

Assessing Malaysian Ship Registration and Seafarer Recruitment for Sustainable Maritime Sector Growth

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Maritime shipping is fundamental to the international trading sector, offering high environmental and energy efficiency as well as cost-effectiveness. Malaysia has also played a significant role, being strategically situated along the Straits of Malacca. Significant obstacles persist, including low regulatory compliance as well as limited qualified seafarers. This study addresses the critical research problem of a declining supply of local seafarers for Malaysian-flagged vessels, which threatens national maritime resilience and workforce sustainability. While general discussions have acknowledged labour shortages in the maritime sector, limited empirical research has specifically examined post-2018 trends in Malaysian ship registration and seafarer deployment. To bridge this knowledge gap, this study assesses current trends in Malaysian ship registration and seafarer employment using data from the JALIN and Seafarers' Documentation (SDPx) databases from 2019 to 2023. A 21 % increase in registered ships was observed, along with significant growth in seafarer ratings by 115 % and officer positions by 4 %. Minimum safe manning data reveals a 27 % shortage of local seafarers for Malaysian vessels, which represents an increase from 26 % in 2018, while the proportion of local seafarers choosing to work on foreign-flagged ships has sharply risen to 40 % compared to just 17 % in 2018. These findings underscore the practical need for strengthened policy frameworks, targeted training reforms and more responsive workforce development strategies. Addressing these trends is vital not only for national maritime competitiveness but also for reducing reliance on foreign labor, enhancing environmental outcomes and ensuring long-term industry sustainability.

1. Introduction

Maritime or seaborne shipping plays a vital role in international goods transportation (Misaal et al., 2024). It is fundamental to the global economy, enabling the efficient movement of goods across borders, with approximately 90 % of global trade relying on maritime transport. Seaborne shipping is also perceived as one of the most environmentally friendly modes of transportation due to its lower greenhouse gas emissions and other pollutants compared to land shipping or air freight (Lindstad et al., 2012).

A critical research problem persists viz. the lack of comprehensive and timely data on local seafarer profiles and ship registration, which hinders effective policy-making and workforce planning. Existing literature and institutional reporting rely heavily on broad survey data that lack the detail necessary for nuanced analysis of seafarer employment patterns and ship registration trends (Chuah et al., 2021). This results in a significant knowledge gap, especially in understanding how the Malaysian maritime workforce is adapting to regional and global labour market shifts. Without these insights, Malaysia may struggle to address the growing shortage of qualified seafarers and align its training and regulatory frameworks with evolving demands. To address this gap, the present study evaluates trends in Malaysian ship registration and seafarer employment between 2019 and 2023 using two robust national databases: the JALIN database for vessel profiling and the Seafarers' Documentation (SDPx) database for seafarer profiling. This study builds upon the earlier work of Chuah et al. (2021) and specifically investigates the current status of Malaysian-registered ships under existing legislation

up to 2023, as well as the deployment patterns of Malaysian seafarers serving on both domestic and foreign-flagged ships. The following section reviews the literature on ship registration and seafarer profiling, highlighting the legal, regulatory and operational significance of ship registration alongside Malaysia's efforts to align with international standards and address compliance challenges. It also explores seafarer profiling as a means to understand workforce trends, address training gaps, improve seafarer welfare, recruitment and retention for sustainable maritime workforce development. Section 3 delineates the study design, methodology and data collection while Section 4 provides an in-depth analysis of Malaysian ship registration and seafarer employment by evaluating the distribution of Malaysian seafarers across both domestic and foreign ships. Section 5 concludes this study with primary study outcomes and future directions.

2. Literature review

Ship registration is pivotal to the shipping sector due to its impact on vessel's financial, legal and operational dimensions. It ensures a legal identity and nationality, support compliance with global maritime regulations and facilitates smooth navigation across international waters (Chuah et al., 2021). A registered ship is required to obtain a registration certificate in accordance with the standards of the International Maritime Organisation to ensure full compliance with safety and environmental regulations. The global ship registration landscape has become increasingly competitive due to the expansion of open registries, also known as flags of convenience, which allow shipowners to register their ships in countries with lower tax burdens and less stringent regulatory enforcement (Tripathy et al., 2024). The practice of ship registration in nations with more regulatory flexibility or less strict regulatory requirements has become more predominant, which has impacted the international shipping sector. Piniella et al. (2017) demonstrated that economic and geopolitical factors contributed to the practice, with certain nations, including Liberia and Panama, emerging as popular choices for ship registration. In Malaysia, ship registration has gradually increased despite existing challenges, such as regulatory compliance (Chuah et al., 2021). The Ministry of Transport Malaysia has sought to sustain an effective registration model by aligning domestic regulations with and adhering to global requirements while forbidding low-compliant vessels from entering Malaysian waters (MOT, 2025). Malaysia has ratified 31 of 69 international maritime conventions, reflecting its ongoing commitment to global maritime governance (GISIS, 2025). Chuah et al. (2022) also underscored the significance of efficacious vessel selection procedures, risk profiling and customised inspections to improve efficiency, especially for ships with limited port stays, to ensure sufficient maritime safety, regulatory compliance and environmental sustainability. Despite these efforts, Malaysia must continuously refine its national registry policies to remain competitive against open registries that dominate the global fleet. Comparative studies of registry systems have shown that effective flag administration, transparency governance and digital registry systems are crucial in attracting shipowners while maintaining compliance with international standards.

Seafarer profiling is equally crucial for understanding evolving trends in maritime workforce recruitment, deployment and skill development to allow more effective data collection and analysis related to seafarer performance, well-being and onboard operational efficiency (Wu and Winchester, 2005). Through profiling, shipping companies can enhance training modules, policies and support services to improve safety and productivity. Seafarer profiling is also instrumental in addressing psychological health issues, facilitating a supportive work environment and ensuring compliance with global regulations, including the STCW Convention (Chuah et al., 2021). Recent studies also point to weaknesses in recruitment and retention strategies, particularly in Malaysia, where the number of qualified local seafarers remains in short supply (Nik Mat et al., 2023) to meet rising demand. Contributing factors include outdated training content, inconsistent certification systems and limited career progression pathways, which discourage younger generations from entering the profession. To address these issues, workforce development strategies must prioritise structured stages of recruitment processes, continuous professional training and strong employer branding to attract and retain talent. Advanced data systems, such as JALIN and SDPx, potentially assist in performing more efficacious seafarer planning, improving seafarers' skills and regulatory adherence to promote sustainable development. Recent literature underscores the importance of seafarer welfare and employment preferences in shaping career decisions, noting that disparities in organisational policies can lead to dissatisfaction and high turnover. Enhanced welfare provisions, such as comprehensive pension schemes (Choe et al., 2021) and psychosocial support services, are essential for improving job satisfaction, retention and the long-term sustainability of the maritime workforce.

3. Methods

A quantitative methodology was employed. The primary data source was the shipping and seafarer database system of the Malaysia Marine Department with holistic ship registration and seafarer distribution records. Two

study objectives were also developed to guide the current analysis in improving Malaysian shipping governance frameworks. Additional computational analysis was performed on both JALIN and SDPx databases as a more accurate technique than conventional survey questionnaires in appraising the number of Malaysian seafarers employed on domestic vessels. Constant monitoring was also required for the number of Malaysian seafarers employed on foreign vessels due to limited data to expand results of Chuah et al. (2021) in clarifying existing queries to industrial stakeholders. Data analysis, including descriptive analysis, was performed through Microsoft Excel 365 and Minitab 21 software to discover statistically significant differences between domestic and foreign seafarers employed on Malaysian ships.

4. Findings and discussion

Table 1 shows the ship registration data, with anchor handling, tug and supply ships as the majority ($n = 1,307$). The trend indicated the high concentration of Malaysia on oil and gas exploration (Ming, 2024) and corresponded to the market forecast on international offshore support ships to increase from USD 25.6×10^9 in 2024 to USD 36.3×10^9 in 2029 at a yearly rate of 7.2 % (MAM, 2024). The second-highest proportion was general cargo ships ($n = 659$), followed by passenger or vehicle RoRo vessels ($n = 574$). Oil or chemical tankers also played a substantial role by expanding from 255 vessels in 2018 to 280 in 2023. Pleasure craft vessels and container ships also significantly expanded owing to fleet expansion, post-COVID-19 market calibrations and supply chain changes (UNCTAD, 2023). High visitor arrivals, particularly via sea (75.3 %), also contributed to higher pleasure craft vessel registration (Tourism Malaysia, 2023). In contrast, product tankers and bulk carriers demonstrated stagnancy, which symbolised economic restraints and market ambiguities (Drewry, 2024). Reduced gasoline and diesel demand owing to engine efficiency advancements and higher electric vehicle adoption rates lowered the demands for product tankers while fleet reductions and asset monetisation contributed to the stagnation in bulk carriers (Maybulk, 2021).

To support the growth of offshore and container vessels, enhanced port infrastructure and regulatory measures are urgently needed. Reinforcing safety standards in the leisure sector is essential due to the gradual growth in pleasure craft vessels. Future scholars can appraise economic and regulatory factors contributing to declining vessel segments while comparing regulatory frameworks across countries and evaluate emerging ship technologies. The findings highlight the evolving nature of ship registration and the necessity for adaptive policy measures to maintain a competitive and resilient maritime sector. These trends also have substantial implications for carbon and pollutant emissions as indicated by the growth of offshore support, container and pleasure craft vessels. Offshore vessels were primarily utilised for oil and gas activities and resulted in higher carbon emissions owing to significant fuel consumption and prolonged operating hours (Chu Van et al., 2019). More container ships also contributed to shipping emissions, which required higher operational efficiency and sustainable port infrastructure. The growth of pleasure craft ships increased emissions in coastal regions, which necessitated investments in green technologies, proactive policies and effective regulations to strike an equilibrium between economic growth and environmental sustainability. Environmental sustainability is a growing priority in maritime development as the sector faces increasing pressure to reduce emissions. Although this study focuses on vessel registration and seafarer profiling, these areas should align with Malaysia's green shipping roadmap, which promotes low-carbon practices through green port infrastructure, energy-efficient vessels and environmental training. Integrating these elements can enhance regulatory compliance and support Malaysia's vision for sustainable maritime growth. Figure 1 illustrates a 54.0 % increase in seafarers from 41,286 between 2014 and 2018 to 63,140 between 2019 and 2023, with deck ratings, engine ratings and engine officers (15.3 %) also increasing. Deck officers decreased by 3.0 %, which was consistent with the admonition of ICS (2021) regarding officer shortage by 2026. Immediate seafarer recruitment and training are vital to maintaining international shipping operations, with 1.89×10^6 seafarers operating 74,000 ships. Table 2 shows a substantial outflow of Malaysian seafarers to foreign ships, with 65.69 % of deck ratings, 53.02 % of engine ratings and 40.02 % of engine officers working abroad despite an overall surplus of certified personnel. Malaysian vessels continuously relied on foreign seafarers, especially deck officers (38.90 %) and engine officers (34.80 %), which was in line with Chuah et al. (2021) demonstrating that Malaysian seafarers constantly sought employment opportunities on foreign ships for more attractive careers, higher salaries and enhanced working conditions, with welfare serving a crucial function. Enhancing working conditions and offering structured training programmes are essential for improving seafarers' adaptability, career advancement, and contributing to industry transformation (Nik Mat et al., 2023). Future studies should collect continuous data from 2024 until 2028 and conduct actual seafarer profiling instead of employing survey questionnaires (Chuah et al., 2021). Policy efficacies, seafarers' tendency to work on foreign ship and international economic trends can also be evaluated to formulate more effective frameworks in balancing seafarer supply and demand.

Table 1: Malaysian ship registration (traditional registry, MISR and TSR) from 1952 to 2023.

Ship type	PK	PEN	KCH	KK	Traditional Registry	MISR	TSR	Total (This study)	Chuah et al. (2021)
LNG/LPG carrier	31	0	1	0	32	1	0	33	32
Oil/chemical tanker	138	12	120	5	275	1	4	280	255
Product tanker	13	1	0	0	14	0	0	14	14
Water tanker	4	0	6	0	10	0	0	10	10
Container ship	38	1	22	0	61	0	0	61	28
General cargo	18	1	444	7	470	0	189	659	537
Bulk carrier	9	0	3	0	12	1	0	13	13
Passenger/vehicle RoRo ship	56	43	225	19	343	0	231	574	448
Landing craft	7	0	154	12	173	0	10	183	148
Barge	378	51	1,129	218	1,776	1	3	1,780	1,554
Pleasure craft	15	0	10	0	25	3	28	56	23
Dredger	33	7	19	0	59	0	0	59	41
Fishing ship	3	71	13	29	116	0	6	122	96
Pilot boat	1	0	9	0	10	0	1	11	6
Offshore ship	316	2	124	35	477	25	0	502	410
Anchor handling/tug/supply anchor ship	353	34	755	117	1,259	15	33	1,307	1,139
Governmental vessel	64	0	34	4	102	0	0	102	91
Others	17	0	3	0	20	0	2	22	20
FPSO/FSO/FSU/FLNG	16	2	0	0	18	1	0	19	19
MODU/MOPU	8	0	0	1	9	0	0	9	9
Total	1,518	225	3,071	447	5,261	48	507	5,816	4,893
Total (excluding MODU/MOPU, FPSO/FSO/FSU/FLNG, fishing ship and barge)	1,113	101	1,929	199	3,342	46	498	3,886	3,215

Adequate career growth opportunities, conducive work conditions and tailored retention approaches are critical to the Malaysian maritime sector in lowering seafarer migration and dependence on foreign seafarers, which can guarantee long-term industrial growth, resilience and sustainability. Maritime Labour Convention (MLC) has also stipulated fundamental protections for seafarers, such as unpaid salaries for health and safety aspects, repatriation (Chang and Khan, 2023) and environmental provisions. The adoption significantly differs across shipping firms and has resulted in inconsistencies. Certain companies guarantee home-to-home repatriation while other corporations conduct repatriation only at the nearest airport and shift additional expenses to seafarers. Although the MLC stipulates a four-month threshold for unpaid wages (Mantoju, 2021), contract-based employment introduces varying interpretations of enforcement. Insurance coverage during off-duty periods is also contingent on corporate policies, with non-coverage areas substantially impacting employment attractiveness and financial stability. Choe et al. (2021) revealed that Korean seafarers' preferences for retirement pensions corresponded to MLC salary and welfare protections, although differences in pension structures impacted financial security. More effective industrial collaboration, transparent policies and enhanced practices are necessary to improve seafarers' welfare (Marbun, 2018) and employment security. While this study is based on verified administrative datasets, its limitations include the absence of real-time data on foreign seafarers' employment, a lack of qualitative insights into seafarers' personal motivations and a restricted scope that does not capture broader industry stakeholder perspectives.

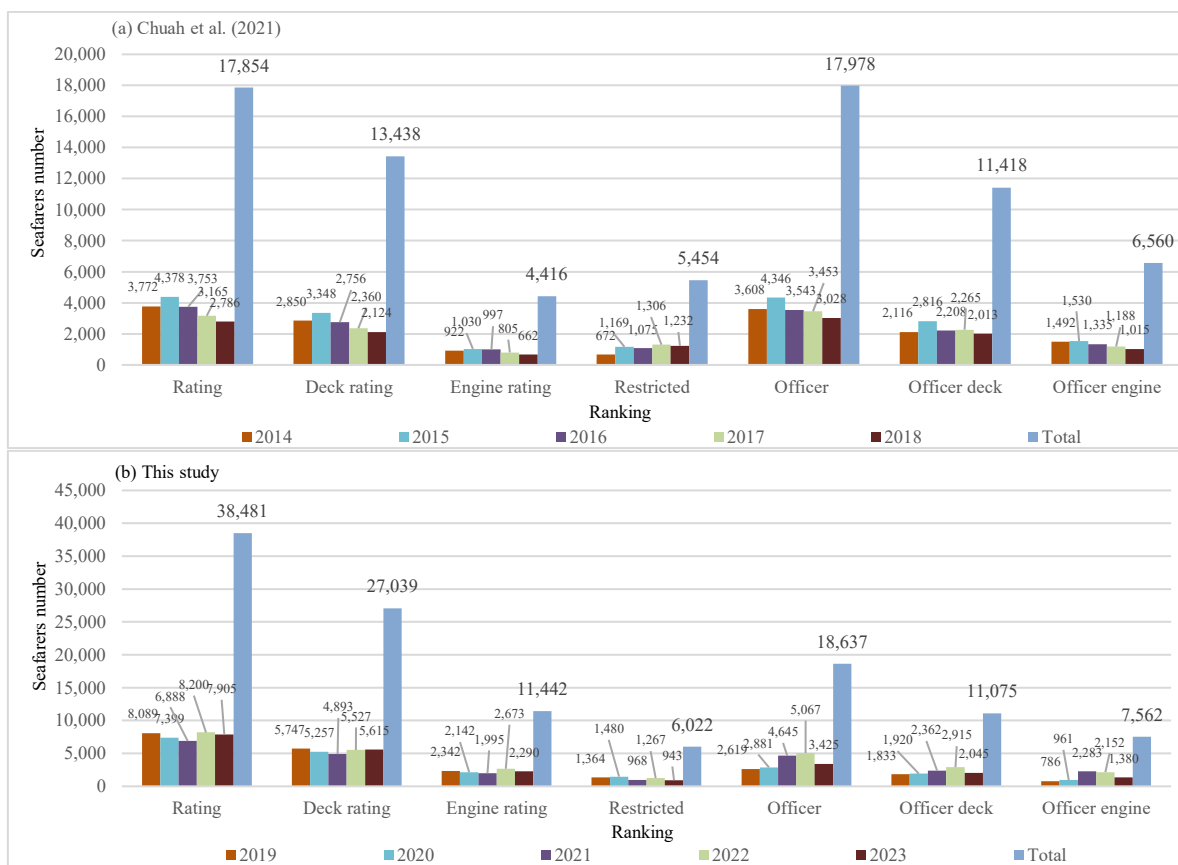


Figure 1: The breakdown of the number of seafarers by rating and officer from 2019 to 2023

Table 2: The number of domestic and foreign seafarers on Malaysian ships by officer and rating

Aspect	Deck officer	Engine officer	Deck rating	Engine rating
Require	8,264	6,957	11,569	6,309
COC + COR	8,268	9,983	29,330	12,375
Malaysian signs on other flags	-4	-3,026	-17,761	-6,066
COC/require (%)	0.61	1.09	2.34	1.81
COR/require (%)	0.39	0.35	0.20	0.15
Interest in Malaysian signs on other flags (%)	-0.08	-40.02	-65.69	-53.02
Foreign seafarers on board Malaysian ships (%)	38.90	34.80	19.80	14.79

5. Conclusions

The current study discovered several Malaysian maritime industrial trends, especially the 21 % rise in registered ships and seafarer employment increases from 2019 to 2023. Existing difficulties remain, such as regulatory compliance, limited domestic seafarers and high dependence on foreign ships. These issues have led to regulatory ambiguities, longer travel distances and higher carbon emissions. Enhancing work conditions, reinforcing domestic seafarer training and extending insurance coverage can increase job attractiveness among the younger generation while guaranteeing workforce sustainability. Constant environmental monitoring and regulatory interventions are also vital to sustaining competitiveness and resilience while reducing carbon footprint. Summarily, a holistic framework incorporating regulatory compliance, workforce development and environmental sustainability is integral to ensuring the long-term growth of the Malaysian maritime sector. Future research should explore data from 2024 to 2028 and include qualitative assessments of seafarers' decision-making, while comparative analyses of international registry systems and integration of Malaysia's green shipping roadmap would provide valuable insights for policy development and environmental sustainability.

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