

ANALYSIS OF USER PERCEPTIONS OF HYDROFOIL SERVICE

by

Service Assessment Division

June 1983

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## INTRODUCTION

This memorandum presents the findings from a survey of hydrofoil passengers in Southern Italy. This hydrofoil service links the ports of Palermo and Naples with a stop in Ustica, a resort island off the northern coast of Sicily (see Figure I). The vessel used in this service is a hydrofoil model RHS 200 manufactured by Cantieri Rodriquez.

The survey, an English version of which appears in Appendix A, was administered on board the vessel over the period June 1 to September 22, 1982 (a total of 46 separate trips including one charter trip from Palermo to Vulcano, an island northeast of Palermo). A total of 1734 questionnaires were returned by the passengers and form the basis of the analysis presented here. Also available for each trip is the captain's trip log (see Appendix A) indicating sea conditions and travel times.

The primary purpose of the analysis is to examine passenger perceptions of hydrofoil service characteristics, segmenting the responses by user group (e.g., first-time vs. repeat users, and business vs. non-business users) and sea conditions. Because no data is available on alternative travel modes linking Palermo, Ustica, and Naples, it is not possible to identify the comparative advantages of the hydrofoil over more conventional modes of transport. Also, the procedure of administration of the survey does not insure that the sample of respondents is representative of users. Specifically, when the questionnaires are distributed at random, as was the case here, frequent users are interviewed with a higher probability than infrequent users; this generates potential biases in the results of the

analysis (for a more detailed explanation of this issue see, for example, Lawrence B. Doxsey, Respondent Trip Frequency Bias in On-Board Surveys, mimeographed, U.S. Department of Transportation, December 1982).

## ANALYSIS

The detailed analysis of the results is reported in the Figures II, III, and IV, and in Tables II, III, and IV. The figures consist of histograms and pie charts which convey at a glance the more detailed information provided in the tables. While the figures and tables are self-explanatory, several highlights are of particular significance and are reported in the text below.

Two-thirds of the hydrofoil trips were taken for pleasure (Figure II.A); this does not come as a surprise given the touristic appeal of the island of Ustica. Also, the reason cited by three-fourths of the passengers for choosing the hydrofoil was that it saves time, while convenience was cited by only one in seven passengers (Figure II.B). Three-fourths of the passengers had taken the hydrofoil prior to their current trip, and few people cited problems with the service, the accessibility, the motion of the vessel, or the noise level during the ride (Table II).

Again, confirming an earlier point, the speed of the hydrofoil was perceived as being very important by the majority of the passengers. Also described as very important by the majority of the passengers was ride comfort and service reliability (Figure IV and Table IV). Most people found that the level-of-service and the amenities were satisfactory, and they reported that they would recommend the hydrofoil trip to their friends (Table II).

No significant difference in perception of vessel motion and noise level exists between passengers who had taken a hydrofoil before the current trip (6 out of 10) and those who had not (4 out of 10). It also appears that sea conditions (as measured on the Beaufort scale defined in Table I) had practically no impact on perceived vessel motion and noise level (Figure III and Table III). This latter finding comes as no surprise considering the dimensions of this hydrofoil (the displacement of the RHS 200 is 115 tons) and the electronic stability augmentation system of the bow and stern foils of the vessel.

### CONCLUSIONS

The analysis of the survey suggests that hydrofoil is a convenient mode of transportation. The speed of the vessel and the ride comfort are judged favorably by the large majority of the passengers.

It should be stressed, however, that the hydrofoil service examined here is primarily seasonal and geared to the tourist market, and it covers relatively long distances. These site-specific characteristics, coupled with potential biases in the survey sample, should be kept in mind when applying the findings of this analysis to the planning of hydrofoil service in other environments.

## APPENDIX A

### THE CAPTAIN'S TRIP LOG AND THE PASSENGER SURVEY FORMS

Table A.I illustrates the English version of the captain's trip log. The hydrofoil captain would fill out one of these forms, and would attach it to the surveys completed by the vessel passengers. Table A.II illustrates the English version of the passenger survey. This survey was distributed by the captain during the trip and collected 15 minutes later.

FIGURE I  
MAP OF HYDROFOIL SERVICE

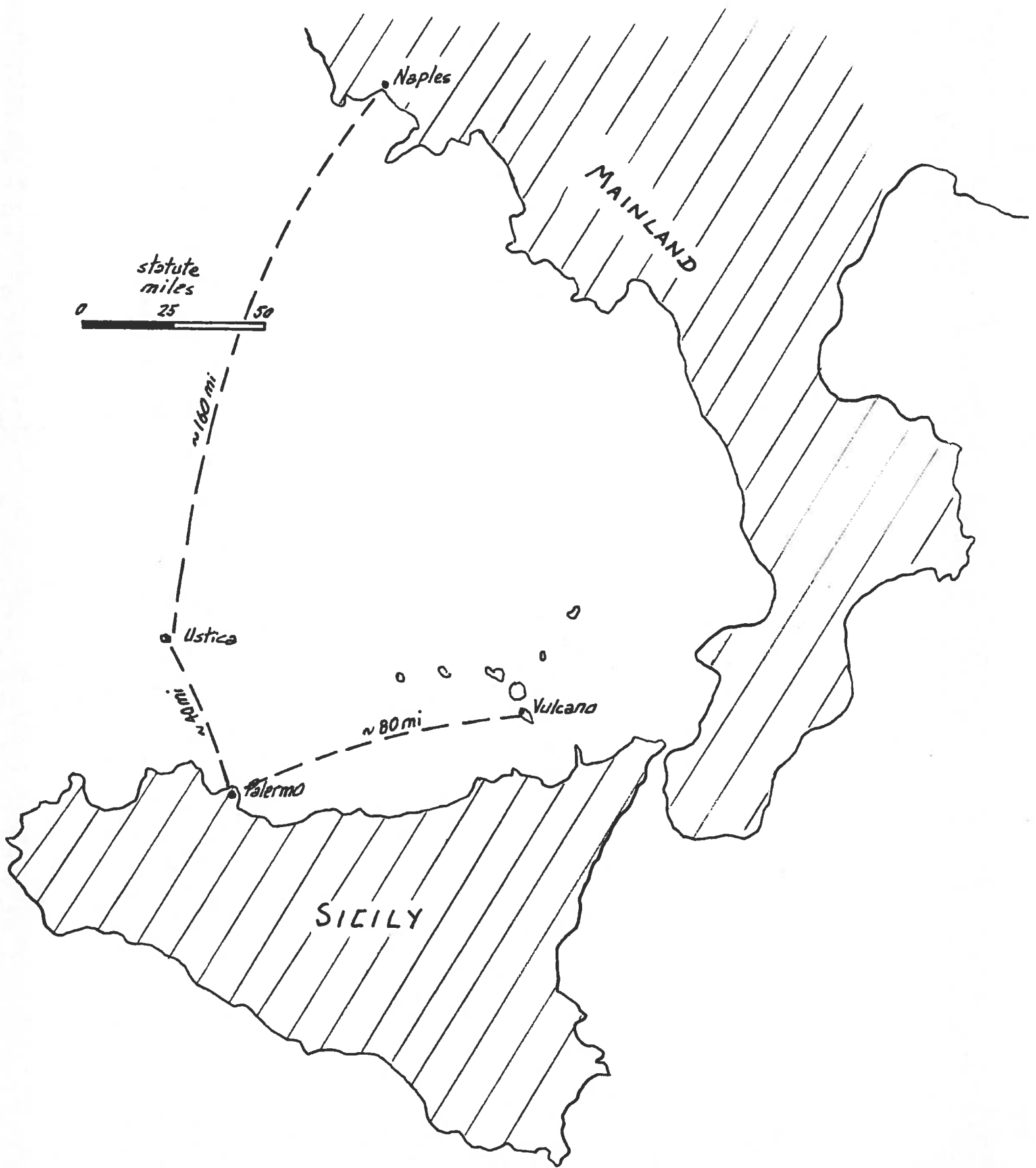
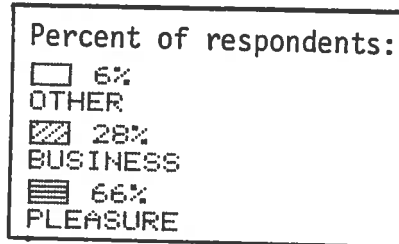
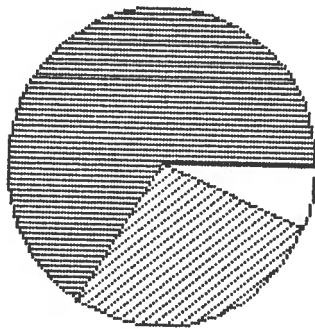


FIGURE II

PURPOSE OF TRAVEL AND REASON  
FOR USING HYDROFOIL

A. PURPOSE OF TRAVEL



B. REASON FOR USING HYDROFOIL

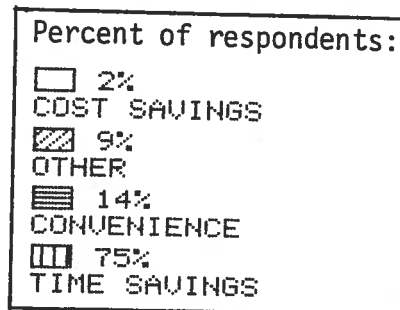
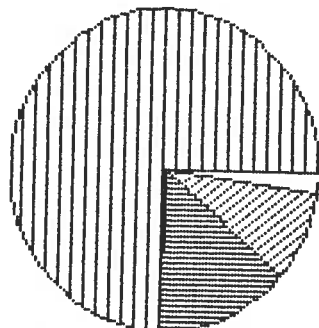




FIGURE III  
USER PERCEPTION OF HYDROFOIL SERVICE CHARACTERISTICS

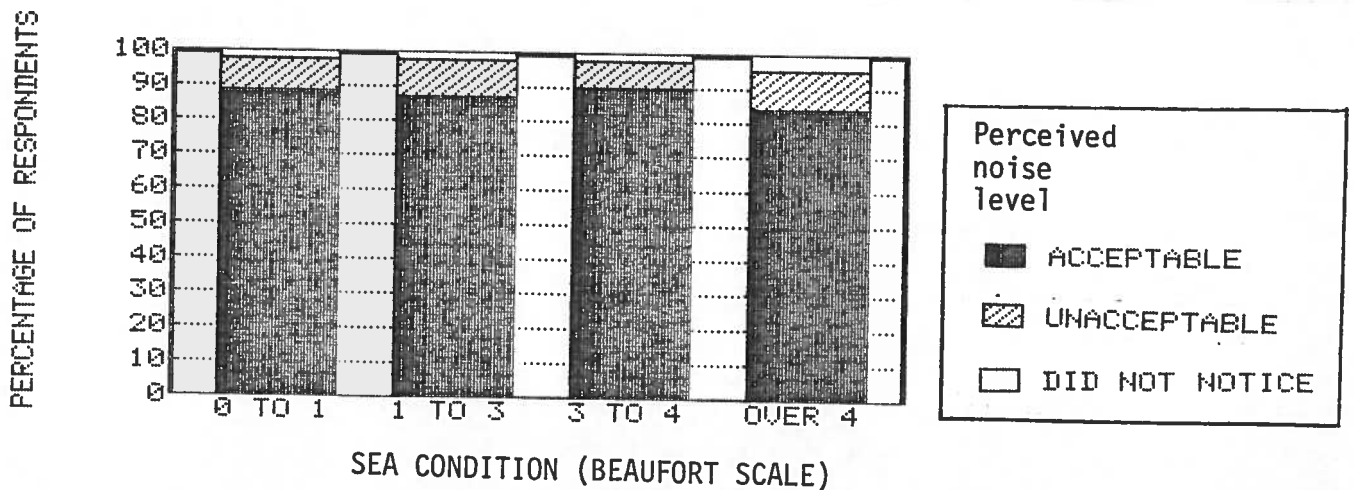
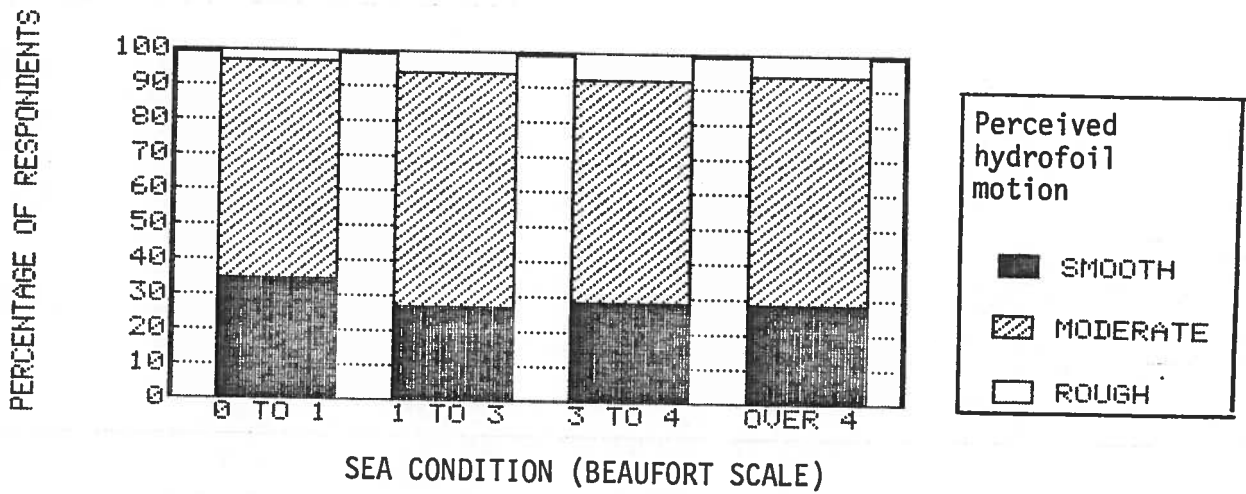
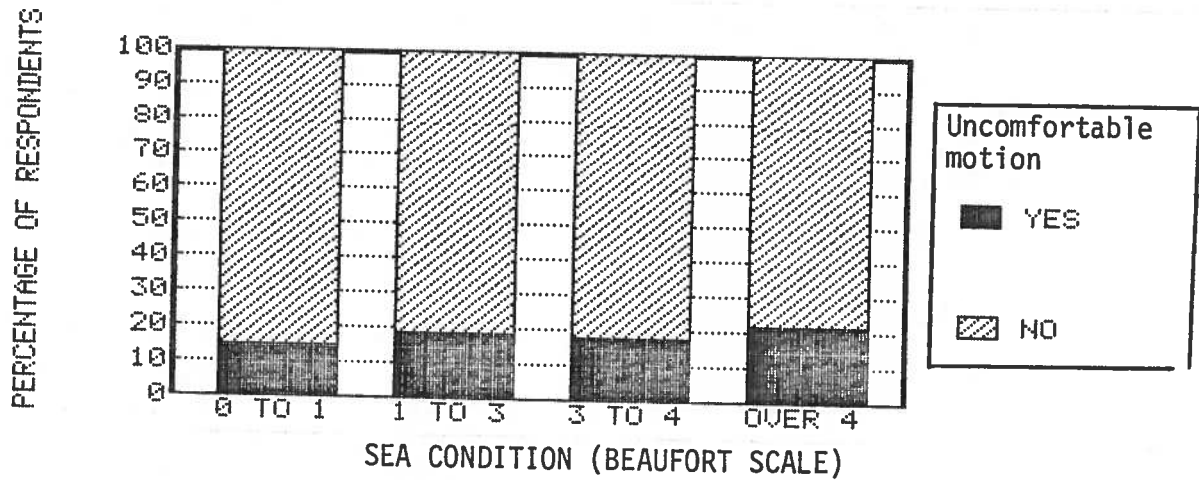
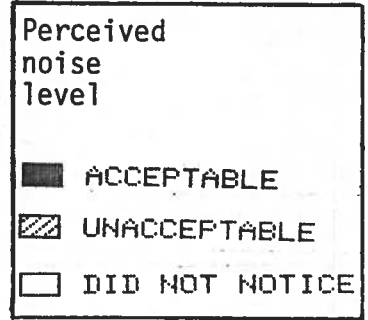
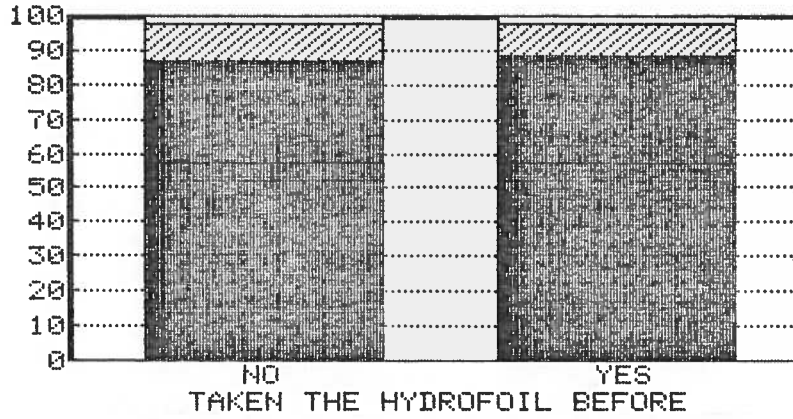
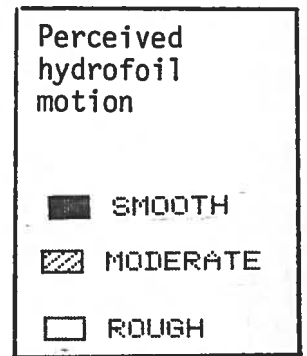
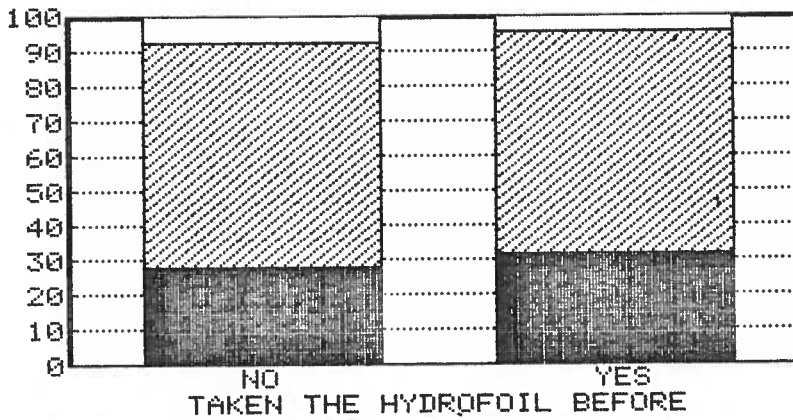


FIGURE III (CONT.)

PERCENTAGE OF RESPONDENTS



PERCENTAGE OF RESPONDENTS



PERCENTAGE OF RESPONDENTS

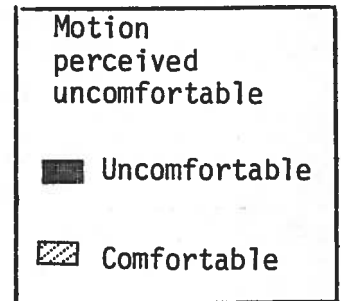
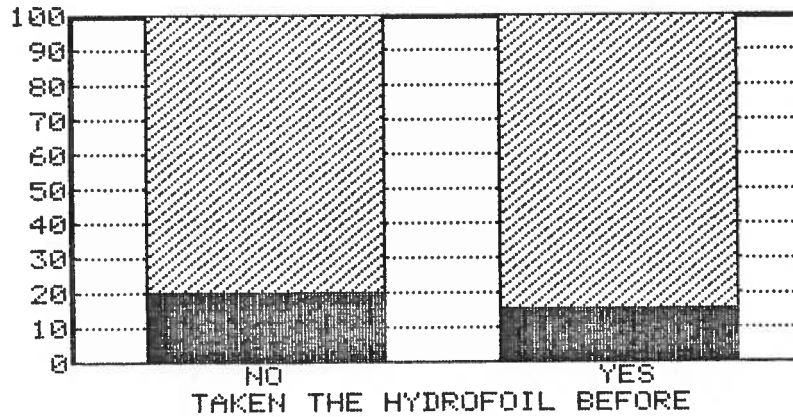
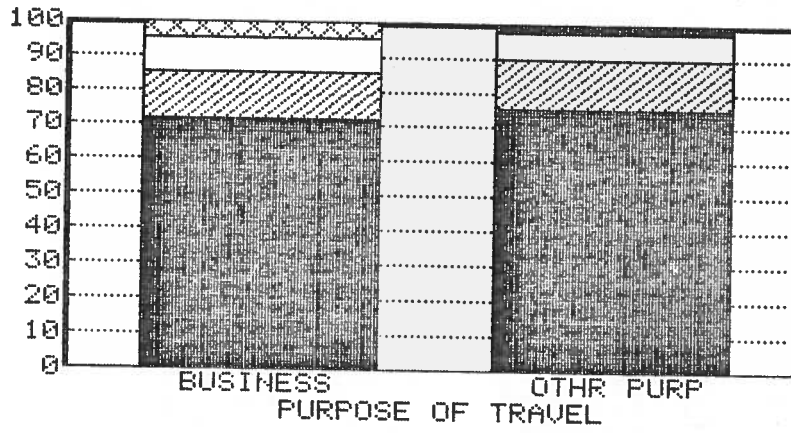


FIGURE III (CONT.)

PERCENTAGE OF RESPONDENTS



Reported reason for travel by hydrofoil

- CONVENIENCE
- COST SAVINGS
- TIME SAVINGS
- OTHER

FIGURE IV

CROSS-CLASSIFICATION OF HYDROFOIL CHARACTERISTICS BY SATISFACTION AND IMPORTANCE LEVELS

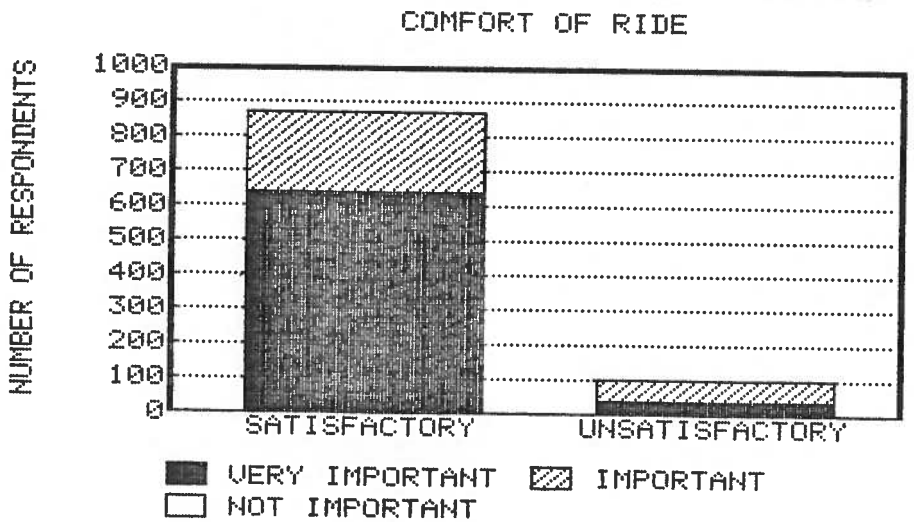
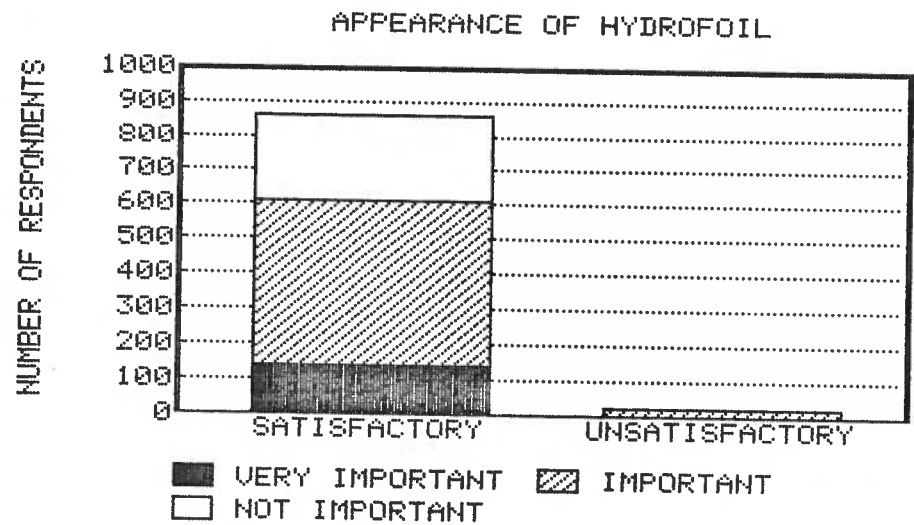
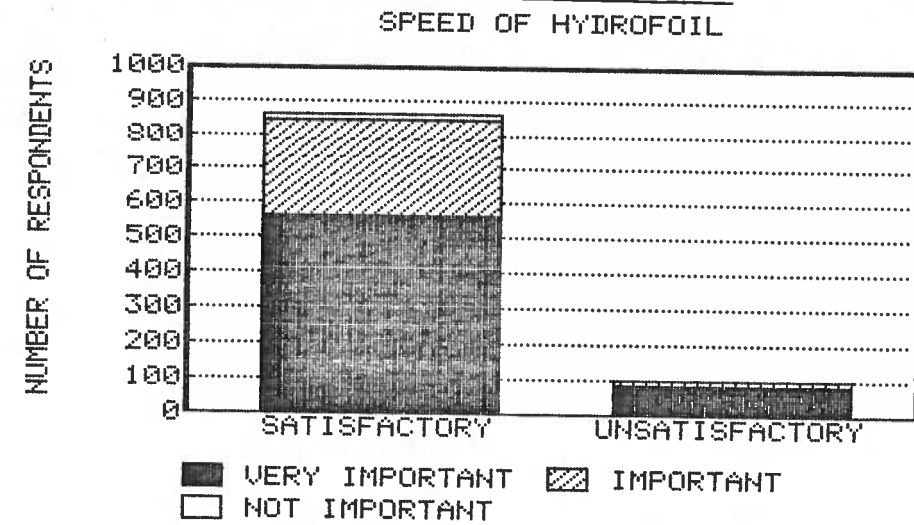
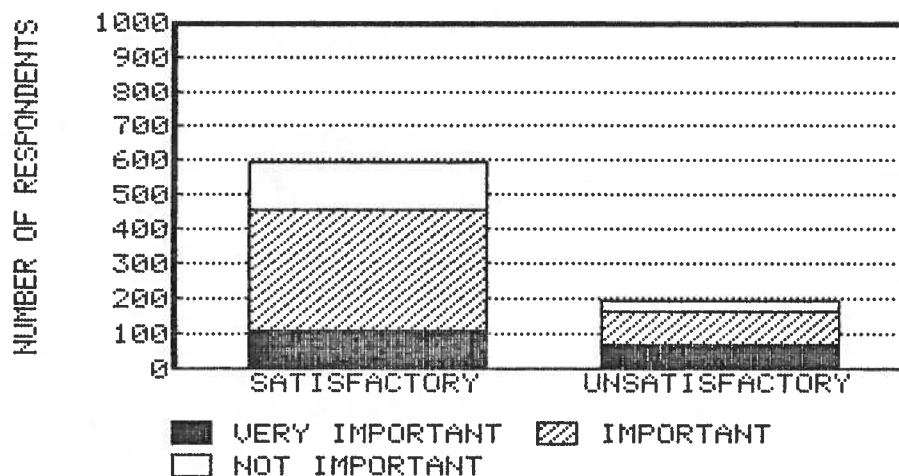
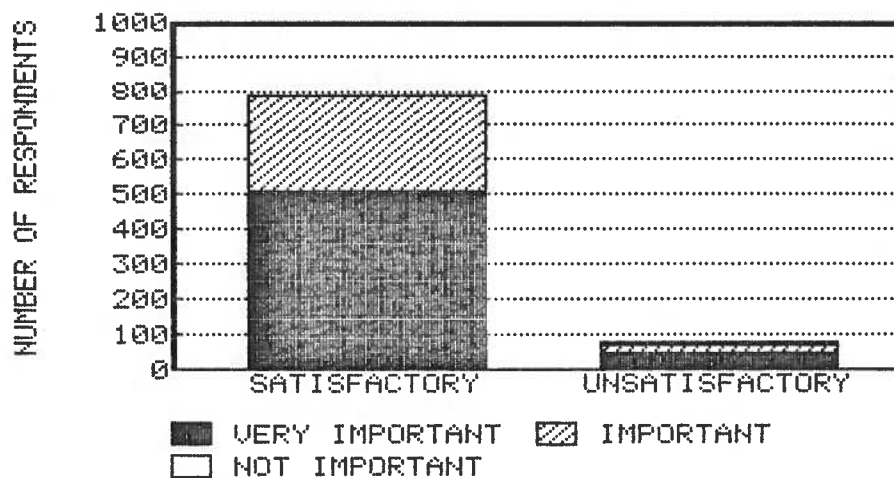


FIGURE IV (CONT.)

CONVENIENCE/APPEARANCE OF PIER



RELIABILITY OF SERVICE



BAR/SHACK SERVICE

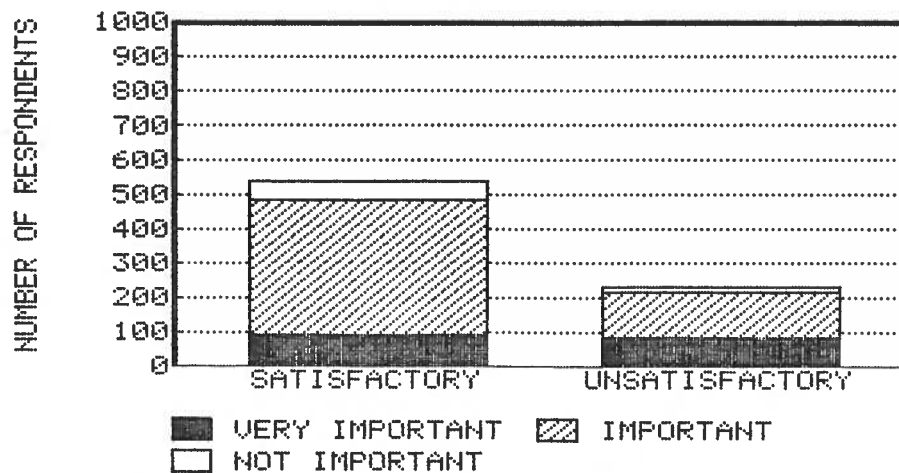


FIGURE IV (CONT.)

HANDLING OF BAGGAGE

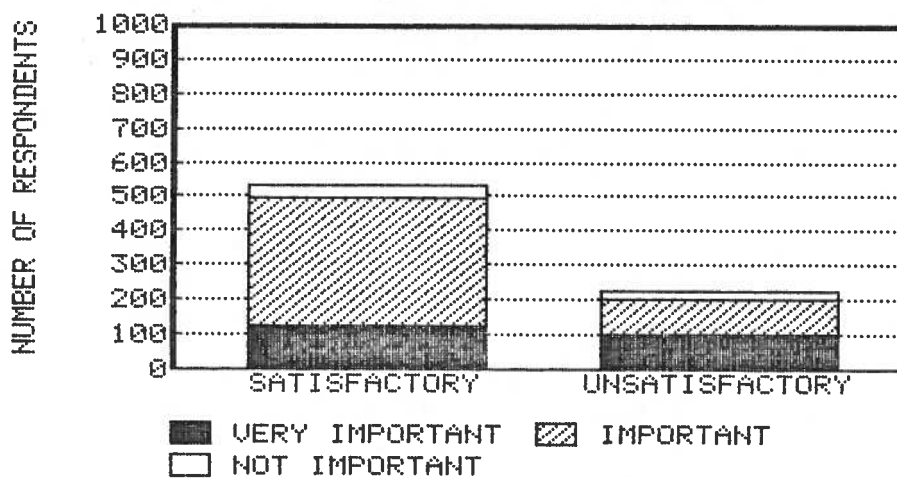


TABLE I  
BEAUFORT WIND SCALE

| Code Number | Wind Velocity<br>(m.p.h.) | Description     |
|-------------|---------------------------|-----------------|
| 0           | 0-1                       | calm            |
| 1           | 1-3                       | light air       |
| 2           | 4-7                       | light breeze    |
| 3           | 8-12                      | gentle breeze   |
| 4           | 13-18                     | moderate breeze |
| 5           | 19-24                     | fresh breeze    |
| 6           | 25-31                     | strong breeze   |
| 7           | 32-38                     | moderate gale   |
| 8           | 39-46                     | fresh gale      |
| 9           | 47-54                     | strong gale     |
| 10          | 55-63                     | whole gale      |
| 11          | 64-75                     | storm           |
| 12          | over 75                   | hurricane       |

TABLE II  
 SURVEY RESULTS  
 (ONE-WAY CROSS-CLASSIFICATION)

TOTAL QUESTIONNAIRES RETURNED : 1784

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|  |                              |        |
|--|------------------------------|--------|
| <u>Are you traveling for</u>                             | business                     | 28.44% |
|  | pleasure                     | 65.86% |
| No response:12   | other, please describe       | 5.70%  |
|  |                              |        |
| <u>Did you take our hydrofoil service because it</u>     | saves cost                   | 2.28%  |
|  | saves time                   | 75.14% |
|  | is convenient                | 13.85% |
| No response:30   | other, please describe       | 8.72%  |
|  |                              |        |
| <u>Have you taken our hydrofoil before?</u>              | yes                          | 73.94% |
| No response:7  | no                           | 26.05% |
|  |                              |        |
| <u>Were you able to get on our hydrofoil</u>             | easily                       | 91.67% |
|  | with some trouble            | 6.74%  |
| No response:32   | with a great deal of trouble | 1.60%  |
|  |                              |        |
| <u>Is the cabin</u>                                      | fine, no complaints          | 80.96% |
|  | acceptable, any comments     | 17.62% |
| No response:25   | unacceptable, explain        | 1.42%  |
|  |                              |        |
| <u>Is the noise level</u>                                | acceptable                   | 88.04% |
|  | unacceptable                 | 9.48%  |
| No response:11   | did not notice               | 2.48%  |
|  |                              |        |
| <u>Do you find the motion of the hydrofoil</u>           | smooth                       | 30.08% |
|  | moderate                     | 64.56% |
| No response:9  | rough                        | 5.35%  |
|  |                              |        |
| <u>Did the motion make you uncomfortable in any way?</u> | yes                          | 17.54% |
| No response:62   | no                           | 82.46% |



TABLE II (CONT.)

Please indicate the importance of the following features and whether you find them satisfactory or unsatisfactory.

|                                      | <u>No<br/>Resp.</u> | <u>Very<br/>Important</u> | <u>IMPORTANCE</u>     |                          |
|--------------------------------------|---------------------|---------------------------|-----------------------|--------------------------|
|                                      |                     |                           | <u>Important</u>      | <u>Not<br/>Important</u> |
| a. Speed of Hydrofoil                | 277                 | 67.95%                    | 30.39%                | 1.66%                    |
| b. Appearance of Hydrofoil           | 339                 | 20.62                     | 48.72                 | 30.66                    |
| c. Comfort of Ride                   | 307                 | 71.50                     | 28.03                 | 0.47                     |
| d. Convenience/Appearance<br>of pier | 458                 | 23.38                     | 50.60                 | 26.02                    |
| e. Reliability of Service            | 376                 | 63.28                     | 35.37                 | 1.35                     |
| f. Bar/Snack Service                 | 502                 | 23.71                     | 63.73                 | 12.56                    |
| g. Handling of Baggage               | 504                 | 30.55                     | 58.98                 | 10.47                    |
|                                      |                     | <u>SATISFACTORY</u>       | <u>UNSATISFACTORY</u> | <u>No. Resp.</u>         |
| a. Speed of Hydrofoil                |                     | 89.46%                    | 10.54%                | 664                      |
| b. Appearance of Hydrofoil           |                     | 96.71                     | 3.29                  | 721                      |
| c. Comfort of Ride                   |                     | 95.19                     | 4.81                  | 683                      |
| d. Convenience/Appearance<br>of pier |                     | 76.04                     | 23.96                 | 803                      |
| e. Reliability of Service            |                     | 91.25                     | 8.75                  | 756                      |
| f. Bar/Snack Service                 |                     | 69.92                     | 30.08                 | 800                      |
| g. Handling of Baggage               |                     | 71.58                     | 28.42                 | 813                      |

TABLE II (CONT.)

(a) Other than our service, please  
check any of these commercial  
passenger boats you have taken.

|                          |        |
|--------------------------|--------|
| hydrofoil                | 18.72% |
| hovercraft               | 1.04%  |
| conventional ferry       | 29.79% |
| hovercraft & conv. ferry | 0.52%  |
| hydrofoil & conv. ferry  | 43.52% |
| hydrofoil & hovercraft   | 0.65%  |
| all three                | 5.75%  |

No response/None:240

(b) If you checked question (a), did  
you enjoy the trip?

|           |        |
|-----------|--------|
| yes       | 71.48% |
| it was OK | 23.91% |
| no        | 4.60%  |

No response:241

Would you recommend this trip to  
your friends and associates?

|     |        |
|-----|--------|
| yes | 96.01% |
| no  | 3.99%  |

No response:55

What is your age (check one)?

|             |        |
|-------------|--------|
| 5 to 21     | 15.50% |
| 22 to 39    | 50.03% |
| 40 to 54    | 26.41% |
| 55 to 64    | 6.42%  |
| 65 or older | 1.65%  |

No response:23

Where do you live?

mostly Palermo (city)  
mostly Sicily (region)

TABLE III  
SURVEY RESULTS  
(TWO-WAY CROSS-CLASSIFICATION)

| TAKEN HYDROFOIL<br>BEFORE | N O I S E L E V E L                     |              |                   | Total |
|---------------------------|---|--------------|-------------------|-------|
|                           | ACcceptble                              | UNaccptble   | Did Not<br>Notice |       |
| No                        | 620 <sup>1</sup><br>0.8659 <sup>2</sup> | 77<br>0.1075 | 19<br>0.0265      | 716   |
| Yes                       | 941<br>0.8903                           | 91<br>0.0861 | 25<br>0.0237      | 1057  |

| TAKEN HYDROFOIL<br>BEFORE | H Y D R O F O I L M O T I O N |               |              | Total |
|---------------------------|-------------------------------|---------------|--------------|-------|
|                           | Smooth                        | Moderate      | Rough        |       |
| No                        | 199<br>0.2772                 | 470<br>0.6546 | 49<br>0.0682 | 718   |
| Yes                       | 335<br>0.3169                 | 676<br>0.6395 | 46<br>0.0435 | 1057  |

| TAKEN HYDROFOIL<br>BEFORE | U N C O M F O R T A B L E M O T I O N |               | Total |
|---------------------------|---------------------------------------|---------------|-------|
|                           | Yes                                   | No            |       |
| No                        | 137<br>0.1986                         | 553<br>0.8014 | 690   |
| Yes                       | 165<br>0.1599                         | 867<br>0.9401 | 1032  |

| REASON for<br>TRAVEL | R E A S O N f o r H Y D R O F O I L |               |                  |               | Total |
|----------------------|-------------------------------------|---------------|------------------|---------------|-------|
|                      | Saves<br>Cost                       | Saves<br>Time | Is<br>Convenient | Other         |       |
| Business             | 22<br>0.0447                        | 355<br>0.7215 | 67<br>0.1362     | 48<br>0.0976  | 492   |
| Other/NA             | 15<br>0.0143                        | 963<br>0.7631 | 176<br>0.1395    | 105<br>0.0832 | 1262  |

<sup>1</sup>Number of respondents

<sup>2</sup>Row fraction of respondents

TABLE III (CONT.)

| SEA CONDITION<br>(Beaufort<br>scale) | NOISE LEVEL   |              |                   | Total |
|--------------------------------------|---------------|--------------|-------------------|-------|
|                                      | ACceptble     | UNaccptble   | Did Not<br>Notice |       |
| 0 - 1                                | 511<br>0.8934 | 49<br>0.0857 | 12<br>0.0210      | 572   |
| 1 - 3                                | 574<br>0.8710 | 69<br>0.1047 | 16<br>0.0243      | 659   |
| 3 - 4                                | 314<br>0.8997 | 27<br>0.0774 | 8<br>0.0229       | 349   |
| 4 - up                               | 162<br>0.8394 | 23<br>0.1192 | 8<br>0.0415       | 193   |

| SEA CONDITION | HYDROFOIL MOTION |               |              | Total |
|---------------|------------------|---------------|--------------|-------|
|               | Smooth           | Moderate      | Rough        |       |
| 0 - 1         | 200<br>0.3503    | 352<br>0.6165 | 19<br>0.0333 | 571   |
| 1 - 3         | 177<br>0.2682    | 444<br>0.6727 | 39<br>0.0591 | 660   |
| 3 - 4         | 102<br>0.2906    | 224<br>0.6382 | 25<br>0.0712 | 351   |
| 4 - up        | 55<br>0.2850     | 126<br>0.6528 | 12<br>0.0622 | 193   |

| SEA CONDITION | UNCOMFORTABLE MOTION |               | Total |
|---------------|----------------------|---------------|-------|
|               | Yes                  | No            |       |
| 0 - 1         | 81<br>0.1457         | 475<br>0.8543 | 556   |
| 1 - 3         | 119<br>0.1862        | 520<br>0.8138 | 639   |
| 3 - 4         | 62<br>0.1813         | 280<br>0.8187 | 342   |
| 4 - up        | 40<br>0.2162         | 145<br>0.7838 | 185   |

TABLE IV

SURVEY RESULTS  
HYDROFOIL CHARACTERISTICS: CROSS CLASSIFICATION OF  
SATISFACTION AND IMPORTANCE

|  |                | Very<br>Important | Important | Not<br>Important | Row<br>Total |
|--|----------------|-------------------|-----------|------------------|--------------|
| a. Speed of<br>hydrofoil                 | Satisfactory   | 567 <sup>1</sup>  | 281       | 16               | 864          |
|  | Unsatisfactory | 90 <sup>1</sup>   | 12        | 0                | 102          |
| b. Appearance of<br>hydrofoil            | Satisfactory   | 146               | 465       | 258              | 869          |
|  | Unsatisfactory | 6                 | 18        | 6                | 30           |
| c. Comfort of<br>ride                    | Satisfactory   | 639               | 235       | 2                | 876          |
|  | Unsatisfactory | 39                | 6         | 0                | 45           |
| d. Convenience/<br>appearance of<br>pier | Satisfactory   | 109               | 352       | 133              | 594          |
|  | Unsatisfactory | 72                | 95        | 31               | 198          |
| e. Reliability<br>of service             | Satisfactory   | 510               | 275       | 4                | 789          |
|  | Unsatisfactory | 53                | 22        | 2                | 77           |

<sup>1</sup>Number of respondents

TABLE IV (CONT.)

|                           |                | Very<br>Important | Important | Not<br>Important | Row<br>Total |
|---------------------------|----------------|-------------------|-----------|------------------|--------------|
| f. Bar/snack<br>service   | Satisfactory   | 98                | 389       | 52               | 539          |
|                           | Unsatisfactory | 86                | 133       | 19               | 238          |
| g. Handling of<br>baggage | Satisfactory   | 130               | 366       | 36               | 532          |
|                           | Unsatisfactory | 103               | 103       | 21               | 227          |

FIGURE A.1  
CAPTAIN'S TRIP LOG  
(ENGLISH VERSION)

SURVEY FOR UNITED STATES GOVERNMENT  
DEPARTMENT OF TRANSPORTATION  
URBAN MASS TRANSPORTATION AUTHORITY  
HIGH SPEED WATERBORNE TRANSPORTATION

Voyage No. \_\_\_\_\_

Date \_\_\_\_\_

Captain's Log

Voyage \_\_\_\_\_ to \_\_\_\_\_

Scheduled Time \_\_\_\_\_

Actual Time \_\_\_\_\_

Sea State Encountered \_\_\_\_\_ (Beaufort Scale)

Wind Velocity \_\_\_\_\_ Direction \_\_\_\_\_

Sea Direction \_\_\_\_\_

Captain's Name: \_\_\_\_\_

The Captain will fill in the above log on each trip the questionnaire is issued.

The following questionnaire is to be handed out about halfway through the trip and picked up 15 minutes later.

FIGURE A.II  
TEXT OF THE PASSENGER SURVEY  
(ENGLISH VERSION)

Please take a few minutes to fill out this questionnaire. Your comments will be used to make this trip and others a more enjoyable experience.

1. Are you traveling for  
 business  
 pleasure  
 other, please describe  
\_\_\_\_\_  
\_\_\_\_\_
  
2. Did you take our hydrofoil service because it  
 saves cost  
 saves time  
 is convenient  
 other, please describe  
\_\_\_\_\_  
\_\_\_\_\_
  
3. Have you taken our hydrofoil before?  
 yes  
 no
  
4. Were you able to get on our hydrofoil  
 easily  
 with some trouble  
 with a great deal of trouble
  
5. Is the cabin  
 fine, no complaints  
 acceptable, any comments  
\_\_\_\_\_  
 unacceptable, explain  
\_\_\_\_\_



6. Is the noise level

\_\_\_\_\_ acceptable

\_\_\_\_\_ unacceptable

\_\_\_\_\_ did not notice

7 (a) Do you find the motion of the hydrofoil

\_\_\_\_\_ smooth

\_\_\_\_\_ moderate

\_\_\_\_\_ rough

(b) Did the motion make you uncomfortable in any way?

\_\_\_\_\_ yes

\_\_\_\_\_ no

8. Please indicate the importance of the following features and whether you find them satisfactory or unsatisfactory.

|                                   | IMPORTANCE     |           |               | SATISFACTORY | UNSATISFACTORY |
|-----------------------------------|----------------|-----------|---------------|--------------|----------------|
|                                   | Very Important | Important | Not Important |              |                |
| a. Speed of Hydrofoil             | _____          | _____     | _____         | _____        | _____          |
| b. Appearance of Hydrofoil        | _____          | _____     | _____         | _____        | _____          |
| c. Comfort of Ride                | _____          | _____     | _____         | _____        | _____          |
| d. Convenience/Appearance of pier | _____          | _____     | _____         | _____        | _____          |
| e. Reliability of Service         | _____          | _____     | _____         | _____        | _____          |
| f. Bar/Snack Service              | _____          | _____     | _____         | _____        | _____          |
| g. Handling of Baggage            | _____          | _____     | _____         | _____        | _____          |

9 (a). Other than our service, please check any of these commercial passenger boats you have taken.

\_\_\_\_\_ hydrofoil

from where to where

\_\_\_\_\_ hovercraft

\_\_\_\_\_ to \_\_\_\_\_

\_\_\_\_\_ conventional ferry

\_\_\_\_\_ to \_\_\_\_\_

\_\_\_\_\_ to \_\_\_\_\_

FIGURE A.II (CONT.)

9 (b) If you checked question 9a, did you enjoy the trip?

\_\_\_ yes

\_\_\_ it was OK

\_\_\_ no

10. Would you recommend this trip to your friends and associates?

\_\_\_ yes

\_\_\_ no

11. What is your age (check one)?

\_\_\_ 5 to 21

\_\_\_ 22 to 39

\_\_\_ 40 to 54

\_\_\_ 55 to 64

\_\_\_ 65 or older

12. Where do you live?

\_\_\_\_\_ City

\_\_\_\_\_ Country