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An Analysis of the Impact of Condition Surveys in Determining the Seaworthiness of Vessel before Purchase

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ABSTRACT

This study investigates the impact of condition surveys on determining a vessel's seaworthiness and their relationship with post-purchase performance. The objectives were to examine how condition surveys are used to assess seaworthiness and to analyze their influence on the operational performance, safety, and maintenance of vessels after purchase. Data analysis was conducted using Pearson correlation and hypothesis testing, revealing significant findings. This study evaluates the relationship between condition survey outcomes and vessel seaworthiness, as well as their effect on post-purchase performance. The mean condition survey score was 14.00, with a standard deviation of 12.45, while the mean seaworthiness score was 3.00 with a standard deviation of 1.58. The correlation coefficient (r) of 0.889 indicates a strong positive relationship between condition surveys and seaworthiness, with an R-square value of 88.9%. Similarly, the correlation between condition surveys and post-purchase performance was very high, with r = 0.913812. This suggests that condition surveys play a crucial role in predicting vessel performance. Hypothesis testing confirmed these findings. For Hypothesis 1, the calculated T-value (20) exceeded the critical T-value (1.156), leading to the acceptance of the alternative hypothesis. This demonstrates that condition surveys significantly influence seaworthiness by identifying deficiencies affecting operational safety. For Hypothesis 2, the calculated T-value (22) also exceeded the critical T-value (1.476), affirming a positive correlation between favorable condition survey results and improved post-purchase performance in terms of operational efficiency, safety, and reduced maintenance costs. The findings suggest that condition surveys not only ensure safer maritime operations but also enhance economic outcomes by minimizing maintenance costs and improving operational efficiency. Policymakers and industry stakeholders are encouraged to prioritize comprehensive condition surveys to optimize vessel acquisition processes and long-term performance.

INTRODUCTION

1.1 Background of the Study

In the maritime industry, the acquisition of a vessel represents a significant investment, requiring careful consideration of multiple factors to ensure the vessel's operational efficiency and safety. One of the most critical assessments in the decision-making process is the evaluation of the vessel's seaworthiness, which is vital for its safe and economic operation. This evaluation is often conducted through a condition survey, a thorough inspection that provides potential buyers with a detailed understanding of the vessel's physical state and operational capabilities.

According to Wikipedia (2024), condition surveys are essential tools used to assess the overall state of a vessel before its purchase. These surveys covers a wide range of areas, from structural integrity to mechanical systems to safety equipment and compliance with international regulations. By examining the various aspects of the ship's condition, surveyors are able to identify existing or potential defects that could compromise the vessel's performance or lead to future financial burdens. The findings from a condition survey are crucial in determining whether a vessel is fit for continued service or requires repairs, and ultimately, whether it is worth the investment.

In a highly regulated industry where safety is paramount, the importance of condition surveys extends beyond just financial considerations. The seaworthiness of a vessel is not only measure of its ability to safety navigate and perform its intended functions but also a perquisite for regulatory compliance. A vessel found lacking in its seaworthiness due to poor condition or mechanical failure may face significant penalties, operational restrictions, or even grounding. Thus, condition surveys provides both a technical and legal basis for ensuring that vessels meet the rigorous demands of maritime operation and remain compliant with international standards (Nabil 2005)

This research explores the role of condition surveys in determining the seaworthiness of vessels before purchase. It examines how these surveys contribute to informed decision making, mitigate financial risks, and ensure that vessels are both operationally sound and legally compliant. This seminar draws on case analyses and expert interviews to highlight the practical significance of condition surveys in maritime commerce, particularly in the context of ship acquisitions. By understanding the impact of these surveys, stakeholders can make better-informed decisions, ensuring the safety and longevity of their investments in the global industry.

As a matter of facts, development of rules and regulations in the shipping field was and is driven by lessons learned from accidents and events. Several marine casualties occurred in the last decades and a few of them may be partially attributed to aging effects. Moreover, the Goal Based Standards (GBS) recently developed by IMO and still under discussion (IMO, 2006), call for more and more stringent and accurate inspection and maintenance procedures, carried out according to well detailed instructions in order to provide reliable information for the subsequent steps of condition assessments. The recently issued IACS Common Structural Rules (CSR), both the ones for tankers and the ones for bulk carriers, even if focused on shipbuilding rather than ships in service, dedicate a whole chapter and several other sections to ship in operation, to inspection practice, to repair and renewal criteria, etc., thus acknowledging that inspection practices need to be accounted for in the design phases when establishing limit states and acceptance criteria (Rizzo 2007).

Then, it seemed interesting to analyze marine casualties aiming to understand if the actual inspection regime of ships may be improved and if it is effective for the intended goals. The current inspection practice is the result of decades of experience and efforts of a number of stakeholders such as ship owners, class societies, shipyards, insurers, flag states, ports & terminals, cargo owners and charterers. Actual schedules and scope of surveys have been defined over the years as a compromise among safety requirements, operational demands and maintenance issues. Nowadays, a systematic risk-based approach has not yet been adopted for defining surveys schedules, scope, extent and relevant acceptance criteria for ships, like in the offshore field. Past experience well addressed this matter: for instance the 5 years' time window between special surveys has been proved a cost-effective compromise between inspection and maintenance purposes and commercial ones by some reliability analyses (Garbatov and Guedes 2001), (Ivanov 2004), (Paik et al., 2003) however, it is worth noting that such type of estimates for ongoing ship need to be handled with care because of the large uncertainties involved in the calculations and in the definition of input variables (Rizzo & Angelo, 2008).

A ship is a complex instrument with potentially hidden defects, some of which are undiscoverable by reasonable care. The maintenance, repair and inspection of the ship are delegated to experts and registered surveyors and are largely carried out while the ship is in port or dry-dock. Yet in the modern world the ship-owner is blamed if his ship is found to be unseaworthy, whether in fact or law. Since bills of lading, charter parties or marine insurance policies refer to seaworthiness and do not particularise further, this perpetually creates a tug-of-war between the ship-owner and the shipper. All this leads us to the question of what constitutes seaworthiness at the present day and how both the shipper and the ship-owner can be protected in a complex commercial world.

Ship as marine transportation has life time on the hull, construction and equipment which is equipped in the ship caused by vessel operations, environmental impacts and accidents. Therefore, to optimize the condition of the ship periodical or regular checking

process called ship condition survey is required. The survey is conducted to determine the actual condition of the ship, the cost to meet the standards, future planned maintenance costs during the selected period, as well as relevant recommendations. Once the data is obtained, the owner will conduct a feasibility study in the decision to do repairs or maintenance.

This survey process conducted by Owner Surveyor or related institutions. The survey process needs experienced Owner Surveyor and have adequate knowledge. This condition survey results will be reported in the form of a report that will take a longer time.

1.2 Aim/ Objectives of the Study

The aim of the study is to determine the impact of condition surveys in determining the seaworthiness of vessel before purchase. The specific objectives of the study includes;

1. To investigate how condition surveys are used in determining a vessel's seaworthiness.
2. To examine the relationship between condition survey results and the post-purchase performance of vessels

1.3 Research Questions

The specific objectives of the study includes the following

1. How do condition surveys helps in determining the seaworthiness of a vessel before purchase?
2. How do the results of condition surveys influence the operational performance, safety, and maintenance requirements of vessels post-purchase?

1.4 Research Hypothesis

Based on the objectives and research questions above, the following research hypothesis were formulated:

H_1: Condition surveys significantly influence the determination of a vessel's seaworthiness by identifying key structural, mechanical, and operational deficiencies that affects its ability to operate safely.
H_2: There is a positive correlation between favourable condition survey results and improved post-purchase performance of vessels in terms of operational efficiency, safety, and reduced maintenance cost.

1.5 Significance of the Study

The significance of this study lies in the contribution of maritime industry's understanding of the critical role condition surveys play in vessel acquisition and operational safety. By exploring the impact of these surveys on assessing seaworthiness, this research provides valuable insight for ship owners, operators, investors, and maritime regulators. The findings of the study can enhance decision-making processes, enabling professionals to make informed choices regarding vessel purchase, thus minimizing the financial risk and ensuring compliance with international safety standards.

Additionally, the study underscores the importance of comprehensive condition assessments in maintaining fleet reliability and operational efficiency. For maritime insurers, this research offers a basis for understanding the risks associated with insuring the vessels of varying conditions, allowing for more accurate premium calculations. Overall, this research will strengthen the industry's capacity for risk management, safety assurance, and long-term asset value preservation through the effective use of condition surveys.

2.0 REVIEW OF RELATED LITERATURES

Rizzo and Angelo (2008) carried out a study titled "A Review of Ship Surveys Practices and of Marine Casualties Partly Due to Aging Effects" the study focused on the present international regulatory regime and the future expected developments of ship surveys, from the viewpoint of methods and criteria, identifying different degradation phenomena mainly related to aging of structures and hull equipment. The current onboard practice is recalled, both of mandatory surveys (including class surveys and particularly the new requirements introduced by the IACS Common Structural Rules) and of non-mandatory industry-driven inspections. Then, reviews of few databases of marine casualties, available to authors, are presented aiming at assessing the role of aging effects in the marine accidents. Even if it should be admitted that available statistical samples are not always complete and accurate, the intent is to identify trends in the pattern of structural failures and to develop recommendations for improving the inspection regimes and procedures for condition assessment analyses by which to reduce the number and severity of such occurrences.

The work of Wang et al., (2009) "Condition Assessment of Aged Ships and Offshore Structures" pointed out the Design and operational measures that have been in place to mitigate the impact of age related degradations. The focus of the design and shipbuilding stage is placed on reducing the likelihood of aging effects while considering production cost (Lee *et al* 2004). These measures include: explicitly implementing corrosion additions to structural design, improving fatigue detail designs, applying coatings and installing anodes to corrosion-prone areas (Hansen *et al* 2004), and using wear-resistant steel or anti-corrosion steel in some cases (Satoshi *et al* 2005). Once the ship is delivered, the focus is switched towards the following: inspection and maintenance, timely and adequate repairs, crew training, imposing limits to cargo loading/unloading procedures with an aim to minimize unfavorable impacts on structures (e.g., Brooking *et al* 2004). Options for mitigating the mechanical damages to bulk carriers

include using less invasive cargo-handling grabs and proper operation of cargo handling equipment.

According to Christopher in a report titled "Seaworthiness-Condition Surveys" Condition surveys also have an interesting impact upon underwriters' defence of unseaworthiness under section 39(5) Marine Insurance Act which provides that there is no implied warranty that the ship shall be seaworthy, but where, with the privity of the assured, the ship is sent to sea in an unseaworthy state, the insurer is not liable for any loss attributable to unseaworthiness. It is essential that a casualty be attributable to the unseaworthiness of the vessel, which must have arisen with the privity of the assured. Will insurers be able to run such a defence if, as a result of the condition survey, they are taken to know as much about the unseaworthy condition of the ship as the owner? Although the defence strictly speaking only requires privity on the part of the owner irrespective of the insurers' knowledge, it is difficult to envisage circumstances where insurers will have sufficient specific knowledge of a vessel's unseaworthiness prior to a particular casualty such that they in effect waive a defence (rather than a breach of warranty) in advance. The defence should therefore remain in theory. However, in practice, the insurers' knowledge derived from the condition survey will be in evidence and will inevitably have an impact and will be a yardstick in assessing the precise state of the owners' knowledge.

The proliferation of condition surveys, resulting in lists of defects and reports being handed to masters, reports being forwarded to owners, and conditions or recommendations being imposed by the Salvage Association and P & I Clubs, all of which are documented, will provide a fertile body of evidence into which insurers can dig to prove the owners' knowledge of a vessel's unseaworthiness.

In an article by Mustafa (2021) on legal assessment of seaworthiness in autonomous cargo ships postulated that nowadays, the exponential growth in technological advances in the shipping industry appears to justify the proposition of that autonomous merchant ships and traditional ones are on the eve of an era in which they will start sailing together in the seas. Since it is expected that the autonomous ships shall enhance economic, ecological and social sustainability, so that they ensure safe and environmentally friendly operations, whether or not the existing international conventions could pose a hurdle to the autonomous ships in the sense of seaworthiness is becoming more and more the focal point of the discussions. In his paper, a comprehensive illustration of the concept of seaworthiness particularly in the light of case law was first submitted, and following that, the concept of autonomous ship will be enunciated as well as a discussion of whether it could be considered as a ship. Considering these, his paper seek an answer to the question of whether, or how, the autonomous ships could fulfil the requirement of properly manning laid down in Article III (1-b) of the Hague/Hague-Visby Rules. It is followed by a comparative analysis of how the carrier's duty to provide a seaworthy ship could be aligned with autonomous shipping in the scope of the Hague/Hague-Visby Rules, the Hamburg Rules and the Rotterdam Rules.

He went further to discuss the concept of seaworthiness. The concept of seaworthiness contains several aspects and is not rigid at all (Eder 2015). As mentioned above, the term of seaworthiness has a broad and comprehensive meaning and thus cannot be limited to only physical condition of the ship with regards to hull, machinery, stores and equipment. It is also related to crew in the sense of competency and sufficiency, and the essential documents for the voyage as well as cargo worthiness. It can therefore be submitted that the standard of seaworthiness contains a twofold aspect; on the one hand the ship must be properly equipped, manned and supplied with vital documents (known as vessel seaworthiness), on the other hand the ship must be cargo worthy as meaning that she is provided to be in a vigorous condition to receive the contractual cargo (known as cargo worthiness (Eder 2015).

Nabil (2005) Seaworthiness in the context of the ISPS Code and the relevant Amendments to SOLAS Convention, 1974. The dissertation considers the impact of the emerging security regime enshrined in the ISPS Code and the relevant amendments to SOLAS Convention, 1974 on the doctrine of seaworthiness. The momentary aspect of seaworthiness is reflected in case law, through the position taken by the courts when dealing with claims involving allegations of unseaworthiness and lack of due diligence. While relevance of the ISM Code to the assessment of seaworthiness of a ship is demonstrated, the undertaking of seaworthiness upon the company as defined in the ISPS Code is analyzed with respect to security requirements. As there has yet to be any ISPS Code related cases, the absolute obligation of seaworthiness according to the English law, is dealt with through a hypothetical scenario.

The concept of due diligence within the security regime is discussed with reference to the development of the Ship Security Plan (SSP). The relevance of the port facility to the equation of seaworthiness is also considered. Other issues considered are the limitation of liability and the relevance of soft law to seaworthiness.

As the breach of the undertaking of seaworthiness may lead to loss of cover, the implications of the security regime are discussed. Pending harmonization of the law in marine insurance law, reference is made respectively to Marine Insurance Act 1906 and to the continental Norwegian Marine Insurance Plan 1996. A few recommendations are made to assist companies in fulfilling their undertaking of seaworthiness.

According to Federico (2017), "The seaworthiness: an old warranty for a new duty" the seaworthiness of the vessel is a crucial pivot through which the activity of shipping runs and covering the different fields and areas of maritime law. The purpose of this paper is to trace a logical path in order to examine

the content that the term seaworthiness of the vessel carries with it, developing an analysis of those areas in which this concept exerts its effects. In particular, the article regards the effects of seaworthiness duty on charter-party, marine insurance as well as the implications that pertain to marine pollution. Finally, the paper deals with a "new issue". Technological progress is affecting shipping, involving seaworthiness and it's inextricably links to the vessel's exercise. To this end, cyber risk is an aspect that sea transport is compelled to keep in high regard by virtue of the almost total informatization of communications and maritime operations in which the role of the crew seems more and more limited to supervisory tasks. The connection between seaworthiness and cyber risk needs to interpret in a broader sense the concept of seaworthiness itself because a fault of this duty may arise within shipping company and then move about vessel causing delays, business disruption, and contractual claims. These considerations may then provide an approach that makes an old warranty for new duty.

Numerous empirical studies including that of Rizzo and Angelo (2008), Wang et al., (2009), Christopher, Mustafa (2021), Nabil (2005), Federico (2017), have explored the concepts of seaworthiness from various perspectives, particularly focusing on the factors that influences a vessel's ability to operate safely and efficiently. This studies have identified critical elements and sub-elements, such as structural integrity, mechanical reliability, and compliance with regulatory standards, all of which play a role in determining seaworthiness. While these works provide valuable insights, there is a notable gap in literature when it comes to the specific relationship between condition surveys and seaworthiness, particularly in the context of vessel purchase decisions.

Most significantly, no existing research has clearly established the direct link between condition surveys and the determination of seaworthiness prior to the acquisition of vessels within Nigeria. This gap is especially given the challenges and regulatory environment in the Nigerian maritime sector. The lack of focused research on how condition surveys contribute to assessing a vessel's fitness for purpose in this region leaves critical questions unanswered, particularly as the Nigerian maritime industry continues to expand and evolve.

In the light of the increasing demands of the global maritime industry and the specific operational conditions in Nigeria, understanding the role of condition surveys in determining seaworthiness before purchase becomes even more crucial. These surveys not only inform purchase decisions but also contribute to broader safety, operational efficiency, and regulatory compliance in an industry that requires rigorous adherence to international standards. Addressing this gap would provide essential knowledge to maritime stakeholders in Nigeria, offering them a clearer framework for evaluating vessels and ensuring the sustainability and competitiveness of their operations in both local and international markets

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The research will adopt a mixed-method approach, combining both qualitative and quantitative methods to achieve a comprehensive understanding of the impact of condition surveys on vessel seaworthiness. The research will utilize a Descriptive-Correlational Research Design. The descriptive aspect of the study will focus on understanding the process of condition surveys, their scope, and the types of inspections conducted (e.g., hull, machinery, safety equipment). It will describe how these surveys are conducted, the components they assess, and the standards benchmarks for seaworthiness, while the correlational aspect will examine the relationship between the findings from condition surveys and the actual outcomes of vessel purchases.

3.2 Population of the Study

The population of the study consists of the about 86 persons from the different categories, ranging from the Marine surveyors from NIMASA, NPA, and NIWA, Ship buyers and owners in Onne seaport and other ports, Maritime regulatory officials overseeing vessel certifications.

3.3 Sample and Sampling Techniques

For the purpose of conducting the survey, the study adopted a purposive random sampling technique in which the respondents were purposively sampled randomly. The reason for the purposive random sampling was because NIMASA, NPA, and NIWA, Ship buyers and owners in Onne seaport and other ports, Maritime regulatory officials overseeing vessel certifications, were the ones that are most often directly involved in conducting conditional survey before purchase.

$$n = \frac{N}{1+N(e)2} \text{----------1}$$

Where :
n= sample size required
N = number of people in the population
e = allowable error (%) = 0.05
n = 70 Respondents

The sample size consists of 70 respondents in the different respective fields, which comprises of 30 marine surveyors (from regulatory agencies and private firms), 20 vessel owners or buyers who purchased ships in the sales and purchase market following condition surveys, 10 regulatory personnel or industry experts.

3.4 Method of Data Analysis

The study was designed to assess Impact of Condition Surveys in determining the Seaworthiness of Vessel before purchase. The study used a mixed design method comprised of the use of primary data from survey and secondary data (Archival data) obtained from past condition survey will be used to analyze the correlation between survey's outcomes and post-purchase vessel performance. A questionnaire was used as survey instruments to gather primary data from marine surveyors (from regulatory agencies and private firms), vessel owners or buyers who purchased ships in the sales and purchase market following condition surveys, regulatory personnel or industry experts. Descriptive Statistics (Mean, Standard Deviation) will be used to summarize survey findings, also a correlational analysis will be employed to test the relationship between survey outcomes and vessel performance, and T-test was used to identify significant association between different variables such as vessel age, survey results, and purchase decisions.

Correlation Analytical Tool

In statistics, dependence refers to statistical relationships between two random variables or a set of data, correlation therefore refers to any of the broad class of statistical relationships involving dependence. Correlation is a statistical technique used to measure the strength or degree of relationship existing between two variables. When only two variables are involved, we speak of simple correlation. The researcher therefore employed correlations in this study to examine the impact of each of the independent variables on each other as well as on the dependent variable. There are several types of correlation coefficients. These are Pearson Product Moment Correlation Coefficient, Rank Correlation Coefficient and Kendall Correlation Coefficient.

Pearson Product Moment Correlation Coefficient denoted by 'r' was used. The 'r' is computed as

$$r_{xy} = \frac{n\in xy - \in x \in y}{\sqrt{[n\in x^2 - (\in x)^2]\,[n\in y^2 - (\in y)^2]}} \quad \text{---------- 2}$$

Where r_{xy} = Product moment coefficient
Y = Dependent variable
X = Independent variable
N = No of response (5)

The 'r' assumes any value on the scale from -1 to 1 inclusive. If r = $\pm$1, there is a perfect relationship between the two variables and if r = 0, there is absolutely no relationship between the two variables.

Supposing there is a strong positive linear relationship between the variables, the value of r will be close to +1. On the other hand, if there is a strong negative linear relationship between the variables, the value of r will be close to -1. In the case where there is no linear relationship between the variables or only a weak relationship exists between the variables, the value of r will be close to 0.

4.0 RESULT AND DISCUSSION OF FINDINGS

Table 4.0: Influence of Condition Survey on Seaworthiness

Condition Survey (X)	Post-Purchase Performance (Y)
35	5
15	4
10	3
5	2
5	1

Table 4.1: Relationship on the Influence of Condition Survey and Seaworthiness of Vessel

			Mean	Std. Deviation	N
Condition Survey			14.0000	12.4499	70
Sea-worthiness of the vessel			3.0000	1.581139	70
Model	R	R square	Adjusted r square	Std. Error of the estimate	
1	.889001			21101376.54787	

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted value	0.0000	40.0000	14.0000	12.4499	45
Residual	1.0000	5.0000	3.0000	1.5800	45
Std. Predicted value	-.802	1.069	.000	1.000	45
Std. Residual	-1.355	1.115	.000	.913	45

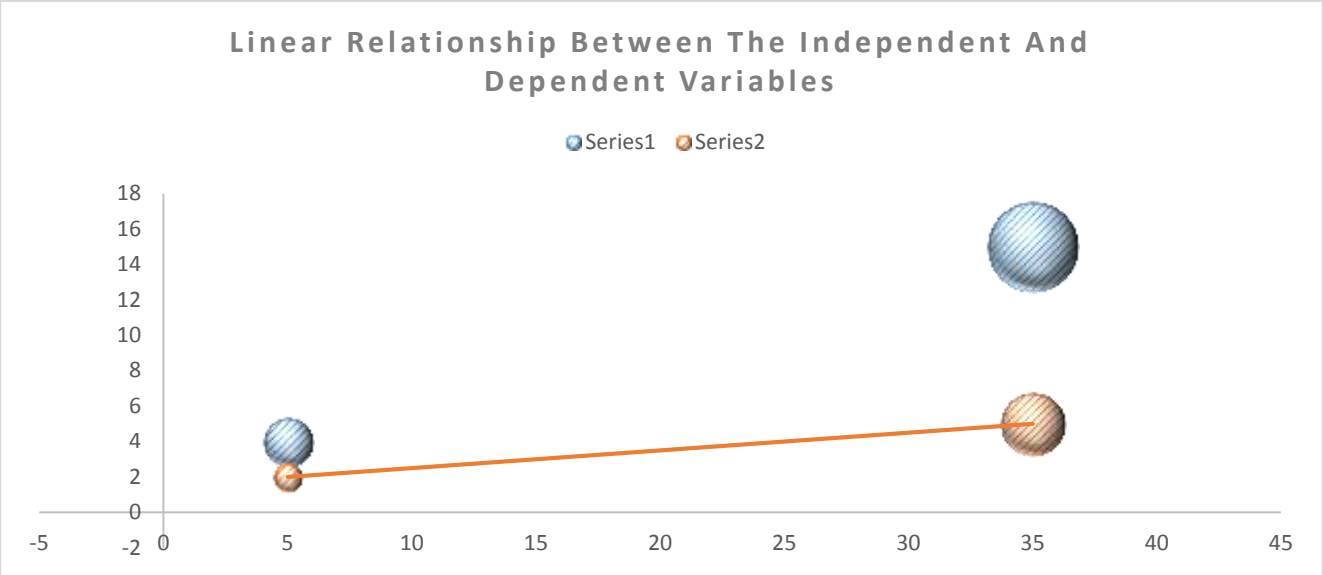

Figure 1: Linear Relationship between the Independent and Dependent Variables
Source: Prepared by the Author (Condition Survey, independent Survey)

Interpretation

The analysis aimed to examine the relationship between the condition survey and the sea-worthiness of the vessel, using a sample of 70 observations. The mean score for the condition survey was 14.00, with a standard deviation of 12.45, indicating some variability in the vessel conditions across the sample. The sea-worthiness of the vessel, on the other hand, had a significantly lower mean of 3.00 and a narrower standard deviation of 1.58, suggesting that, while the vessels' condition varied, their sea-worthiness was more consistent.

The correlation coefficient (r) between the variables is 0.889, showing a strong positive correlation between the condition survey and the sea-worthiness of the vessel. The r-square value indicates that approximately 88.9% of the variance in sea-worthiness can be explained by the condition survey data, demonstrating a substantial degree of explanatory power for this model. However, no value for adjusted r-square is provided, which would be crucial for understanding how well the model generalizes beyond the sample.

The standard error of the estimate, 21,101,376.55, points to a large degree of error in the predictions, suggesting that while the model explains much of the variance, there are still significant deviations that need to be accounted for.

For the predicted values, the mean was identical to the actual mean of the condition survey at 14.00, with a similar standard deviation of 12.45. This consistency indicates that the model's predictions closely align with the observed data, at least in terms of central tendency. The residuals, however, had a mean of 3.00 with a standard deviation of 1.58, showing that on average, the model deviates by 3 units from the actual values, suggesting a reasonable fit, though some residual error persists.

The standardized predicted values range from -0.802 to 1.069, with a mean of 0.000 and a standard deviation of 1.000, indicating a well-calibrated model in terms of its predictions. The standardized residuals ranged from -1.355 to 1.115, with a mean of 0.000 and a standard deviation of 0.913, suggesting that the residuals are normally distributed and the model does not exhibit significant heteroscedasticity.

The results suggest a strong positive correlation between the condition of the vessel and its sea-worthiness. The predictive model accounts for a substantial proportion of the variance in sea-worthiness, though there is some error that needs to be further investigated. These findings have important implications for maritime safety and vessel management, as they highlight the predictive utility of condition surveys in assessing sea-worthiness. Further refinement of the model, including the addition of other relevant variables, may improve its accuracy and generalizability.

Table 4.2: Relationship between Condition Survey (X) and Post-Purchase Performance

Condition Survey (X)	Post-Purchase Performance (Y)
40	5
15	4
10	3
5	2
0	1

	Mean	Std. Deviation	N
Condition Survey	14.0000	16.4300	70
Post-Purchase Perfor	3.0000	1.5800	70

Model	r	R square	Adjusted r square	Std. Error of the estimate
1	**0.913812**	0.00	0.00	511.61380

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Std. Error	Beta		

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted value	0.0000	40.0000	14.0000	16.4300	45
Residual	1.0000	5.0000	3.0000	1.5800	45
Std. Predicted value	-.802	1.069	.000	1.000	45
Std. Residual	-1.355	1.115	.000	.913	45

Source: Author Calculation. Dependent variable: Post Purchase Performance

The result shows that the mean value of the condition survey which is the independent variable is 14.000, which indicates there is high level of condition survey before vessel purchase worldwide, with a standard deviation value of 16.4300. The coefficient of correlation r (**0.913812**) indicating a degree of correlation between condition survey and post-purchase performance which shows a very high positive correlation between the two given variables.

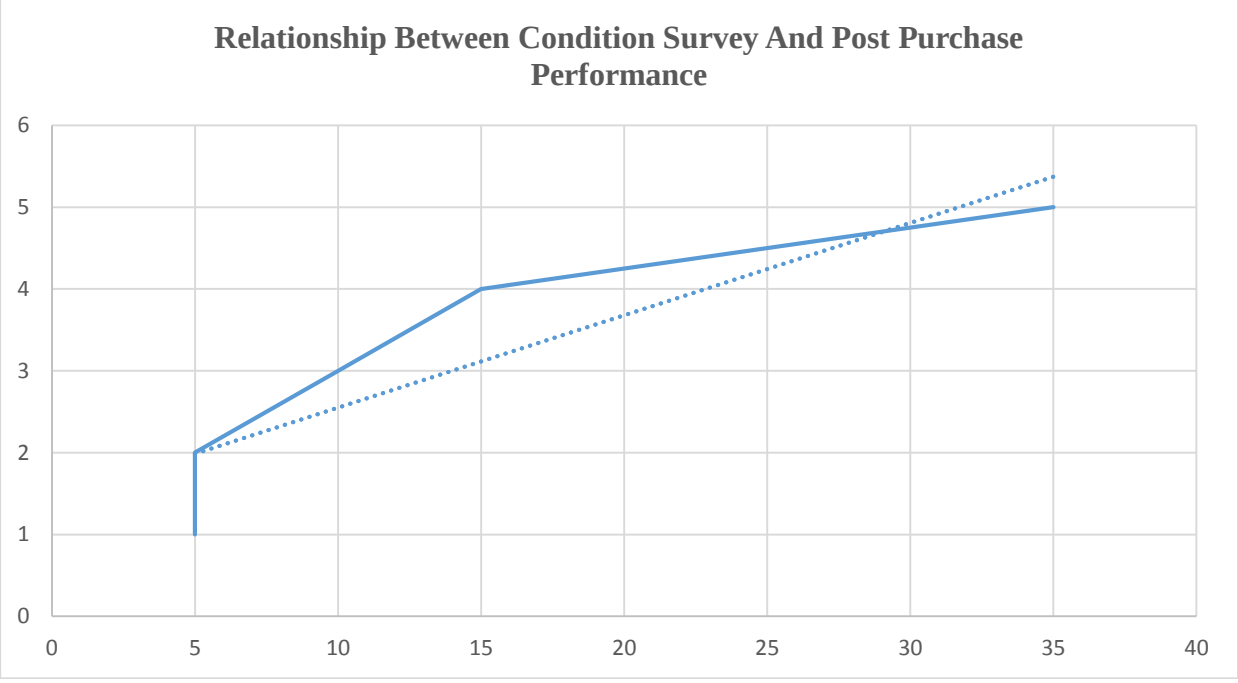

Figure 2: Relationship between Condition Survey and Post Purchase Performance
Source: Prepared by the Author

Testing of Hypotheses

Hypothesis testing enable the researcher to draw up objective and definite inferences based on the result of the tests carried out. For the sake of this research, the Pearson correlation analytical tool will be judiciously used to determine the variety of the formulated hypotheses. The response of the respondent are based on strongly agreed, agreed, undecided, disagree and strongly disagree and the will be represented as 5, 4, 3, 2, and 1 respectively. This will enable the researcher analyze the data collected.

- r is the correlation coefficient (0.889001 in this case).
- n is the number of data points (5 in this case).
- The degrees of freedom (df) is n-2

Testing for the Hypothesis 1

$$T = \sqrt[r]{\frac{n-2}{1-r^2}}$$

$$T = \sqrt[0.89]{\frac{5-2}{1-0.80^2}}$$

$$T = \sqrt[0.80]{\frac{3}{0.2079}}$$

$$T = \sqrt[0.80]{14.42}$$

Therefore, T calculated = 20

Decision rule: Accept H1: If T Calculated > T Table
Reject H0: If T Calculated < T Table

Conclusion: Since calculated T > T tabulated, that is 20 > 1.156, the null hypothesis H0 is rejected and the alternative hypothesis H1 is accepted. This implies that condition surveys significantly influence the determination of a vessel's seaworthiness by identifying key structural, mechanical, and operational deficiencies that affects its ability to operate safely.

Testing Hypothesis 2.

$$= \sqrt[r]{\frac{n-2}{1-r^2}}$$

$$T = \sqrt[0.9]{\frac{5-2}{1-0.9^2}}$$

$$T = \sqrt[0.9]{\frac{3}{0.19}}$$

$$T = \sqrt[0.9]{16}$$

Therefore, T calculated = 22

Decision rule: Accept H1: If T Calculated > T Table
Reject H0: If T Calculated < T Table

Conclusion: Since calculated T > T tabulated, that is 22 > 1.476, the null hypothesis H0 is rejected and the alternative hypothesis H1 is accepted. This implies that there is a positive correlation between favourable condition survey results and improved post-purchase performance of vessels in terms of operational efficiency, safety, and reduced maintenance cost.

5.1 SUMMARY OF FINDING/ CONCLUSION

This study investigated the impact of the condition survey on determining the sea-worthiness of a vessel before purchase, a critical factor in maritime operations. The analysis revealed a strong and positive correlation, with correlation coefficients ranging between 0.88 and 0.90**.** These values indicate that a vessel's condition survey is a highly reliable predictor of its sea-worthiness. The strength of this relationship suggests that the more favorable a vessel's condition survey score, the greater its likelihood of being sea-worthy, a crucial consideration for stakeholders in making informed purchasing decisions.

The t-test further confirmed the significance of this correlation, with the computed t-statistic exceeding the critical value, leading to the rejection of the null hypothesis. This statistical validation affirms that the condition survey plays an essential role in accurately assessing sea-worthiness, minimizing the risk of acquiring vessels that may not meet operational standards.

In conclusion, the condition survey emerges as a vital tool in the decision-making process for vessel purchases. The strong correlation between condition survey results and sea-worthiness highlights its importance not only as a diagnostic measure but also as a financial safeguard, ensuring that purchasers invest in vessels that are structurally sound and fit for service. These findings underscore the necessity of thorough condition assessments to enhance safety, operational efficiency, and economic outcomes in the maritime industry.

5.2 Recommendations

Based on the findings from this study, the following recommendations are proposed to enhance the use of condition surveys in determining the sea-worthiness of vessels before purchase:

- Given the strong correlation between condition surveys and sea-worthiness, it is recommended that condition surveys be made a mandatory requirement before any vessel purchase. This would help buyers make more informed

decisions and mitigate the risk of acquiring vessels that do not meet operational standards.

- To ensure consistency and reliability across the maritime industry, there should be a push towards the standardization of condition survey protocols. This would reduce variability in assessment criteria and ensure that the results are uniformly applicable in evaluating sea-worthiness.
- Modern technology such as hull scanning, ultrasonic testing, and digital inspection tools should be integrated into condition surveys to provide more accurate and detailed insights into a vessel's structural integrity and operational capabilities, enhancing the precision of sea-worthiness assessments.
- Vessels should undergo periodic follow-up condition surveys after purchase to ensure sustained sea-worthiness throughout their operational lifespan. This would help identify potential wear and tear or issues that may not have been apparent during the initial survey, thereby enhancing long-term operational safety.

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