**Factors related to being successful in fishing**

**Aim:**

* This project will analyse the comparison of means between different variables; an estimation of differences in performance parameters will be calculated.
* This analysis will result in a comparison of catch value between the skippers and the correlation of the difference in categorical factors.

**Background**:

There is a vast difference between each fishing expedition; the quantity and quality of catches will determine whether a trip is successful. Therefore, this report would like to explore what factors are related to a successful fishing venture. This report primarily based on data on the amount of fish caught by each of the 151 fishing boats working in Tasmania. For each boat, the amount of fish caught was recorded. Moreover, the total time spent on trips and the total price paid for catches was measured, along with four other factors (experienced, age of the boat, equipment and search).

**Findings:**

1. The mean value paid for catches of experienced skippers was $10,800 - $20,800 higher than the mean value paid for catches of inexperienced skippers (Table 1).
2. The mean time on spent trips for skippers with adequate search equipment was 39.2 hours - 50.9 hours more than the mean time spent on trips for skippers with sophisticated search equipment (Table 2).
3. The mean time on spent trips for inexperienced skippers with average general equipment was 19.8 hours - 45.7 hours more than the mean time on spent trips for inexperienced skippers with above-average general equipment (Table 3).
4. The mean time spent on trips for experienced skippers with average general equipment was 11.3 hours – 32.5 hours more than the mean time on spent trips for experienced skippers with above-average general equipment (Table 4).
5. The possibility of getting high catch value for experienced skippers was 52% - 71% and the possibility of getting high catch value for inexperienced skippers was 5% - 26% (Table 5) (Table 6).
6. Boats that have adequate search equipment usually have average general equipment, whereas boats that have sophisticated search equipment have above average general equipment (Table 7).

**Statistical methods and results**

**Variables**

Measuring how much fish caught within one trip, is sorted as a new variable catch value. "high" represent catch is above the median and "low" represent catch below the median.

**Computational methods:**

Microsoft Excel 2016 was used for the statistical calculation of this report.

The 'Pivot table' tool produced the table for calculating the count of a boat with different combinations for categorical variables.

Degree of freedom:

1. For the test of association: (number of rows – 1) \* (number of columns).
2. For the goodness of fit: depends on the no data points and several statistics needed to obtain the expected result.

The t-test table is made by ‘t-Test: Two-Sample Assuming Unequal Variances’ option in data analysis.

Confidence Interval = point estimate ± (confidence multiplier \* standard error)

p-value = 1 - CHISQ.DIST(chi-squared statistic, 1, 1)

**Results**

|  |  |  |
| --- | --- | --- |
| **Table 1.** Two-tailed t-test assuming unequal variances for value versus the experience of skippers | | |
|  | Experienced skippers | Inexperienced skippers |
| **Mean in value [$1000]** | 70.7 | 54.9 |
| Variance | 238.9 | 178.2 |
| Observations | 105 | 46 |
| degree of freedom = 99 | |  |
| t-statistic = 6.37 | |  |
| P (T ≤ t) two-tailed < 0.001 | |  |
|  |  |  |
| The point estimate of difference = 15.8 | |  |
| Standard error = 2.5 | |  |
| Approximate 95% CI: (10.8, 20.8) | |  |

There is strong evidence (p<0.001) to reject the null hypothesis that there is no difference in the mean value of catch between experience and inexperienced skippers. The mean value paid for catches of 105 experienced skippers was $70,700 and the mean value paid for catches of 46 inexperienced skippers was $54,900.

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| **Table 2.** Two-tailed t-test assuming unequal variances for time versus search equipment. | | |
|  |  |  |
|  | Skippers with adequate search equipment | Skippers with sophisticated search equipment |
| **Mean-time [in an hour]** | 131.1 | 86 |
| Variance | 370.9 | 264.6 |
| Observations | 69 | 82 |
| degree of freedom = 134 | |  |
| t-statistic = 15.37 | |  |
| P (T ≤ t) two-tailed <0.001 | |  |
|  |  |  |
| The point estimate of difference = 45.1 | |  |
| Standard error = 2.9 | |  |
| Approximate 95% CI: (39.2, 50.9) | |  |

There is strong evidence (p<0.001) to reject the null hypothesis that there is no difference in the mean time on spent trips between skippers with adequate and sophisticated search equipment. The mean time on spent trips of 69 skippers with adequate search equipment was 131.1 hours and the mean time on spent trips of 82 skippers with sophisticated search equipment was 86 hours.

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| **Table 3**: Two-tailed t-test assuming unequal variances for time versus inexperienced skippers with general equipment | | |
|  |  |  |
|  | *Inexperienced skippers with average general equipment* | *Inexperienced skippers with above-average general equipment* |
| **Mean time [in an hour]** | 116.4 | 83.7 |
| Variance | 452.1 | 493.9 |
| Observations | 26 | 20 |
| degree of freedom = 40 | |  |
| t-statistic = 5.05 | |  |
| P (T ≤ t) two-tailed < 0.001 | |  |
|  |  |  |
| The point estimate of difference = 32.7 | |  |
| Standard error = 6.5 | |  |
| Approximate 95% CI: (19.8, 45.7) | |  |

There is strong evidence (p<0.001) to reject the null hypothesis that there is no difference in the mean time on spent trips between inexperienced skippers with average general equipment and inexperienced skippers with above-average general equipment. The mean time on spent trips of 26 inexperienced skippers with average general equipment was 116.4 hours and the mean time on spent trips of 20 inexperienced skippers with above-average general equipment was 83.7 hours.

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| **Table 4:** Two-tailed t-test assuming unequal variances for time versus experienced skippers with general equipment | | |
|  |  |  |
|  | *Experienced skippers with average general equipment* | *Experienced skippers with above-average general equipment* |
| **Mean time [in an hour]** | 119.7 | 97.8 |
| Variance | 792.7 | 685.7 |
| Observations | 52 | 53 |
| degree of freedom = 102 | |  |
| t-statistic = 4.13 | |  |
| P (T ≤ t) two-tailed < 0.001 | |  |
|  |  |  |
| The point estimate of difference = 21.9 | |  |
| Standard error = 5.3 | |  |
| Approximate 95% CI: (11.3, 32.5) | |  |

There is strong evidence (p<0.001) to reject the null hypothesis that there is no difference in the mean time on spent trips between experienced skippers with average general equipment and experienced skippers with above-average general equipment. The mean time on spent trips of 52 experienced skippers with average general equipment was 119.7 hours and the mean time on spent trips of 53 experienced skippers with above-average general equipment was 97.8 hours.

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| **Table 5:** Pivot table of counts for experience and catch value | | | |
| Count of boat | Experienced |  |  |
| catch value | no | yes | Grand Total |
| high | 7 | 65 | 72 |
| low | 39 | 40 | 79 |
| Grand Total | 46 | 105 | 151 |
|  |  |  |  |
| Count of the boat with different combinations of experience of skippers and catch value. Experienced skippers are more likely to have high catch value than inexperienced skippers. | | | |
|  |  |  |  |
| **Table 6:** Proportion of experienced and inexperienced skippers with high catch value trips | | | |
|  | **Inexperienced skippers** | **Experienced**  **skippers** |  |
| point estimate | 0.15 | 0.62 |  |
| sample size | 46 | 105 |  |
| Standard error | 0.05 | 0.05 |  |
| Approximate 95% CI: | (0.05, 0.26) | (0.52, 0.71) |  |
|  |  |  |  |
| The interval does not include zero; therefore, it means that there is a statistically significant difference between the probabilities of catching high value for inexperienced versus experienced skippers. | | | |

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| Count of Boat | Search equipment |  |  |
| General equipment | adequate | sophisticated | Grand Total |
| above average | 19 | 54 | 73 |
| average | 50 | 28 | 78 |
| Grand Total | 69 | 82 | 151 |
|  |  |  |  |
| Expected count of boat | Search equipment |  |  |
| General equipment | adequate | sophisticated | Grand Total |
| above average | 33.36 | 39.64 | 73 |
| average | 35.64 | 42.36 | 78 |
| Grand Total | 69 | 82 | 151 |
|  |  |  |  |
|  |  | chi-squared statistic = 22 | |
|  |  | degree of freedom = 1 | |
|  |  | p-value <0.001 | |

**Table 7:** Association of search equipment and general equipment

There is strong evidence (p<0.001) to reject the null hypothesis that the boat with search equipment and boat with general equipment are independent. The actual amount of boat with adequate search equipment and average general equipment is 50 which is higher than expected amount (35.64), the actual amount of boat with sophisticated search equipment and above-average general equipment is 54 which is higher than expected amount (39.64).