



Climate Change: An Exploratory Analysis in Philippines Maritime Industry Operations

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ABSTRACT

This study aimed to explore the impact of climate change to maritime industry in the Philippines. An exploratory-descriptive analysis was used in this study. A total of 100 sample size of data were utilized on each identified variables from year 2019 to 2023 through data mining. Quota sampling method was utilized in this study. The study was conducted at the School of Maritime Education, Biliran Province State University – Naval campus (11°28'30" North & 124°28'08" East) from January to April 2024. Correlation regression analysis was applied, and the results revealed after fitting the model, Ho was rejected at 0.05 level of significance. It has been tested that there was a strong regression relationship between climate change and employment. The above model, rainfall and typhoons have a direct severe impact to asset, property & equipment, accidents, employment, stockholders' equity, and employment, while temperatures have minimal impact towards Philippines maritime industry operation.

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1. Introduction.

The Philippines was already reeling under the impact of climate change. The effects of this climate change-stronger typhoons, rising sea levels, and corresponding effects on assets, property and equipment, accident, employment and stocks. Most likely, the country's economy and the environment are not inescapable. This is projected to continue and worsen, unless effective steps for mitigation and adaptation are not implemented immediately.

According to Taraz et al. (2021) when the climate accelerates, the frequency of extreme weather conditions will also increase. Most likely, increasing of the earth's average atmospheric temperature, rainfalls, typhoon, floods, and sea level rise causes corresponding changes in climate and that may result from loss of assets, property & equipment, sea accident, employment, and stockholders' equity.

Though climate change has various serious effects in all over the world, study shows according to Canlas (2014) that

the Philippines, mean temperature rise between 0.9° C to 1.4° C in 2020 and between 1.7° C to 2.4° C in 2050. This resulted to drier and wetter in some parts of the area in the country.

In line to this, the study assessed the vulnerable impact of climate change to maritime industry in the Philippines. Findings provides baseline data through developing programs or projects addressing the gaps, issues and concerns relevant to maritime industry.

2. Statement of the Problem.

The study aimed to explore the impact of climate change in Philippines maritime industry, Biliran Province State University, Naval Biliran, Philippines from January to April 2024.

Specifically, it sought to answer on what was the impact of climate change to Philippines maritime industry operations (assets, property & equipment, and sea accident).

3. Methodology.

3.1. Research Design.

This study applied exploratory-descriptive research design since the researcher begun an investigation and wishes to ex-

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plain the status of climate change to the maritime industry operations.

3.2. Locale of the Study.

This study conducted at Biliran Province State University – Naval, Biliran, Philippines (11° 28'30" N, 124° 28' 08" E) from January to April 2024.

3.3. Sample Size.

There were 100 sample size of data from each variable were used to give substantial reliability of the study.

3.4. Sampling Technique.

Quota sampling technique was utilized since it was a larger data taken on identified variables from 2019 to 2023.

3.5. Research Instrument.

The instrument used in this study was exploratory research instrument about the impact of climate change to Philippine maritime industry operations.

3.6. Data Gathering Procedures.

The researcher prepared and sent letter request to the Director of Climate Adaptation, Mitigation, & Disaster Risk Reduction of Biliran Province State University, Philippines to conduct this study. After the approval letter, the researcher immediately gathered the data through data mining. The data gathered between 2nd week and 3rd week of March 2024.

3.7. Data Analysis.

The RStudio software was used to analyze the data from 2019 to 2023 on the identified variables (*constant and predictors*) through correlational regression analysis.

4. Results.

Impact of climate change to Philippines maritime industry operations (*assets, property & equipment, and ship accident, employment, and stockholders' equity*).

Table 1: Climate change versus asset.

Variables	Coefficient	SE Coefficient	T-Value	P-Value
Constant	-0.000	0.168	-0.00	1.000
Temp 1	0.052	0.211	0.25	0.808
Rainfall	-0.187	0.220	-0.85	0.403
Typhoon	-0.657	0.204	-3.23	0.004

$$\text{assets}_1 = -0.000 + 0.052 \text{ temp}_1 - 0.187 \text{ rainfall}_1 - 0.657 \text{ typhoon}_1$$

Source: Authors.

Table 1 shows the climate change versus assets. The assets were highly affected by typhoon with 65.7%. This implies that an increasing number of typhoons hit in the area would also increases the number of damages on the assets in maritime industry operation. According to Campiglio, E., Monnin, P., & von

Jagow, A. (2019), that climate-related events such as hurricanes and droughts – i.e., physical risks – already have a negative impact on both equity and debt instruments through lower payoffs and higher non-performing loans.

Table 2: Climate change versus property & equipment.

Variables	Coefficient	SE Coefficient	T-Value	P-Value
Constant	-0.000	0.171	-0.00	1.000
Temp 1	0.053	0.214	0.25	0.806
rainfall	-0.174	0.223	-0.78	0.444
typhoon	-0.634	0.207	-3.07	0.005

$$\text{Property \& equipment}_1 = -0.000 + 0.053 \text{ temp}_1 - 0.174 \text{ rainfall}_1 - 0.634 \text{ typhoon}_1$$

Source: Authors.

Table 2 stated the climate change versus property and equipment. The property & equipment are highly affected by typhoons ranging to 63.4%. This implies that an increasing number of typhoons hit in the area would also increase the damage on the property & equipment in the maritime sector due to climate change. The claim supported that European Union vessels declined by about 9% (10,000) vessels were at risk from damage to property and infrastructure from multiple direct impacts due to sea level and increasing storm level (Daw et al., 2009).

Table 3: Climate change to ship accident.

Variables	Coefficient	SE Coefficient	T-Value	P-Value
Constant	-0.000	0.171	-0.00	1.000
Temp 1	0.053	0.214	0.25	0.806
rainfall	-0.174	0.223	-0.78	0.444
typhoon	-0.634	0.207	-3.07	0.005

$$\text{Ship accident}_1 = -0.000 + 0.053 \text{ temp}_1 - 0.174 \text{ rainfall}_1 - 0.634 \text{ typhoon}_1$$

Source: Authors.

Table 3 mentioned climate change versus ship accident. The ship accident was low affected by typhoons, ranging to 48.4%. This implies that only 48 or less the ship accident happened per 100 number of typhoons hit in the area based on the data from 2019 to 2023 in the maritime industry operation. The record shows that most ships capsizing incidents happened in the Philippines waterways were due to typhoon occurrences (Sigua & Aguilar, 2003).

Table 4: Impact of climate change to employment.

Variables	Coefficient	SE Coefficient	T-Value	P-Value
Constant	0.000	0.147	0.00	1.000
Temp 1	-0.154	0.184	-0.84	0.411
Rainfall 1	0.246	0.192	1.28	0.215
Typhoon	0.821	0.178	4.61	0.000

$$\text{employment}_1 = 0.000 - 0.154 \text{ temp}_1 + 0.246 \text{ rainfall}_1 + 0.821 \text{ typhoon}_1$$

Source: Authors.

Table 4 emphasized on climate change versus employment. The employment was very much affected by typhoons, ranging to 82.1%. This implies that the increasing number of typhoons hit in the area would also increase the number affected when it comes to employment in maritime industry operation.

Table 5: Impact of climate change to stockholders' equity.

Variables	Coefficient	SE Coefficient	T-Value	P-Value
Constant	-0.000	0.178	-0.00	1.000
Temp_1	0.049	0.223	0.22	0.829
Rainfall_1	-0.155	0.232	-0.67	0.511
Typhoon_1	-0.572	0.215	-2.66	0.014

$$\text{Stockholders_1} = -0.000 + 0.049 \text{ temp_1} - 0.155 \text{ rainfall_1} - 0.572 \text{ typhoon_1}$$

Source: Authors.

Table 5 reflected the climate change versus stockholder's equity. The stockholders' equity was moderately affected by typhoon. This implies that increasing number of typhoons hit in the area, the stockholder's equity also becomes low in maritime industry operation by 57.2%. Evans (1981) stated that due to typhoon, stockholder's equity was low and bank borrowing was high.

Conclusions and Recommendations.

Conclusion.

After fitted the model, H_0 was rejected at 0.05 level of significance. Therefore, there was a strong correlational regression relationship between climate change and employment. The above model, rainfall and typhoons observed highly direct impact to asset, property & equipment, accidents, employment, stockholders' equity, and employment, while temperature revealed minimal impact towards the Philippines maritime industry operations.

Recommendation.

- The Maritime Higher Education Institutions (MHEIs) helps the Philippine government crafting the specific plan / pro-

gram to address the climate change in relations to maritime industry operation.

- The plan / program must be assessed, evaluated validated, and implemented for better outcomes.

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