**Appendix List**

1. Appendix 1. Korean Fleet Evolution
   * Table Appendix 1. Korean Fleet Evolution (1989 ~ 2020)
2. Appendix 2. Coded Causal Factors Distributed to the Section of the ISM Code

* Table Appendix 2. Coded Causal Factors Distributed to the Section of the ISM Code

1. Appendix 3. Test Results

* Table Appendix 3. *The Outcome of H1. Repeated-Measures ANOVA in the Korean Merchant Fleet.*
* Table Appendix 4. *The Outcome of H2, Paired Samples Test for Korean Merchant and Fishing Fleet.*
* Table Appendix 5. *The Outcome of H3, Paired Samples Test for Korean and World Merchant Fleet.*

Appendix 1. Korean Fleet Evolution

We noted that the number of ships registered in Korea is not the same yearly. We conducted an Independent Samples t-Test with a 99% confidence level to compare the numbers by period groups. There were significant differences between the period groups of the KM fleet in p1(1989–1996) (M = 1644, SD = 73.7) from p3(2005–2012) (M = 1751, SD = 42.8); t (11) = -3.542, p = 0.004, and p4(M = 1758, SD = 14.67); t(8) = -4.303, p = 0.003. Similarly, the test results showed significant differences between the Korean fishing fleet in p1(1989–1996) (M = 75209, SD = 5243.97) from p2(1997–2004) (M = 85972, SD =5381.63); t(14) = -4.052, and p4(2013–2020) (M = 66742, SD = 1176.61); t(8) = 4.457, p = 0.002. The other groups did not indicate significant differences. However, to compare the data strictly by the same standards, the difference in actual ship volume was weighted for all groups and adjusted without exception. Meanwhile, despite noticeable differences among the periods of the WM fleet, we did not consider them because relevant data could hardly be found to prove the correlation between the number of vessels and maritime accident frequencies. Instead, we intended to make up the gap by a within-variable comparison and a supplementary comparison with another region.

*Table Appendix 1. Korean Fleet Evolution*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Period | Korean Merchant Fleet | | | Korean Fishing Fleet | | |
| Total | Average | Change(%) | Total | Average | Change(%) |
| p1(1989-1996) | 13,150 | 1,644 |  | 601,675 | 75,209 |  |
| P2(1997-2004) | 12,645 | 1,581 | -3.84 | 687,779 | 85.972 | 14.31 |
| p3(2005-2012) | 14,004 | 1,751 | 10.75 | 628,253 | 78,532 | -8.65 |
| p4(2013-2020) | 14,065 | 1,758 | 0.44 | 533,939 | 66,742 | -15.01 |
| Source: Korea Maritime Safety Tribunal (KMST)  Unit: Vessel Number | | | | | | |

Appendix 2. Coded Causal Factors Distributed to the Section of the ISM Code

*Table Appendix 2. Coded Causal Factors Distributed to the Section of the ISM Code*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sections of the ISM Code | Very serious | | Serious | | Less serious | | Total | |  |
| No. | % | No. | % | No. | % | No. | % |
| 1. General | 21 | 4.4 | 7 | 1.5 | 10 | 2.1 | 38 | 7.9 |
| 2. Safety and environmental protection policy | 1 | 0.2 | 0 | 0.0 | 1 | 0.2 | 2 | 0.4 |
| 3. Company responsibility and authority | 1 | 0.2 | 1 | 0.2 | 5 | 1.0 | 7 | 1.5 |
| 4. Designated person(s) | 3 | 0.6 | 3 | 0.6 | 9 | 1.9 | 15 | 3.1 |
| 5. Master’s responsibility and authority | 13 | 2.7 | 19 | 4.0 | 37 | 7.7 | 69 | 14.4 |
| 6. Resource and personnel | 31 | 6.5 | 32 | 6.7 | 71 | 14.9 | 134 | 28.0 |
| 7. Development of plans for shipboard operations | 20 | 4.2 | 20 | 4.2 | 25 | 5.2 | 65 | 13.6 |
| 8. Emergency preparedness | 6 | 1.3 | 4 | 0.8 | 2 | 0.4 | 12 | 2.5 |
| 9. Reports and analysis of NCs, accidents, and hazardous situations | 2 | 0.4 | 8 | 1.7 | 6 | 1.3 | 16 | 3.3 |
| 10. Maintenance of the ship and equipment | 8 | 1.7 | 15 | 3.1 | 13 | 2.7 | 36 | 7.5 |
| 11. Documentation | 2 | 0.4 | 0 | 0.0 | 1 | 0.2 | 3 | 0.6 |
| 12. Company verification, review, and evaluation | 25 | 5.2 | 24 | 5.0 | 32 | 6.7 | 81 | 16.9 |
| Total | 133 | 27.8 | 133 | 27.8 | 212 | 44.4 | 478 | 100.0 |
| The percentages of the total are in relation to the total of 478 casual factors Source: B.-M. Batalden, A. K. Sydnes, and WMU 2014 | | | | | | | | | |

Annex 3. Test Results

*Table Appendix 3. The Outcome of H1. Repeated-Measures ANOVA in the Korean Merchant Fleet.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Period Group (I) | Period Group (J) | Mean Difference(I-J) | Std. Error | Sig.\* | 95% Confidence Interval | | | Lower Bound | Upper Bound | | p1 | p2 | 10.625 | 8.343 | 1.000 | -19.71 | 40.96 | | P1 | P3 | 19.375 | 5.278 | 0.048 | 0.19 | 38.56 | | p1 | p4 | 16.250 | 8.641 | 0.613 | -15.17 | 47.67 | | p2 | p3 | 8.750 | 8.362 | 1.000 | -21.65 | 39.15 | | p2 | p4 | 5.625 | 6.590 | 1.000 | -18.33 | 29.58 | | p3 | p4 | -3.125 | 7.120 | 1.000 | -29.01 | 22.76 | | 1One tailed test: \*p > 0.025 | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Table Appendix 4. The Outcome of H2, Paired Samples Test for Korean Merchant and Fishing Fleet.*   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Paired Samples | | Paired Differences | | | | | t | df | Sig.  (2-tailed) | | Mean (%) | Std. Deviation | Std. Error Mean | 95% Confidence Interval | | | Lower | Upper | | p2-on-p1 |  | -32.95 | 11.88 | 4.20 | -42.88 | -23.02 | -7.847 | 7 | 0.000\*\*\* | | p3-on-p1 |  | -62.50 | 33.50 | 11.84 | -90.51 | -34.50 | -5.277 | 7 | 0.001\*\* | | p4-on-p1 |  | -185.58 | 48.18 | 17.03 | -225.86 | -145.30 | -10.895 | 7 | 0.000\*\*\* | | 1One-tailed test: \*\* p < 0.025, \*\*\*p ≤ .000 | | | | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Table Appendix 5****. The Outcome of H3, Paired Samples Test for Korean and World Merchant Fleet.*   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Paired Samples | | Paired Differences | | | | | t | df | Sig.  (2-tailed) | | Mean (%) | Std. Deviation | Std. Error Mean | 95% Confidence Interval | | | Lower | Upper | | p3-on-p2 |  | 19.08 | 20.91 | 7.40 | 1.59 | 37.56 | 2.580 | 7 | 0.036\* | | p4-on-p2 |  | 91.10 | 26.89 | 9.51 | 68.62 | 113.58 | 9.581 | 7 | 0.000\*\*\* | | \*p < .05, \*\*\*p < .000 | | | | | | | | | | |