Table 33: General Survey Properties t-Test

| Property | X | Std Dev | N | $s/n^{-2}$ | X- exp. mn. (3) | T |
|---|---|---|---|---|---|---|
| External Appearance | 4.3779 | .99376 | 299 | .057472 | 1.3779 | **23.9752** |
| Internal Layout | 3.7508 | 1.09600 | 297 | .063596 | 0.7508 | **11.80577** |
| Size | 3.3112 | 1.11025 | 286 | .065650 | 0.3112 | **4.74029** |
| History | 4.1797 | 1.13010 | 295 | .065797 | 1.1797 | **17.92939** |
| Legacy | 3.8691 | 1.09774 | 298 | .063590 | 0.8691 | **13.66724** |
| Route | 2.9565 | 1.22671 | 299 | .070942 | -0.0435 | -0.61318 |
| Speed | 3.2020 | 1.10264 | 297 | .063982 | 0.2020 | **3.15714** |
| Marine Technology | 3.4848 | 1.10921 | 297 | .064363 | 0.4848 | **7.53228** |
| Non Marine Technology | 3.0000 | 1.09975 | 297 | .063814 | 0.0000 | 0.0000 |
| Fittings, Furnishings, & Finishes | 4.1472 | .97885 | 299 | .056608 | 1.1472 | **20.26569** |
| Service & Cuisine Quality | 4.0805 | 1.10717 | 298 | .064137 | 1.0805 | **17.60632** |
| Repeat Passenger Patronage | 3.6498 | 1.28345 | 297 | .074473 | 0.6498 | **8.72531** |
| Funnel Design & Shape | 3.4463 | 1.20275 | 298 | .069673 | 0.4463 | **5.25300** |
| Media Attention | 3.5302 | 1.27687 | 298 | .073967 | 0.5302 | **7.16806** |

T (2 tail .05) 100 df = 1.984  T (1 tail .05) 5 df = 1.660

5.7 General Survey Factor Analyses:

Factor analysis is a good statistical technique for reducing the information contained in a number of variables to those which define the basic constructs underlying the original data (Hair, Anderson, Tatham & Black, 1998). The sample size of 300+ was sufficient for factor analysis of the fourteen properties. Hair, Anderson, Tatham & Black (1998) recommend a sample size of 250 for significant factor loadings at .35. A sample size of

350 would be required for significant factor loadings at .30. This recommendation is based on a .05 significance level, a power level of 80 percent, and standard errors assumed to be twice those of conventional correlation coefficients. They also recommend a minimum acceptable size of ten observations per variable. With fourteen variables, the sample size also met this criterion. SPSS software was used for the analysis.

The purpose of the factor analysis was twofold; first, to confirm the structure of the Categories and their constituent Properties; and second, to identify the latent variables or constructs represented by the original variables. Therefore, two methods of factor analysis were applied. This procedure followed the example in SPSS (1998) where two approaches were used as illustrative of real studies. The first factor analysis used the principal components extraction method with varimax rotation. The principal components analysis looks at the total variance and as Hair, Anderson, Tatham, & Black (1998, 102) wrote, "derives factors that contain small proportions of unique variance and, in some instances, error variance." Varimax rotation simplifies the columns of the factor matrix by maximizing the sum of variances of required loadings of the factor matrix (Hair, Anderson, Tatham, & Black, 1998). Varimax minimizes the number of variables that have a high loading on a factor and may improve interpretability of the factors (Norusis, 1994). The second factor analysis utilized the maximum-likelihood method for extraction with an oblique rotation. SPSS (1998) used the maximum-likelihood method in order to find more variables that loaded strongly on a single factor. In this case it was used to provide a comparison to the first method. Hair, Anderson, Tatham, & Black (1998) stated that oblique rotations are more realistic since theoretically important underlying dimensions cannot be assumed to be uncorrelated. Therefore, SPSS' OBLIMIN was used for the

rotation.

In both methods, an eigenvalue cut-off of 1 and a significance level absolute value of .35 were used. The survey, as of August 20, had 308 useable responses of which 270 were complete. As stated earlier, .35 was the significance level for a sample of 250 while a sample of 300 would be required for a .30 significance level, therefore .35 was used. Since 85% of the responses were complete, variable means were substituted for missing values. The Kaiser-Olkin Measure of sampling Adequacy (KMO) was meritorious at .806 for both methods. Also, there was not a predetermined number of factors to be extracted in both methods.

Table 34 shows the results of the Principal Component Factor Analysis with Varimax Rotation. Property loadings above .35 are shown in bold.

Table 34: Rotated Component Matrix from Principal Component Factor Analysis with Varimax with Kaiser Normalization Rotation

| Property | Factor | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Service & Cuisine Quality | **.738** | .058 | .172 | .319 |
| Internal Layout | **.717** | -.010 | .173 | -.013 |
| External Appearance | **.653** | **.434** | .107 | -.269 |
| Repeat Passenger Patronage | **.644** | .091 | .057 | **.444** |
| Facilities, Furnishings, & Finishes | **.615** | .032 | **.488** | -.017 |
| Funnel Design & Shape | **.518** | **.362** | .008 | -.067 |
| History | .111 | **.777** | .088 | -.167 |
| Media Attention | .089 | **.674** | .162 | .304 |
| Legacy | **.388** | **.640** | .004 | .133 |
| Size | -.095 | **.575** | .143 | **.470** |
| Marine Technology | .158 | .269 | **.802** | .031 |
| Non Marine Technology | .248 | -.056 | **.759** | .198 |
| Speed | -.007 | **.528** | **.573** | .236 |
| Route | .098 | .097 | .173 | **.802** |

Factor 1 explained 20.149% of variance. Factor 2 explained 17.812%. Factor 3 explained 13.891%. Factor 4 explained 10.535% for a cumulative total of 62.387%. Hair, Anderson, Tatham, & Black (1998) state that 60% is satisfactory for the social sciences.

Table 35 shows the results of the Maximum Likelihood Extraction with Oblimin with Kaiser Normalization rotation. Property loadings above .35 are shown in bold.

Table 35: Pattern Matrix from Maximum Likelihood Extraction with Oblimin with Kaiser Normalization Rotation

| Property | Factor | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| External Appearance | **.854** | .078 | -.050 | -.049 |
| Funnel Design & Shape | **.414** | .148 | -.081 | -.056 |
| Media Attention | -.002 | **.650** | -.099 | -.050 |
| Size | -.052 | **.587** | -.017 | -.047 |
| History | .279 | **.542** | .066 | .022 |
| Legacy | .312 | **.466** | -.161 | .033 |
| Route | -.199 | .269 | -.257 | -.143 |
| Service & Cuisine Quality | .096 | .022 | **-.840** | .042 |
| Repeat Passenger Patronage | .001 | .121 | **-.655** | -.002 |
| Facilities, Furnishings, & Finishes | .285 | -.125 | **-.396** | -.287 |
| Internal Layout | .343 | -.150 | -.348 | -.139 |
| Marine Technology | .098 | .073 | .136 | **-.854** |
| Non Marine Technology | -.042 | -.082 | -.204 | **-.565** |
| Speed | -.006 | **.459** | .078 | **-.496** |

The extracted sums of squares loadings were 28.834% for Factor 1, 8.028% for Factor 2, 6.656% for Factor 3, and 5.061% for Factor 4. The total was 48.579%.

However, since the factors were correlated the rotation sums of squares loadings could not be computed (SPSS, 1998). The Goodness-of-fit Test was a Chi-Square of 120.471 for 41 degrees of freedom with a significance of .000. The result was highly significant ($p<0.0005$). That would indicate that the four factor model's predictions were not good estimates of the observed correlations. In their discussion of the Goodness-of-fit Test, SPSS (1998) wrote that the statistic may imply that more factors are needed than are actually necessary and that this applied especially for large sample sizes. When the eigenvalue cut-off was lowered and more factors were extracted, the result was one-variable factors. Therefore, it was decided to remain with a four factor solution in the interests of parsimony and meaningfulness.

## 5.8 Interpretation of the Factors:

The initial General Legendary Passenger Ship Model is repeated in Figure 43.

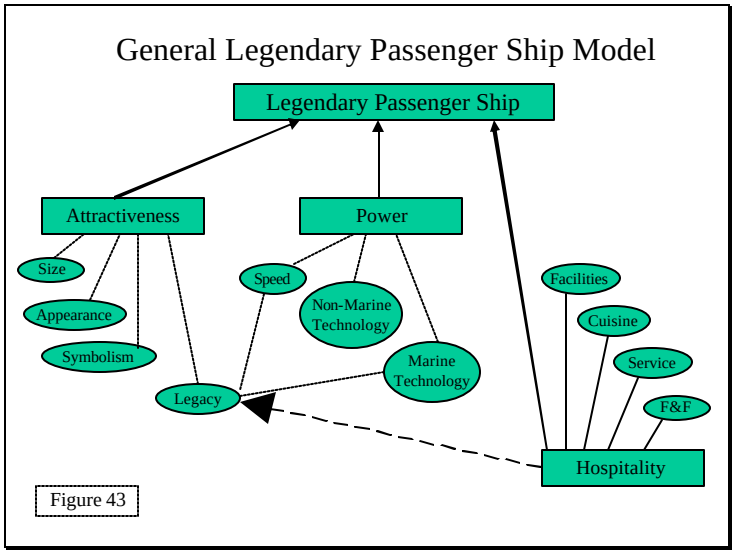


Figure 43

The eleven properties of size, appearance, symbolism, legacy, speed, non marine technology, marine technology, facilities, cuisine, service, and furnishings and finishes were modified for the General Survey. Appearance was divided into external appearance and interior layout. Symbolism was divided into history and route. Facilities and furnishings and finishes were combined into facilities, furnishings, and finishes. Cuisine and service were combined into service and cuisine quality. Size, speed, non marine technology, and marine technology remained the same. Additional properties of repeat passenger patronage and funnel design and shape were added from Delphi Round 2. Media attention was added at my committee's suggestion. The result was the fourteen properties that were included in the General Survey.

In their discussion of criteria for the significance of factor loadings, Hair, Anderson, Tatham, & Black (1998, 111) write, "In short, factor loadings greater than $\pm$.30 are considered to meet the minimal level; loadings of $\pm$.40 are considered more important; and if the loadings are $\pm$.50 or greater, they are considered practically significant." The matrices will be discussed first at the statistically significant level of .35 and then at the practically significant level of .50.

Factor 1 of the Rotated Component Matrix consisted of Service & Cuisine Quality, Internal Layout, Repeat Passenger Patronage, External Appearance, Facilities, Furnishings, & Finishes, Funnel Design & Shape, and Legacy. All, with the exception of Legacy, had loadings above .500. This factor can be labeled Attractiveness since its properties contain or measure features that attract both passengers and enthusiasts.

Factor 2 consisted of External Appearance, Funnel Design & Shape, History, Media Attention, Legacy, Size, and Speed. All, with the exceptions of External Appearance and Funnel Design & Shape, had loadings above .500. The three highest loading properties were History, Media Attention, and Legacy. This factor doesn't readily fit into the three categories from the initial model. A good term for this factor is Significance, since high loadings of a ship on these three properties would reflect its importance and meaningfulness.

Factor 3 consisted of Marine Technology, Non Marine Technology, Speed, and Facilities, Furnishings, & Finishes. Only Facilities, Furnishings, & Finishes loaded below .500. This factor is essentially the same as the Power category from the initial model and is labeled Power.

Factor 4 consisted of Repeat Passenger Patronage, Size, and Route. Only Route was above .500. A high Repeat Passenger Patronage can reduce a company's marketing expenses. Size is equated with comfort and safety in the public's mind (Coggins 2000, Maxtone-Graham 1972). Route is directly related to profit potential, transit times, and the number of ships required to maintain a weekly schedule. These three properties help make up a company's competitive advantage. Therefore, this factor is labeled Competitive Advantage.

Factor 1 of the Pattern Matrix consisted of External Appearance and Funnel Design & Shape. These two properties were also included in the Attractiveness Component of the Rotated Component Matrix. In addition, External Appearance was derived from the

Appearance Property within the Attractiveness Category of the initial General Passenger Ship Model. Therefore, this Factor is also labeled Attractiveness.

Factor 2 consisted of Media Attention, Size, History, Legacy, and Speed. These were also included in the Significance Component of the Rotated Component Matrix. Therefore, this Factor is labeled Significance.

Factor 3 consisted of Service & Cuisine Quality, Repeat Passenger Patronage, Facilities, Furnishings & Finishes. This Factor shared only Repeat Passenger Patronage with the Competitive Advantage Component. Repeat Passenger Patronage can be viewed as the voice of the market place on the success of a company's product mix, of which, Service & Cuisine Quality and Facilities, Furnishings & Finishes are integral parts. Therefore, this Factor is labeled Competitive Advantage.

Factor 4 consisted of Marine Technology, Non Marine Technology, and Speed. These three properties were also included in both the Power Category of the initial General Passenger Ship Model and the Power Factor of the Rotated Component Matrix. Therefore, this Factor is labeled Power.

When the Matrices are shown, Tables 36 and 37, only with practically significant absolute values of .500 or greater most of the double loadings are eliminated in the Rotated Component Matrix and the number of significant properties in the Pattern Matrix are reduced.

Table 36: Rotated Component Matrix from Principal Component Factor Analysis with Varimax with Kaiser Normalization Rotation with Absolute Value > .500

| Property | Factor | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Service & Cuisine Quality | .738 | | | |
| Internal Layout | .717 | | | |
| External Appearance | .653 | | | |
| Repeat Passenger Patronage | .644 | | | |
| Facilities, Furnishings, & Finishes | .615 | | | |
| Funnel Design & Shape | .518 | | | |
| History | | .777 | | |
| Media Attention | | .674 | | |
| Legacy | | .640 | | |
| Size | | .575 | | |
| Marine Technology | | | .802 | |
| Non Marine Technology | | | .759 | |
| Speed | | .528 | .573 | |
| Route | | | | .802 |

Table 37: Pattern Matrix from Maximum Likelihood Extraction with Oblimin with Kaiser Normalization Rotation with Absolute Value > .500

| Property | Factor | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| External Appearance | .854 | | | |
| Media Attention | | .650 | | |
| Size | | .587 | | |
| History | | .542 | | |
| Service & Cuisine Quality | | | -.840 | |
| Repeat Passenger Patronage | | | -.655 | |
| Marine Technology | | | | -.854 |
| Non Marine Technology | | | | -.565 |

Under both methods of factor analysis, Attractiveness was the strongest factor. Significance was the second strongest factor. Under the Principal Component extraction method, Power was the third strongest followed by Competitive Advantage. Under the Maximum Likelihood extraction method, this order was reversed.

As stated earlier, the purpose of the factor analysis was twofold; first, to confirm the structure of the Categories and their constituent Properties; and second, to identify the latent variables or constructs represented by the original variables. Hair, Anderson, Tatham, & Black (1998, 115) wrote, “If the objective is simply to identify logical combinations of variables and better understand the interrelationships among variables, then factor interpretation will suffice.” This summarizes the purpose of the factor analysis,

therefore, factor interpretation will suffice for this study.

## 5.9 Summary:

The purpose of this chapter has been to describe the results from the Delphi Method Exercise and the General Survey. The Delphi Method validated the Categories and their constituent Properties. This exercise also resulted in two additional properties for the General Survey and served a pilot study for the General Survey. When the 71 ships from the Delphi exercise were sorted by cluster analysis, four initial groupings of legendary ships emerged, Grand Legends, Legends, Demi Legends, and Personal/Local Legends. The General Survey produced slightly over 300 useable responses and 237 ships. Cluster analysis also produced four groupings of legendary ships. Factor analysis of the responses to the Properties' questions resulted in four components/factors. In order of strength, they were Attractiveness, Significance, Power, and Competitive Advantage. The order for the first two remained the same under both the Principal Component method and the Maximum Likelihood method. The third and four were reversed under the Maximum Likelihood method. Attractiveness and Power were also categories in the initial General Legendary Passenger Ship Model. The new categories of Significance and competitive Advantage emerged from the factor analysis. The implications of these results will be discussed in the next chapter.