis. *Journal of Marketing Research, 23*, 271–280.

Carroll, J., & Green, P. (1987). *A new approach to the multiple correspondence analysis of categorical data* (working paper). Philadelphia: Wharton School, University of Pennsylvania.

Carroll, J., Green, P., & Schaffer, C. (1987). Comparing interposing distances in correspondence analysis: A clarification. *Journal of Marketing Research, 24*(4), 445–450.

Cruise Lines International Association. (2005). *The cruise industry–an overview–Spring 2005*. New York: Author.

Cruise Lines International Association. (2007). *The cruise industry–an overview–Spring 2007*. New York: Author.

Dolnicar, S. (2002). A review of data-driven market segmentation in tourism. *Journal of Travel and Tourism Marketing, 12*(1), 1–22.

Dowling, R. (Ed.). (2006). *Cruise ship tourism*. Oxfordshire, UK: CABI Publishing.

Gonzalez, P., & Molina, O. (2009). Spanish tourist behavior. A specific objective based segmentation. *Tourismos: An International Multidisciplinary Journal of Tourism, 4*(3), 185–203.

Kwortnik, R. (2008). Shipscape influence on the leisure cruise experience. *International Journal of Culture, Tourism, and Hospitality Research, 2*(4), 289–311.

Lück. M. (Ed.). (2007). *Nautical tourism: Concepts and issues*. New York: Cognizant Communication.

Petrick, J. (2004). The roles of quality, value, and satisfaction in predicting cruise passengers' behavioral intentions. *Journal of Travel Research, 42*(4), 397–407.

Petrick, J. (2005). Reoperationalising the loyalty framework. *Tourism and Hospitality Research, 5*(3), 199–212.

Pina, I., & Delfa, M. (2005). Rural tourism demand by type of accommodation. *Tourism Management, 26*, 951–959.

Teye, V., & Leclerc, D. (1998). Product and service delivery satisfaction among North American cruise passengers. *Tourism Management, 19*(2), 153–160.

Teye, V., & Leclerc, D. (2003). The white Caucasian and ethnic minority cruise markets: Some motivational perspectives. *Journal of Vacation Marketing, 9*(3), 227–242.

Teye, V., & Paris, C. (2011). Cruise line industry and Caribbean tourism: Guests' motivations, activities, and destination preference. *Tourism Review International, 14*(1), 17–28.

Weaver, A. (2005). Spaces of containment and revenue capture: "Super-sized" cruise ships as mobile tourism enclaves. *Tourism Geographies, 7*(2), 165–184.