



KNOWLEDGE MANAGEMENT IN MARITIME EDUCATION: IMPLICATIONS FOR SUSTAINABLE RESOURCE USE AND MARINE POLICY

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ABSTRACT

This study examines the relationship between Knowledge Management (KM) and job satisfaction among educators in Malaysia's Maritime Education and Training Institutions (MET). Anchored in Dalkir's Integrated Life Cycle Model, which conceptualises KM as a continuous process of knowledge creation, sharing, and application, and Herzberg's Two-Factor Theory, this research investigates how KM practices influence educator engagement and institutional outcomes. The Malaysian cultural context, characterised by collectivism and respect for hierarchy, plays a significant role in shaping KM behaviors and job satisfaction levels. Comparative insights suggest that localised KM strategies are essential for optimising knowledge flow in culturally distinct environments. Utilising a quantitative approach with 194 randomly selected educators, the study reveals high KM practice levels and a significant correlation with job satisfaction. Furthermore, KM practices are shown to directly support sustainability in the maritime sector by embedding environmental awareness, efficient resource use, and marine policy development into institutional knowledge structures. This highlights KM's role as a critical enabler of sustainable maritime education and policy reform.

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Introduction

Malaysia's education system plays a pivotal role in supporting national development, including the advancement of the maritime sector. Within this context, Organisational Quality Management Initiatives (OQMI) refer to structured institutional programs aimed at improving administrative efficiency, academic quality, and stakeholder satisfaction across higher education institutions. These initiatives often focus on continuous improvement mechanisms, performance-based assessments, and institutional accountability, all of which

have direct implications for Maritime Education and Training (MET) institutions.

One of the most significant policy frameworks influencing educational transformation in Malaysia is the Malaysia Education Blueprint 2013–2025. Although primarily focused on the general education system, this blueprint underscores the importance of producing holistic, entrepreneurial, and balanced graduates through Outcome-based Education (OBE), enhanced digital literacy, and internationalisation. In the maritime context,

these goals translate into cultivating a workforce adept in sustainability practices, maritime digital technologies, and international regulatory compliance, aligning well with the specialised requirements of MET institutions. Specific initiatives such as Technical and Vocational Education and Training (TVET) reform and the strengthening of higher education governance have also enhanced the institutional landscape for maritime programs.

At the core of achieving these outcomes is Knowledge Management (KM), which in this study refers to the systematic processes of capturing, sharing, and applying knowledge to enhance institutional effectiveness and educational quality. In the maritime education context, KM encompasses mechanisms such as collaborative learning environments, digital knowledge repositories, and structured mentorship (Abbas *et al.*, 2021) that support the professional development of educators and sustainability education for cadets.

Globally, maritime education is evolving in response to technological advancement and sustainability imperatives. Recent developments in green shipping practices and maritime logistics education underscore the need for MET institutions to prepare future professionals with a strong environmental focus (Alam & Rashid, 2023). International trends such as decarbonisation, green shipping, and maritime automation are reshaping MET curricula worldwide. The International Maritime Organization (IMO), for example, has prioritised sustainability through initiatives like the IMO 2020 sulphur cap and long-term targets for greenhouse gas reduction from shipping. These directives influence national maritime education strategies, urging countries like Malaysia to equip their maritime professionals with competencies in green technologies, regulatory compliance, and environmental stewardship.

While considerable progress has been made in enhancing the quality of maritime education in Malaysia, a critical gap persists in aligning educational practices with sustainability goals through effective knowledge management.

Many MET institutions lack coherent KM frameworks that facilitate knowledge transfer related to green shipping, environmental compliance, and sustainable marine resource use. Additionally, there is limited empirical research exploring how KM practices influence job satisfaction among educators, a factor that significantly affects institutional engagement, innovation, and the long-term viability of sustainability programs. This study addresses this gap by examining the interplay between KM and job satisfaction within the Malaysian MET context, while also assessing KM's contribution to sustainability-oriented education and policy development.

Literature Review

KM enhances maritime institutions by systematically capturing and sharing knowledge that influences sustainability practices. Research indicates that institutions implementing KM strategies effectively contribute to environmental policy-making and sustainable maritime operations. KM frameworks provide educators and students with access to best practices in sustainable shipping, climate change mitigation, and marine resource conservation.

A well-structured KM system enables maritime institutions to develop sustainable strategies by integrating data analytics, digital tools, and industry partnerships (Nonaka & Takeuchi, 1995). Knowledge-sharing networks among maritime educators and practitioners facilitate the adoption of sustainable shipping technologies and environmental policies (Davenport & Prusak, 1998). Furthermore, KM supports the continuous improvement of eco-friendly maritime operations by embedding sustainability principles into curricula and professional training programs (Carayannis *et al.*, 2014).

Studies have shown that institutions with robust KM frameworks actively contribute to international maritime sustainability goals, such as reducing emissions, waste management, and marine biodiversity conservation (Scholz, 2017). By incorporating KM-driven sustainability

models, MET institutions can foster innovation in maritime logistics, ship design, and port management, leading to more sustainable maritime operations (Wright *et al.*, 2020).

Methodology

This study employs a quantitative approach to examine the relationship between knowledge management (KM) and job satisfaction among educators in MET institutions in Malaysia. A structured survey questionnaire was used to collect data from a sample of 194 educators (Creswell & Creswell, 2018).

The survey instrument included Likert-scale questions assessing KM practices, job satisfaction, and sustainability awareness. Descriptive statistical analysis, Spearman's rank correlation, and multiple regression analysis were conducted to determine the strength and significance of relationships between KM variables and sustainability factors (Creswell & Creswell, 2018). Reliability and validity tests were performed to ensure the robustness of the findings.

Additionally, expert interviews with maritime educators and industry professionals provided qualitative insights into KM's role in sustainable maritime education. The integration of both quantitative and qualitative data ensures a comprehensive understanding of KM's impact on sustainability initiatives within MET institutions (Yin, 2014).

This statistic is calculated by browsing each institution's website and determining the number of educators in each institution in 2021. The overall number of educators serving at maritime institutions in Peninsular Malaysia is 388, with a breakdown of instructors per institution shown in Table 1.

In this research, a simple random sampling technique was employed to ensure each educator in the population had an equal probability of selection. The sampling frame comprised full-time maritime educators from 19 MET institutions accredited by the Malaysian Qualifications Agency (MQA). The MQA,

which oversees academic programs in higher education, ensures the quality of education provided by these institutions (Chin, 2019). Educators included in the sample had at least one year of professional teaching experience, ensuring the insights reflect meaningful KM practices (Oribhabor & Anyanwu, 2019).

The survey instrument was constructed by adapting and contextualising items from prior validated KM and job satisfaction studies. Items were aligned with Dalkir's Integrated Life Cycle Model and Herzberg's Two-Factor Theory. A pilot study was conducted involving 15 educators from non-sampled institutions. Feedback from the pilot was used to refine language clarity, improve item reliability, and confirm construct validity. Cronbach's alpha values above 0.80 were recorded, indicating acceptable reliability. This process follows best practices in instrument validation for social science research (Taherdoost, 2019).

The descriptive statistics, Spearman's rank correlation, and multiple regression analysis were conducted to assess relationships between KM and job satisfaction variables. Prior to analysis, assumptions of normality, linearity, and homoscedasticity were examined using the Shapiro-Wilk test and residual plots. Although Spearman's correlation is non-parametric, testing assumptions supports result validity. Effect sizes (Cohen's *d* and *R*²) were calculated to evaluate the strength of associations and interpret practical significance.

This study also incorporates qualitative data obtained from semi-structured interviews with five maritime education experts. A triangulation strategy was employed to merge insights from both data sets. Qualitative themes helped explain statistical patterns, contextualise findings, and validate KM frameworks within the Malaysian MET setting.

Results and Discussion

Visual Summary of KM Influence

To enhance understanding, Figure 1 illustrates the relationship between key KM elements

Table 1: Respondent of educators in MET institutions, Malaysia

No.	Institutions/Academy	Number of Educators
1.	Universiti Malaysia Terengganu	84
2.	Politeknik Ungku Omar (PUO), Ipoh, Perak	20
3.	Akademi Laut Malaysia Sdn. Bhd. (ALAM), Kuala Sg Baru, Melaka	25
4.	Ranaco Marine Sdn. Bhd. (RANACO), Cukai, Kemaman, Terengganu	20
5.	Akademi Kastam Diraja Malaysia (AKMAL), Pulau Langkawi, Kedah	10
6.	Malaysian Institute of Marine Engineering Technology (UniKL MIMET), Lumut, Perak	56
7.	Maritime Skills Sdn. Bhd. (MSSB), Kemaman, Terengganu	10
8.	Pusat Pendidikan dan Latihan APM, Kuantan, Pahang	17
9.	Institut Latihan Pentadbiran dan Pengurusan Pengangkutan Laut (ILPPPL), Pulau Indah, Pelabuhan Klang, Selangor	10
10.	Netherlands Maritime Institute of Technology (NMIT), Johor Bahru, Johor	24
11.	Institut Perikanan Malaysia (IPM), Chendering, Terengganu	7
12.	Univerisiti Teknologi Malaysia, Johor Bahru, Johor	35
13.	Univerisiti Teknologi Petronas, Perak	35
14.	University of Southampton Malaysia, Johor Bahru, Johor	10
15.	Xiamen University Malaysia Campus, Johor	10
16.	Pusat Latihan Gerakan Polis Marin (PULAMAR), Batu Uban, Pulau Pinang	8
17.	Pelorus Intelligence & Technology Academy Sdn. Bhd. (PELORUS), Lumut, Perak	5
18.	Pelita Akademi Sdn. Bhd. (PELITA), Kuala Kubu Bharu, Selangor	5
19.	Pusat Latihan Gerakan Polis Marin (PULAMAR), Tampoi, Johor Bahru, Johor	5
Total		396

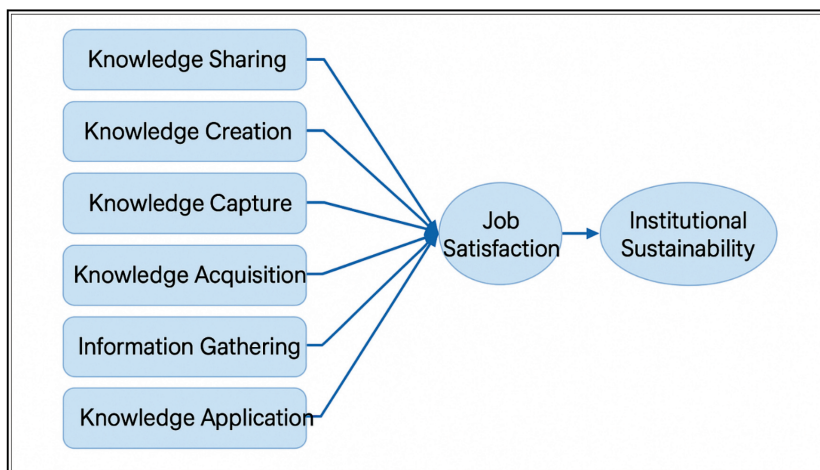


Figure 1: Conceptual diagram linking KM elements to job satisfaction and institutional sustainability

and their influence on job satisfaction and institutional sustainability. Each element contributes differently to professional engagement and environmental outcomes.

Clarification of KM Terminology and Framework

This study adopts six key elements of the KM cycle: Knowledge sharing, knowledge creation, knowledge capture, knowledge acquisition, knowledge distribution, and knowledge application. To ensure clarity, knowledge acquisition is defined as the process of internalising new information through structured learning, mentoring, or industry interaction (Abbas *et al.*, 2021), while information gathering refers strictly to the initial collection of raw, unprocessed data. These definitions are used consistently to avoid conflating distinct stages of the KM cycle. Maintaining consistency in terminology, this research applies “knowledge acquisition” strictly to refer to the learning and assimilation of knowledge and avoid interchangeably using it for other stages in the KM cycle.

Interpreting the Low Score in Knowledge Creation

Knowledge creation yielded the lowest average among KM elements (mean = 4.08), despite still reflecting generally positive engagement. This relatively lower score may reflect institutional constraints such as limited research incentives, time constraints due to teaching responsibilities, lack of collaboration mechanisms, or insufficient funding. To enhance knowledge creation

within MET institutions, policymakers and administrators could prioritise research grants, encourage team-based innovation, support joint industry-academic projects, and embed creative thinking in the teaching-learning ecosystem (Wang & Notteboom, 2019; Abbas *et al.*, 2021).

Implications of KM Practices on Educator Experience

The findings highlight that KM elements significantly influence educator job satisfaction. Knowledge sharing encourages collaboration and teamwork, enabling peer mentorship and reducing professional isolation. One case from the survey indicated that centralised digital repositories for lesson materials facilitated idea exchange, increased teaching confidence, and nurtured interdepartmental cooperation (Abbas *et al.*, 2021).

KM practices are strongly associated with improved educator satisfaction and institutional effectiveness. Knowledge sharing fosters a collaborative teaching culture. For instance, subject cluster meetings and peer-review teaching forums have enabled cross-disciplinary dialogue, reducing isolation and building professional confidence (Abbas *et al.*, 2021). MET institutions that implemented initiatives like a “Teaching Innovation Forum” reported increased engagement and morale among faculty.

Knowledge application allows educators to translate institutional and experiential knowledge into enriched classroom delivery. Through tools such as simulation-based training,

Table 2: Mean analysis of knowledge management elements

Knowledge Management Elements			
	N	Mean	Standard Deviation
K. Sharing	194	4.08	0.54
K. Creation	194	4.08	0.52
K. Capture	194	4.11	0.52
K. Acquisition	194	4.14	0.55
K. Distribution	194	4.08	0.56
K. Application	194	4.09	0.51

educators effectively contextualise maritime scenarios, thus improving learner engagement. These practices, when embedded systematically, also drive institutional sustainability by fostering adaptive and knowledge-driven cultures (Ghosh *et al.*, 2018; Alam & Rashid, 2023). Educators who integrate industry-based data, case studies, or simulations into their curricula report enhanced student engagement and teaching quality. One MET institution adapted real-time shipping data into navigation training, leading to improved student competency and satisfaction (Alam & Rashid, 2023).

Meanwhile, that KM elements have meaningful influence on educators' job satisfaction. For instance, knowledge sharing supports collaborative teaching environments. When educators engage in mentoring, group planning, or joint content development, they foster a culture of openness and mutual support. One participant noted that shared digital libraries improved not only content delivery but also professional camaraderie.

Understanding these KM dynamics allows institutions to tailor professional development efforts and KM infrastructure that empower educators and reinforce institutional sustainability (Ghosh *et al.*, 2018; Alam & Rashid, 2023). Future research may benefit

from qualitative case studies exploring high-performing MET institutions that strategically embed KM in both policy and practice.

Future research may explore longitudinal impacts of KM interventions, comparisons across institutions with varying technological capabilities, or cultural influences on KM adoption. Additionally, further inquiry could assess how KM influences curriculum innovation, digital transformation, or organisational change in the maritime education sector.

Influences of Knowledge Management towards Job Satisfaction

Table 3 shows the summary of the strength of relationships between KM elements and job satisfaction. Knowledge capture and overall KM implementation demonstrated strong positive correlations, while other elements which are sharing, creation, acquisition, distribution, and application, showed moderate but significant correlations.

These results underscore that KM strategies influence educators' morale and engagement. Educators working within institutions that systematically capture and disseminate institutional knowledge report higher levels of contentment, as they feel more prepared and supported in their roles.

Table 3: Findings of Spearman rank correlation

No.	Null Hypothesis	Relationship
1.	There is no positive relation between Knowledge Sharing with job satisfaction among educators in MET institutions	Moderate
2.	There is no positive relation between Knowledge Creation with job satisfaction among educators in MET institutions	Moderate
3.	There is no positive relation between Knowledge Capture with job satisfaction among educators in MET institutions	Strong
4.	There is no positive relation between Knowledge Acquisition with job satisfaction among educators in MET institutions	Moderate
5.	There is no positive relation between Knowledge Distribution with job satisfaction among educators in MET institutions	Moderate
6.	There is no positive relation between Knowledge Application with job satisfaction among educators in MET institution	Moderate
7.	There is no relation for overall knowledge management factors with job satisfaction factors among educators in MET institutions	Strong

Furthermore, these practices align closely with sustainability objectives. MET institutions that prioritise knowledge sharing and application are more likely to integrate eco-conscious content and practices into curricula (Ghosh *et al.*, 2018). Educators in such environments often perceive their work as contributing to broader environmental and social goals, thereby enhancing their professional purpose and job satisfaction (Wu & Pagell, 2011).

These insights emphasise the importance of embedding KM into institutional strategies not only to enhance educator performance but also to align education with broader global sustainability goals.

Conclusions and Implications

This study confirms that Knowledge Management (KM) practices have a significant influence on job satisfaction among educators in Malaysia's Maritime Education and Training (MET) institutions. More importantly, it reveals that KM is not only a catalyst for improving workplace engagement but also a key enabler of sustainability in maritime education.

The findings demonstrate that KM elements such as knowledge sharing, capture, and application contribute to building collaborative learning environments, enhancing teaching effectiveness, and aligning educational practices with environmental responsibility. When applied effectively, these KM strategies facilitate the integration of eco-conscious content and research into curricula, directly supporting long-term goals for sustainable maritime operations and workforce preparedness in the era of green shipping (Ghosh *et al.*, 2018; UNCTAD, 2021; Sharma & Manfreda, 2021; Alam & Rashid, 2023).

To amplify these benefits, MET institutions should embed KM into institutional planning and policy frameworks. This includes investing in digital knowledge platforms, incentivising collaborative teaching practices, and fostering partnerships with industry stakeholders to co-develop sustainable maritime solutions (Abbas *et al.*, 2021; Le & Bui, 2022).

Future research should extend beyond self-reported measures to include case studies and longitudinal evaluations of KM outcomes. Specifically, scholars are encouraged to explore how advanced technologies (e.g., AI-based knowledge systems, digital twins) and different organisational cultures affect KM efficacy. Challenges such as resistance to change, technological readiness, and cross-departmental coordination should also be critically assessed (Wang & Notteboom, 2019; Zhou *et al.*, 2021).

In broader terms, this research has practical implications for maritime education reform. By aligning KM with sustainability priorities, institutions can enhance teaching quality, retain satisfied educators, and fulfil international regulatory demands for environmental stewardship in shipping. The integration of KM into strategic development thus offers a holistic pathway towards innovation, policy relevance, and sector-wide transformation (IMO, 2021; Chin, 2019).

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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