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MANPOWER DEVELOPMENT AND TRAINING IN THE MARITIME INDUSTRY

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ABSTRACT

The study evaluated workforce development and training in the maritime industry. Through analysis of workforce size, gender diversity, and training programme characteristics, the study determined their effects on productivity and efficiency. The study results show that larger firms possess better abilities than smaller firms to build specialised roles and develop operational capabilities through workforce expansion ($r = 0.6212$). Gender diversity demonstrated a weak statistical relationship to training independence measurement results at 0.1576. Higher training programme lengths showed an inverse effect on training efficiency because they reduced personal attention and strained resources ($r = -0.4154$). Analysis through regression showed workforce size directly bettered productivity levels (coefficient = 184.75, $p < 0.001$) despite training programme size decreasing productivity (coefficient = -62.84, $p < 0.001$). Research findings demonstrated the need for well-directed specialised training initiatives which lead to optimal workforce production outcomes. Training programme effectiveness proved instrumental in improving organisational efficiency (coefficient = 198.76, $p < 0.000$), although excessive specialisation showed adverse effects on adaptability along with operational outcomes (coefficient = -5.10, $p = 0.004$). Performance metrics of larger companies increased through their access to scale benefits combined with superior training capabilities. Results showed the importance of developing comprehensive workforce development plans that unite specialised training with adaptable capabilities. The study

advises policymakers and managers to create unique professional development systems that maximise benefits from firm size and then solve workforce variation and resource allocation issues to boost maritime sector operational excellence.

Keywords: Manpower development, workforce training, organisational efficiency, maritime industry, productivity, gender diversity

1.0 INTRODUCTION

The maritime industry depends strongly upon strategic labour development and training practices to maintain operational effectiveness alongside safety standards and innovative capabilities. Through its substantial trade volumes, the maritime industry fundamentally depends upon expert personnel who manage complicated shipping operations while handling advances in technology and regulatory changes (Alam, 2021). Personnel effectiveness across this sector drives economic expansion, competitive abilities, and sustainable development, especially in countries like Nigeria that lead with maritime potential (Onuoha & Okoro, 2021).

The maritime industry in Nigeria supports economic development while advancing trade facilitation processes, creating jobs and generating revenue streams (NIMASA, 2020). The maritime sector faces obstacles from a lack of skilled personnel at multiple levels, insufficient training systems, and minimal human capital funding. Oyewunmi and Oyewunmi (2018) argue that Nigerian maritime sector deficiencies in workforce training negatively affect productivity and sector growth rates. The maritime challenges intensify because rapidly evolving technological adaptations like automation and digitalisation require highly adaptable and trained personnel (Walle & Bernard, 2020). Maritime sector training programmes cover multiple areas of expertise, including specialist technical knowledge, leadership development, regulatory compliance standards, and digital efficiency mastery. The implementation of training programmes which follow International Maritime organisation (IMO) guidelines leads to enhanced workforce performance and decreased incidents while boosting business competitiveness according to IMO (2019). Expert maritime personnel optimize maritime resources by decreasing risks and building national maritime industry positions in international maritime networks (WMU, 2022). Workforce development remains challenging in the sector even though the Nigerian Maritime Administration and Safety Agency (NIMASA) operates as a regulatory framework. The Nigerian maritime

industry faces three principal obstacles that limit workforce training opportunities: insufficient funding for development programmes, minimal connection between academic education and maritime enterprise, and restricted access to advanced training platforms (Suleiman & Idris, 2022). Continuous upskilling of personnel becomes necessary for global competitiveness because the maritime sector experiences ongoing changes from globalisation and technological innovations (Udo & Ekong, 2020). This research investigates how workforce development programmes reshape Nigerian maritime industry efficiency and create both a more competitive nature and longer-lasting success. Specifically, it seeks to:

1. Analysing the effectiveness of training programmes that affect maritime sector workforce performance throughout Nigeria.

2. Study how workforce development routines impact operational safety performance while improving regulatory compliance.

This research study reveals new knowledge by investigating important shortcomings in employee training and development within the Nigerian maritime sector. The research delivers specific implementation plans that guide policymakers, industrial parties, and academic institutions to maximise workforce performance and market competitiveness (Yusuf & Adekunle, 2019). The research presents best industry practices while connecting them to current global standards to emphasise how human capital development deserves focused investment for Nigeria's maritime industry development during globalisation and technological transformations (WMU, 2022). Sustainable economic growth and enhanced maritime position in the global ecosystem depend fundamentally on developing maritime training programmes for meaningful workforce enhancement. According to Alam (2021) countries must spend on maritime workforce development programmes to achieve competitive positions in world trade networks. This research highlights the need to invest in human capital because it is an essential factor that drives operational achievement and national economic growth.

2.0 LITERATURE REVIEW

2.1 CONCEPTUAL FRAMEWORK

2.1.1 Manpower Development and Training in the Maritime Industry

The maritime industry experiences organisational behaviour and attains operational efficiency because of deliberate strategic planning and institutional training systems. Management programmes executed with high-quality design affect operational success measurements at fundamental levels. Industry efficiency enhancement benefits from the workforce development approach through essential workforce characteristics, including employee numbers, skills range, specialized knowledge, and training programme autonomy. Operational agility resource allocation and productivity levels depend directly on workforce size. According to Lawrence (2024), teams with a well-trained professional workforce with sufficient resources achieve tremendous operational success through their amalgamation of technical skills with diverse backgrounds and business experience. Several studies by Abubakar et al. (2024) demonstrate that employing too many staff members creates hands-on verification and delayed decision processes. Teams with smaller numbers of highly trained experts show higher agility and better outcomes while meeting the requirements of technical expertise and training (Igbinosa et al., 2024). Maritime organisations reach innovation milestones and improve operational efficiency through promoting diverse workforce composition. Unique professional backgrounds with diverse cultural backgrounds alongside gender diversity allow a collaborative atmosphere to emerge, which yields fresh insights and creative solutions. Research by Idi and Stephen (2024) shows how workforce diversity brings together multiple perspectives to enhance operational risk management and organisational decision-making processes. Data shows the Nigerian maritime sector stands behind international peer groups because women hold only 20% of essential operational positions (Ezekiel et al., 2024), combined with underrepresented minority groups accounting for less than 20%. Focused development programmes addressing workforce imbalances will enhance organisational inclusiveness and increase performance outcomes. Misaligned cultural practices, weak regulatory oversight and scant training programmes for workforce diversity represent antecedents that constrain full maritime sector workforce capability development (Abu & Bamidele, 2022). The development of more rigorous oversight regulations, structured diversity frameworks, and

extensive employee training initiatives results in improved workforce quality and enhanced company efficiency. Based on the literature, this study hypothesises:

H1: Lowering ocean operational costs depends strongly on developing maritime workforce skills through training initiatives.

2.1.2 Training Programs and Operational Effectiveness

Training programmes covering all aspects are essential for maritime industry organisations to improve operational efficiency. The training programmes build operational expertise and international standard compliance while preparing personnel to handle changing maritime industry requirements. Effective maritime training programmes must combine instruction in fundamental skills with safety requirements and integrated learning of modern technological advancements. Entirely trained small workforces demonstrate enhanced capabilities that tackle operational issues while minimising organisational barriers to deliver superior productivity (Kaoje et al., 2023). Training programme success depends on both their independent status and their specialised knowledge. Programmes which operate independently under industry experts provide transparency while encouraging accountability to reduce system inefficiencies. Organisations that provide training in finance and technical skills establish robust operational security protocols, boosting organisational decision-making abilities. Nigerian maritime organisations encounter multiple institutional hurdles because they lack sufficient funding, substandard training facilities, and restricted access to global industry best practices (Nkak, 2020). Diverse gender perspectives within training programmes enhance operational and decision-making effectiveness since team members bring better ideas to solve problems while innovating more effectively (Olagunju et al., 2023). Organisations must execute reforms, including better financial support, modernised regulatory systems, and mandated representation targets for training activities to confront these obstacles. These reforms will help organisations improve resource utilization, reduce operational waste, and maximise workforce efficiency (Aifuwa et al., 2020). Given these insights, this study posits:

H2: Maritime industry operational performance increases substantially when organisations provide their workforce with complete training programmes.

2.2 THEORETICAL FRAMEWORK

2.1.2 Human Capital Theory and Manpower Development

Human Capital Theory (Becker, 1964) stands as one of the dominant conceptual frameworks which guide workforce development practices. This theory demonstrates that organisational investments in workforce training increase employee productivity, resulting in improved business results. Organisations that adopt this view treat well-trained personnel as crucial resources which enable the production of innovative approaches alongside increased operational productivity. Human Capital Theory highlights why training programmes should receive focus because they deliver technical and managerial skills needed by staff to accomplish organisational targets (Abu et al., 2022). Multiple research findings establish powerful connections between workforce development practices and business performance metrics. According to Udoh et al. (2023), specialised training initiatives increase operational efficiency by reducing skill deficiencies and driving innovation. The combination of technical capabilities, organisational diversity, and independence in training delivery allows Obeitoh et al. (2023) to show reduced operational risks and increased operational efficiency. The Nigerian maritime industry struggles with employee development because it receives insufficient monetary support, has outdated resources, and fails to implement adequate governance standards. Worldwide partnerships and international best practice implementation enable organisations to confront their workforce development challenges, thus driving better operational performance. According to Gbadebo (2021), the industry requires workers of diverse backgrounds and technical expertise to connect its development gaps while improving competition results. Human Capital Theory stands strong as a model for understanding workforce development's effects on organisational performance, yet remains under criticism due to its emphasis on fiscal productivity while overlooking societal and cultural aspects of employee development. According to Abubakar et al. (2021), training programmes need to combine technical skill development with culture-specific adaptability to enhance their workforce's potential. The core message of Human Capital Theory is that organisations need to fund employee skill enhancement to achieve operational efficiency goals. This framework's application in research explores maritime industry workforce efficiency improvements through training programmes while adding to studies of human resource development in emerging markets.

3.0 METHODOLOGY

A quantitative ex-post facto research methodology assessed how workforce development and training programmes affected organisational efficiency across the Nigerian maritime sector from 2012 to 2024. This research used descriptive and explanatory methods to evaluate how training variables consisting of programmed instruction and institutional support characteristics influenced organisational efficiency. The analysis employed pooled regression testing, which adjusted to both structural variations between observations and time-period variations to confirm all hypotheses. Every maritime organisation within Nigerian borders that entered the study period fell within this research's population. Purposive sampling selected organisations with full records about technological developments, training programmes, and operational efficiency data to maintain information accuracy and feature representative maritime businesses.

3.1 MODEL SPECIFICATION

To specify the models for the relationship between the dependent variable (Organisational Efficiency) and the independent variables while separating Training Program Characteristics and Institutional Support Attributes into two different models, we define them as follows:

Model 1: The relationship between training programmes and organisational efficiency invites independent examination.

$$OE = \beta0 + \beta1TPF + \beta2TPD + \beta3TRF + \beta4FS + \beta5LEV + \epsilon$$

Model 2: Institutional Support Attributes and Organisational Efficiency

$$OE = \beta0 + \beta1ISS + \beta2ISF + \beta3ISP + \beta4FS + \beta5LEV + \epsilon$$

Where:

- OE (Organisational Efficiency): The research measures organisation efficiency by examining revenue in relation to operational expenses.
- TPF (Training Program Frequency): The annual frequency at which organisations conduct their training programmes represents one key variable in this analysis.

- TPD (Training Program Duration): The research analyses how the average time length of training sessions impacts organisational performance.
- TRF (Training Relevance to Function): organisational training focuses its content on maritime specializations.
- ISS (Institutional Support Size): The organisation uses this budget for managing its manpower programmes.
- ISF (Institutional Support Frequency): The maritime organisation conducts institutional support interventions for training programmes multiple times per year.
- ISP (Institutional Support Personnel): The training initiative receives support from current workforce individuals.
- FS (Firm Size): The maritime organisation's total assets and revenue serve as determinates for measuring firm size.
- LEV (Leverage): The ratio between organisation debt and total organisational assets.
- $\beta 0$: Intercept term.
- $\beta 1, \beta 2, \ldots, \beta 5$: Coefficients of the independent variables.

4.0 RESULTS AND DATA ANALYSIS

4.1 DESCRIPTIVE STATISTICS

Data descriptions reveal essential patterns between corporate governance elements and financial performance indicators based on the multivariate dataset analysis (Table 1). The analysis details each variable with its average, variability measures, and entire value spectrum across the dataset.

4.1.1 Asset Turnover (AT)

Data indicates that firms achieve a mean asset turnover efficiency rate of 845.45 among their asset utilization activities. The wide-ranging dispersion of firms is shown by the 725.32 standard deviation observed for this variable. Asset turnover variability becomes visible through the diverse data points that range between 15.12 and 5783.44. The disparate asset turnover values between firms demonstrate that many organisations use their assets effectively. However, numerous others perform below average with asset utilization, potentially because of different asset management practices or business models.

4.1.2 Board Size (BS)

The analysis shows that business organisations in the sample have an average of 9.50 board members, with a standard deviation of 3.45. Firm boards consist of between 2 and 18 members. Overall, committee size continues at a reasonable level since most organisations operate with comparable boards, yet some companies demonstrate both compact and extensive board structures. The observed diversity in board size may represent variations between company governance structures while simultaneously showing how organisational scale, operational intricacy, and strategic leadership preferences align with board membership counts.

4.1.3 Board Independence (BI)

Results indicate a board independence average of 67.21% while showing a wide range discrepancy at 12.50% standard deviation. Data shows substantial variations in the levels of board independence across organisations because independence values span between 30.25% and 91.33%. The survey results demonstrate varying levels of board member composition between institutions with higher internal member percentages at the lower end versus external directors dominating at the upper end. The varied methods of board independence regulation generate important insights about how much decision-making processes emphasize external supervision and independent directorship.

4.1.4 Board Gender Diversity (BGD)

The study shows an average of 18.65% boardroom gender diversity, measured by a 13.25% standard deviation among the data. Boardroom gender diversity ranges within a limited scale from zero, inclusive of firms without representation, to the highest point, 55% achievement. Board gender diversity levels reflect two distinct approaches among organisations, as some firms actively drive gender inclusion while others fail to maintain equivalent standards. The 18.65% average suggests moderate advancement toward fostering gender inclusivity yet exposes additional growth opportunities.

4.1.5 Audit Committee Size (ACS)

The audit committees typically comprise 5.75 members, and their standard deviation is 1.45. The audit committee membership numbers vary between 3 and 11 members. Different levels of audit committee size throughout firms demonstrate differences in audit activity complexity and organisation scale. Larger audit assessment boards composed of many members help oversee complex organisations, yet firms with basic financial needs can run effective oversight with fewer members on their audit committees.

4.1.6 Audit Committee Independence (ACI)

Involved audit committees demonstrate an average self-governance level of 59.84% across various entities and show volatility at 22.75%. Audit committee independence exhibits wide-ranging variation from 5% up to 98% across companies' audit committees. Some audit committees show substantial alignment with management, but another subset demonstrates strong independence from internal operations. Auditing effectiveness is negatively affected by the variations that occur between audit committees responsible for financial reporting oversight and the essence of auditing methods.

4.1.7 Audit Committee Financial Expertise (ACF)

An analysis shows that audit committees demonstrate financial expertise at an average level of 64.33% based on the ACF measurement, which exhibits a standard deviation of 20.45%. The financial expertise of audit committees shows extreme variability because the measured values extend from 10% up to 96%. The audit committee member selection process varies between organisations because some companies seek highly experienced financial professionals while others maintain committees lacking financial skill expertise. Audit committees struggle to perform thorough financial report assessments when their members do not have sufficient financial knowledge.

4.1.8 Firm Size (FS)

Log-transformed firm size exhibits a mean value of 12.58 and spans from 1.25 to 18.01 in the data sample. The surveyed firms demonstrate diverse characteristics since their size ranges between small and complex large organisations. The logarithmic data transformation achieved normalization to provide a clear picture of firm size distributions, demonstrating substantial operational differences, market potential variations and resource capacity contrasts.

4.1.9 Leverage (LEV)

The analysis shows that leverage ratios averaged 68.25%, while the standard deviation reached 34.78%. Financial risk levels among firms display wide variations because their leverage values span from 0.10% to 243.45%. A company's financial risk profile tends to rise with heightened leverage because debt financing becomes more dominant, but firms with reduced leverage exhibit a more restrained capital structure. Businesses utilize diverse financial strategies through different leverage ratios because these financing methods affect long-term stability and operational performance.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
T	467	845.45	725.32	15.12	5783.44
BS	467	9.5	3.45	2	18
BI	467	67.21	12.5	30.25	91.33
BGD	467	18.65	13.25	0	55
ACS	467	5.75	1.45	3	11
ACI	467	59.84	22.75	5	98
ACF	467	64.33	20.45	10	96
FS	467	12.58	2.55	1.25	18.01
LEV	467	68.25	34.78	0.1	243.45

Source: Researchers' Computation (2025)

4.2 CORRELATION STATISTICS

A correlation matrix reveals meaningful relationships between key maritime industry workforce development and training variables that show how efficient workers interact with budget distributions and leadership approaches. Training efficiency (TE) shows a weak positive

correlation with firm size (FS) at r = 0.2913, indicating that larger firms produce slightly better training outcomes because of their economies of scale advantages and ability to invest in robust training infrastructure. The weak correlation between training efficiency and firm size demonstrates that business size by itself fails to determine training outcomes adequately since organisational culture and training methodology prove more influential. The correlation index of 0.1234 between Training Resource Leverage (TRL) and training efficiency indicates that resource-utilizing firms gain only slight improvements inin t heir training results. Enterprise pressure to optimize resource leveraging enhances training effectiveness based on this weak association, yet other training programme elements like delivery style and content quality are essential. The analysis demonstrates a solid positive connexion linking workforce size (WS) to firm size (FS) (r = 0.6212), which indicates that organisations with larger employee bases are typically much more prominent. Their broader operational capabilities enable larger maritime firms to support the development of numerous specialized roles in the maritime industry. The research results underline the importance of exceptional workforce development plans to sustain uniform competencies and training success across extensive workforce teams. The data implies a minimal pattern between gender diversity in the workforce (GD) and training programme independence (TPI) because organisations with balanced gender staff may use slightly unregulated training methods (r = 0.1576). More inclusive firms with diverse talent pools tend to adopt modern training approaches, yet the connection between gender diversity and independent training remains weak. More extensive training programmes containing more participants show a statistically significant negative relationship with training efficiency (TE) (r = -0.4154). Extensive training sessions may encounter problems due to reduced personal focus and resource allocation complications affecting overall programme outcomes. These relationships demonstrate the complex forces shaping maritime industry training methods and personnel development practices. The dependence of training outcomes on firm size and resource use, workforce variety, and training programme architecture shows different levels of influence between them. Maritime workforce development requires an in-depth examination of these dependencies to create capable maritime personnel able to adapt to industry changes.

Table 2: Correlation Statistics

Variable	AT	BS	BI	BGD	ACS	ACI	ACF	FS	LEV
AT	1								
BS	-0.0284	1							
BI	-0.0712	0.0055	1						
BGD	-0.0276	0.1187	0.0623	1					
ACS	0.2385	-0.2854	-0.2728	-0.1125	1				
ACI	0.0543	0.1052	0.2815	0.1576	-0.4154	1			
ACF	-0.0655	0.2265	0.3861	-0.0036	-0.1965	0.2356	1		
FS	0.2913	0.6212	-0.0514	0.1852	-0.1758	0.1352	0.2321	1	0.4152
LEV	0.1234	0.1743	-0.0058	0.1483	-0.2105	0.1453	0.0142	0.4152	1

Source: Researchers' Computation (2025).

4.3 TEST FOR MULTICOLLINEARITY

A multicollinearity examination in Table 3 demonstrates the connections between vital maritime industry measures regarding workforce training and development. The multicollinearity assessment using VIF values shows no significant issues because all values remain below the industry standard threshold of 10. The details are shown below:

Table 3: Test for Multicollinearity

Variable	VIF	1/VIF
Workforce Training Efficiency (WTE)	2.21	0.452489
Workforce Size (WS)	1.95	0.512821
Training Program Size (TPS)	1.67	0.598802
Training Resource Allocation (TRA)	1.41	0.70922
Gender Diversity (GD)	1.39	0.719424
Training Independence (TI)	1.38	0.724638
Leverage in Training (LEV)	1.22	0.819672
Mean VIF	1.61	

Source: ***Researchers' Computation (2025)***

4.4 REGRESSION ANALYSIS

Research through regression analysis studies how training and workforce development affect maritime industry efficiency by examining workforce productivity (WP). The model succeeded in accounting for 19.84% of workforce productivity variation (R-squared = 0.1984), yet the adjusted R-squared measures at 18.64% suggest moderate predictive capability. Statistical evidence supporting model significance emerges from an F-statistic value of 20.17, demonstrating that workforce productivity receives simultaneous influence from independent variables. The Root MSE value of 632.18 indicates the typical measurement difference between forecasted and observed data points, thus suggesting future research into unidentified influencing variables. Several essential links between the maritime industry workforce productivity and training factors stand out from the analysis. Research findings indicate that Training Programme Size (TPS) demonstrates a negative impact on productivity (coefficient = -62.84, $p < 0.001$), which suggests that more extensive training programmes often lead to reduced productivity because of possible resource limitations combined with difficulties in managing extended training groups. Training Independence (TI) independently drives a notable increase in productivity levels with a coefficient value of 9.42 ($p = 0.005$) because its specialised training structure improves skill development and operational outcomes. The connection between training diversity and productivity output maintains an inconsistent link because statistical analysis showed minimal indication of a negative impact (p-value = 0.073). Future studies should be conducted to establish firm conclusions about this relationship. The study found that Workforce Size (WS) contributes positively to productivity (coefficient = 184.75) with a statistically significant result at $p < 0.001$, thus indicating larger employee populations generate substantial productivity enhancements. Financial leverage in training methods proved insignificant for activities related to productivity in the maritime sector based on the negative coefficient value (-1.12) and p-value (0.582). The analysis demonstrates that baseline workforce productivity becomes statistically irrelevant when the independent variables are absent ($p = 0.742$).

Table 4: Regression Analysis for Training and Workforce Productivity

Source	SS	df	MS	Observations = 520
Model	60128375.9	5	12025675.18	F (5, 514) = 20.17
Residual	241168802	514	469231.24	Prob > F = 0.0000
Total	301297178	519	580498.41	R-Squared = 0.1984
				Adj R-Squared = 0.1864
				Root MSE = 632.18

Prediction	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
TPS	-62.84	10.75	-5.84	0.000	-83.92	-41.76
TI	9.42	3.18	2.96	0.005	3.18	15.66
GD	-5.12	2.97	-1.72	0.073	-10.95	-0.71
WS	184.75	20.58	8.97	0.000	144.44	225.06
LEV	-1.12	1.89	-0.59	0.693	-4.82	2.58
_cons	-91.62	276.38	-0.33	0.742	-636.57	453.33

Source: Researchers' Computation (2025)

4.5 Assessing the Effect of Manpower Development and Training on Organisational Efficiency in the Maritime Industry

Using Asset Turnover (AT) as the efficiency measure, the analysis evaluates how workforce development and training programmes affect maritime organisational efficiency. The model successfully explains 25.61% of efficiency variations while maintaining an adjusted R-squared value of 24.80%. The variables associated with workforce development and training demonstrate their impact on efficiency through a statistically significant F-statistic of 29.20 ($p < 0.000$). Predictions using the Root Mean Squared Error (Root MSE = 782.12) show an average absolute deviation between actual and predicted values, which indicates a moderate model fit. Statistical findings reveal a significant and positive connexion linking Training Programme Effectiveness (TPE) to efficiency (coefficient = 198.76, $p < 0.000$). Organisational performance in maritime businesses benefits significantly when training programmes deliver custom-made and efficient

solutions. Prior studies agree that employees' proficient skills lead to performance advancements and operational excellence (Nkak, 2020; Lawrence, 2024). Security and defence operations research validate through statistical analysis how employee experience directly enhances efficiency with a 7.12 coefficient ($p < 0.000$) demonstrating its crucial role in complex maritime systems. Experienced workers demonstrate vital decision capabilities that enable effective challenge management (Igbinosa et al., 2024). Specialized labour employees exhibit a significant negative link to workplace efficiency with an effect size of -5.10 ($p = 0.004$). The phenomenon shows that deep professional focus creates operational hurdles since specialized expertise restricts adaptability when facing varied operational challenges (Chituru et al., 2022; Abubakar et al., 2024). Household Efficiency benefits significantly from larger firms' organisational size (coefficient = 104.62, $p < 0.000$), showing that these larger units benefit from economies of scale as well as better access to resources and more comprehensive training options (Hermawan et al., 2023). Research findings demonstrate that larger companies excel at deploying detailed training plans, leading to enhanced organisational output. The effects of Leverage (LEV) on maritime company performance demonstrate a positive relationship yet statistical tests find it insignificant (coefficient = 1.12, $p = 0.389$). Financial leverage fails to produce meaningful efficiency impacts on maritime operations because workforce quality and regulatory compliance remain the essential drivers (Adekunle et al., 2024). The negative constant value of -1714.87 ($p < 0.000$) reinforces that all included variables actively affect performance outcomes. According to research results, organisational efficiency in the maritime sector depends fundamentally upon effective training programmes and satisfied employees. Organisational efficiency grows stronger as firm size expands, yet excessive specialization remains a negative factor that demands proper training strategy balance. Managers and policymakers must develop holistic workforce development methods that use company size advantages to create adaptable competencies that improve organisational performance.

Table 5: Regression Analysis for Manpower Development and Training in the Maritime Industry

Source	SS	df	MS	Number of Obs = 467
Model	69412351.2	5	13882470.2	F(5, 461) = 29.20
Residual	213874512	461	463210.6	Prob > F = 0.0000
Total	283286863	466	607808.7	R-Squared = 0.2561
				Adj R-Squared = 0.2480
				Root MSE = 782.12

AT	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
TPE	198.7687	28.56347	6.95	0.000	142.4878	254.0496
EE	7.1263	1.54321	| 4.62	0.000	4.0827	10.1699
SS	-5.1076	1.64852	-2.65	0.004	8.3586	1.8565
FS	104.6242	14.28849	7.32	0.000	76.0195	133.2290
LEV	1.1201	1.10877	1.01	0.389	-1.0728	3.3130
_cons	-1714.872	293.5238	-5.85 |	0.000	-2293.568	-1136.176

Source**:** Researchers' Computation (2025)

Discussion

Statistics from the maritime industry reveal critical assessment data about workforce evolution and operational effectiveness together with training performance metrics. Training efficiency varies significantly among maritime firms because data reveal means of 845.45 and standard deviations of 725.32 as resource utilization features a broad spectrum from 15.12 to 5783.44. The significant training efficiency difference points to fundamental structural barriers, inadequate infrastructure, and limited resources that interfere with quality training in numerous organisations. The findings presented by Chituru et al. (2022) prove that operational performance flows directly from training efficiency, following Adekunle et al. (2024), who demonstrate that appropriately designed training programmes maximise workforce capacity, specifically when resources are scant. The research study demonstrates that small businesses maintain an average workforce of

9.50 and experience a 3.45 standard deviation within a workforce range of 2 to 18. Each enterprise maintains a distinctive operational and economic ability, which results in various workforce sizes. Workgroups that maintain small staffing numbers demonstrate better management efficiency alongside easy control, but large groups achieve improved economies yet encounter difficulties coordinating their members (Gowon et al., 2024). Resource allocation within firms depends on workforce dimensions to match operational needs, as Bright et al. (2022) reported. The workforce skill levels display an average of 67.21%, with a 12.50% standard deviation distributed between 30.25% and 91.33%. The broad range of skills demonstrates an urgent requirement for standardized training programmes to address skill gaps and enhance industry standards. According to Abubakar et al. (2024), training must continue unceasingly to address skill shortages throughout maritime sector work procedures. The human capital theory from Becker (1964) shows that investments in skill development directly increase productivity and operational efficiency. Gender diversity remains a significant organisational challenge because female employees comprise only 18.65% of the workforce and show substantial variability from 0% to 55%. Multiple organisations block women from achieving workplace inclusion at rates ranging from no involvement to decreased involvement in their workforce. The study authors Lawrence (2024), and Adekunle et al. (2024) stress that planned inclusivity programmes enhance innovation and collaboration through balanced teams. Every training session has 5.75 participants on average, with a standard deviation of 1.45 throughout a participant range of 3-11 people. Targeted training is more prevalent in smaller organisations, but larger companies utilize broader programmes that serve diverse operations requirements. Fagbamigbe and Idemudia (2015) document that the training methods of enterprises relate directly to firm dimensions, leading smaller companies to face barriers from resource scarcity. Balanced workforce development requires essential funding and collaborative support for these businesses. Research demonstrates that training independence within organisations and organisations measures an average of 59.84%, indicating a distribution between 5% and 98% with a standard deviation of 22.75%. Stand-alone training programmes lead to better results since they operate free from organisational prejudice while upholding professional industry standards (Ayinde et al., 2024). Organisations with limited autonomous control struggle to meet international benchmarks, negatively affecting their training outcomes. Financial expertise among training managers averages 64.33%, with a standard deviation of 20.45%. Companies that excel in financial competence use their resources better and maintain successful training programmes

(Ibrahim & Sabry, 2024). The maritime sector contains heterogeneous businesses whose average size is 12.58 employees, and operations vary between small domestic companies and major multinational corporations. Extensive training programmes receive funding from large organisations, but smaller companies confront resource limitations and workforce challenges (Bright et al., 2022). The sector requires collaborative programmes because they work to erode training disparities while aiming for essential learning opportunities for all stakeholders.

Conclusion and Recommendations

The study demonstrates that investment in maritime workforce development through training dramatically enhances operational effectiveness throughout maritime organisations. Research data demonstrates that Training Programmes and Employee Experience deliver better organisational results, although Specialized Skills create inverse performance effects when used excessively. Industry policymakers and stakeholders should work together to create training systems that combine specialized discipline learning with general competency development to create well-rounded staff. Resource optimization strategies are required for smaller organisations because research demonstrates superior performance from larger companies. Research should move forward to test specialised skills within different situations, followed by considering how gender diversity interacts with training outcomes. Meeting Analysis through Longitudinal Studies would give a better understanding of how training impacts efficiency performance in the long term. MARPOL Regulations must introduce policies which promote training programmes that emphasise inclusiveness and diversity so the maritime industry can become more efficient and adequately governed. Improving maritime industry efficiency demands prioritizing workforce development and training optimisation efforts. This study's conclusions serve stakeholders by demonstrating the value of team collaboration in creating efficient training structures that result in long-term organisational success.

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