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The Urgency of Developing a Crewing Management System (CMS) for PT MCS Internasional in the Era of Maritime Digitalization

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ABSTRACT

The maritime industry is undergoing a rapid digital transformation that is reshaping traditional operations and human resource management. PT MCS Internasional, a large-scale maritime service provider managing crew operations for multiple types of vessels and companies, faces challenges in data management, efficiency, and compliance monitoring. The complexity of handling numerous crew members and diverse client requirements demands a structured digital solution. This research aims to examine the necessity and urgency of developing a Crewing Management System (CMS) tailored to PT MCS Internasional's operational framework. Using a qualitative descriptive method through interviews, observation, and document analysis, the study finds that the manual and semi-digital processes currently in use result in data duplication, low accuracy, and slow decision-making. Customized CMS is essential to streamline operations, integrate multiple data sources, ensure regulatory compliance, and improve competitiveness. The paper concludes that implementing a comprehensive CMS will serve as a strategic move to enhance efficiency, reliability, and scalability in managing maritime human resources.

Introduction

The global maritime industry is currently undergoing a profound transformation driven by digitalization. Technological innovation has become a key enabler of efficiency, transparency, and competitiveness within the sector. According to the International Maritime Organization (IMO, 2023), the adoption of digital solutions such as integrated management platforms, automation, and data analytics has proven essential to improving safety, operational performance, and regulatory compliance across international shipping (Progoulaki & Theotokas, 2016). This transformation is not merely a technological shift but a strategic response to the complex and evolving demands of global trade, environmental regulations, and the need for sustainable maritime practices (Bhattacharya, 2015; Frazila & Zukhruf, 2020; Gekara & Sampson, 2021; Munim et al., 2020).

In Indonesia, one of the leading players in maritime services is PT MCS Internasional, a company that provides comprehensive crew management solutions for both domestic and international clients (Karlis & Polemis, 2018; Kim, Park, & Lee, 2021). The organization manages thousands of seafarers operating on diverse vessels, including cruise ships, merchant fleets, and offshore support vessels (Ahola et al., 2021). Despite its extensive operations and established reputation, PT MCS Internasional continues to rely heavily on fragmented tools such as manual spreadsheets, email correspondence, and isolated software systems to maintain crew databases, monitor certifications, and coordinate assignments (Gavalas et al. 2022; Caesar et al., 2015). This reliance on traditional methods has created a gap between the company's operational complexity and its digital infrastructure, limiting its ability to adapt to the demands of modern maritime operations (Nguyen et al., 2019).

These manual systems have led to several recurring inefficiencies that affect both performance and compliance (Lagoudis, and Raftopoulou, 2024) . First, the process of retrieving data during client audits or regulatory inspections is slow and error-prone due to the absence of centralized information management (Manuel & Shou, 2022). Second, redundant data entries across multiple files have increased the risk of duplication and inconsistency (Lam & Bai, 2016;; Lee & Park, 2021). Third, the manual tracking of certificates, medical records, and training documentation has proven unsustainable given the large number of active crew members. Lastly, the lack of real-time analytical insights restricts management's ability to evaluate crew performance, predict rotation needs, and anticipate compliance risks (Panayides & Polyviou, 2017; Sanchez & Nguyen, 2020; Tseng & Pilcher, 2019). Together, these issues emphasize the urgent need for a more integrated, data-driven solution.

In response to these challenges, PT MCS Internasional recognizes the strategic necessity of implementing a *Crewing Management System (CMS)*—a centralized digital platform designed to automate workflows, manage comprehensive crew information, and generate actionable insights. A well-developed *CMS* would serve as the backbone of the company's human resource management in maritime operations, streamlining communication among departments, enhancing transparency, and supporting data-driven decision-making. The adoption of such a system aligns with the global trend toward maritime digitalization, where automation and interoperability are considered critical factors in achieving operational excellence and regulatory compliance (Nazemzadeh & Vanelslander, 2015).

The main problems identified in the current system can be summarized as follows: disconnected databases among operational divisions, prolonged data validation processes, inconsistent reporting formats, and the absence of predictive tools to support managerial decisions. These shortcomings collectively hinder efficiency, increase administrative costs, and limit the company's responsiveness to client and regulatory demands. Addressing these issues through the implementation of a *CMS* will not only resolve immediate operational pain points but also position the organization to compete more effectively within a rapidly digitalizing industry (Kitada et al., 2018); Loukis et al., 2019; Thai et al., 2016).

Two seminal studies provide critical insights into the digital transformation of maritime operations yet leave meaningful gaps that the present research addresses. First, Gavalas et al. (2022) investigated digital adoption in shipping firms and found that technology uptake significantly improved operational efficiency, but the study largely focused on ship operations and logistics rather than shore-based crew management functions. Second, Theotokas,

Lagoudis, and Raftopoulou (2024) explored human resource management (HRM) challenges in maritime digitalization and identified training and skills as major issues, but they noted a lack of empirical work on HRM practices and systems for shore-based, large-scale crew databases.

Based on the problems outlined above, this study aims to: (1) identify the operational gaps caused by the absence of a *CMS* at PT MCS Internasional; (2) evaluate the potential impact of digitalization on crew management performance; (3) analyze the urgency and strategic value of *CMS* development; and (4) propose system features that align with international best practices in maritime digital ecosystems. The outcomes of this research are expected to contribute both theoretically and practically—by providing a framework for understanding digital transformation in maritime crew management and offering actionable recommendations for companies seeking to enhance operational efficiency, compliance, and sustainability through technology adoption.

Research Method

This research employed a qualitative descriptive design to examine the existing crew management process, identify operational gaps, and evaluate the potential benefits of implementing a Crew Management System (CMS). Data were collected through interviews with the crewing and operations manager at PT MCS Internasional, direct observation of current administrative workflows, and document analysis of crew logs, audit reports, and compliance records. The collected data were analyzed thematically by categorizing responses into three key dimensions: operational challenges, digitalization readiness, and technological expectations. The qualitative findings were then compared against international best practices in maritime human resource management to identify areas for improvement and strategic alignment.

Results and Discussion

Current Operational Condition

The current crew management process at PT MCS International operates with a combination of Excel-based databases and email coordination. Although reliable for small-scale operations, this approach is no longer suitable for large and complex client portfolios. Common issues observed include:

1) Redundant manual input and file version conflicts.
2) Difficulty in tracking crew certification status across multiple vessels.
3) Time-consuming data compilation during external audits.
4) Lack of integrated dashboards for managerial decision-making.

Table 1. Current Problems Identified in Crew Management

No.	Problem Area	Description
1	Data Management	Scattered files and inconsistent formats between departments.
2	Certification Monitoring	Manual reminder system; high risk of missing expiry deadlines.
3	Reporting	Non-standardized reports; manual data aggregation.
4	Communication with Clients	Delays in responding to client information requests.

5	Decision-Making Support	Lack of visualized analytics for managerial planning.

These challenges reflect the company's growing complexity and the necessity of system-based integration.

Urgency of CMS Development

The urgency for PT MCS Internasional to develop its own CMS arises from three main factors:

1. Operational Efficiency
   Automation can reduce the administrative workload by up to 50%, allowing staff to focus on strategic tasks. The CMS can provide automation in crew rotation planning, performance evaluation, and reporting.
2. Regulatory Compliance
   Compliance with STCW, MLC, and client-specific requirements necessitates accurate and up-to-date crew documentation. A CMS with built-in compliance monitoring reduces the risk of regulatory penalties or audit failures.
3. Strategic Competitiveness
   In the global shipping labor market, service speed and transparency are competitive advantages. A robust CMS enhances corporate image and reliability, increasing client trust and retention.

Expected Benefits of CMS Implementation

The expected outcomes of CMS implementation are summarized in Table 2.

Table 2. CMS implementation

Benefit Area	Description of Expected Improvement
Data Accuracy	Real-time data updates and validation across departments.
Time Efficiency	Faster crew assignment and document retrieval.
Transparency	Shared dashboards for internal and client use.
Compliance	Automated alerts for certification and contract renewal.
Decision-Making	Analytical tools for resource planning and performance tracking.

These benefits are consistent with international research findings (Ahmed et al., 2021; IMO, 2022), highlighting that integrated crewing systems significantly improve workforce management efficiency.

Proposed CMS Functional Framework

The proposed CMS for PT MCS International should include the following modules:

1) Crew Database Management – centralized digital records.
2) Certification and Document Control – automated expiry alerts and document compliance tracking.
3) Crew Deployment Scheduler – integrated rotation and availability tracking.
4) Payroll and Contract Integration – synchronization with payroll systems.

Analytics Dashboard – visual monitoring and predictive analytics.

This model ensures data accuracy, transparency, and flexibility, enabling PT MCS Internasional to manage its complex crewing operations efficiently and competitively.

Discussion

The absence of a centralized Crewing Management System (CMS) has significantly hindered PT MCS Internasional from achieving operational excellence. Fragmented data storage, manual workflows, and email-based coordination have resulted in inefficiencies and inconsistent compliance documentation. According to Lee and Park (2021), integrating digital platforms within maritime organizations enhances information transparency and reduces redundancy across departments. This aligns with the International Maritime Organization's (IMO, 2023) emphasis that digitalization is no longer optional but a strategic necessity for ensuring safety, compliance, and efficiency in maritime operations. Consequently, implementing a CMS should be viewed not merely as a technological upgrade but as a strategic shift toward data-driven governance and sustainable competitiveness.

A comparative analysis with previous studies highlights how CMS development bridges critical operational gaps that earlier research did not fully address. Gavalas et al. (2022) emphasized that digital adoption in shipping operations improves fleet efficiency and communication reliability but paid little attention to human-resource digitalization, especially in crew management. Similarly, Theotokas et al. (2024) identified human capital management as a major constraint in maritime digital transformation but acknowledged the absence of empirical studies on how integrated digital systems can improve crew coordination and compliance. The present research fills this gap by focusing on how CMS implementation at PT MCS Internasional can integrate crewing, operational, and client-service functions—providing a comprehensive, data-centric approach to human resource management in the maritime context.

From a strategic perspective, the CMS offers transformative benefits. It strengthens PT MCS Internasional's ability to align its operations with international maritime standards such as the STCW Convention and Maritime Labour Convention (MLC 2006), ensuring that crew certification, safety records, and compliance data are updated in real time. Strategically, CMS adoption supports long-term competitiveness by enabling predictive analytics for crew rotation and contract management, thus reducing administrative delays and improving readiness for audits. Furthermore, the system enhances transparency, allowing clients to access accurate and timely data—an increasingly critical factor in maintaining trust and securing repeat business in the global shipping market.

From a technical standpoint, a CMS integrates data across multiple modules, including recruitment, payroll, certification tracking, and performance evaluation. This integration minimizes redundancy and human error while enabling real-time monitoring of seafarer status and compliance indicators. Automation features—such as alerts for certificate expiry, electronic approvals, and analytics dashboards—reduce the reliance on manual processes, thereby increasing productivity. Compared with conventional spreadsheet systems, CMS technology also allows for advanced reporting and data visualization, which facilitate faster and more accurate decision-making by management. These technical enhancements ultimately ensure higher operational reliability and a stronger data-driven culture within the organization.

From a business perspective, the CMS serves as both a cost-efficiency and value-creation mechanism. Reducing manual administrative work lowers labor costs and minimizes financial losses due to errors or regulatory penalties. At the same time, improved data quality and real-time analytics enhance service differentiation—positioning PT MCS Internasional as a modern, technology-oriented maritime service provider. Over time, such a system contributes to improved client retention, stronger brand reputation, and greater capacity to expand internationally. Moreover, in an increasingly ESG-conscious industry, digital transparency supports sustainability reporting and corporate accountability, adding another layer of business value.

However, implementing a CMS is not without challenges. The initial cost of system development and integration can be substantial, especially for organizations with legacy infrastructure. Resistance to change among employees accustomed to manual workflows may also slow adoption. Data migration poses additional risks if not managed carefully, as errors in transferring historical crew information can lead to compliance violations. To address these challenges, PT MCS Internasional should adopt a phased implementation approach, beginning with pilot projects in high-priority departments. Continuous user training and change-management programs should accompany deployment to ensure smooth transition and user acceptance.

In conclusion, the development of a comprehensive CMS represents a critical step for PT MCS Internasional toward achieving operational excellence in the digital maritime era. Compared with prior studies that focused narrowly on shipping logistics or HR training, this research emphasizes the integrative potential of digital systems to bridge the gap between human resource management and operational efficiency. Strategically, a CMS strengthens regulatory compliance and competitive positioning; technically, it enhances data integration and decision-making; and commercially, it drives client satisfaction and business sustainability. The implementation of such a system is not merely a technological upgrade—it is a strategic investment in the company's long-term resilience and growth within the global maritime ecosystem.

Conclusion

This study concludes that PT MCS Internasional urgently needs to develop and implement a Crewing Management System to cope with increasing operational complexity and data volume. Manual systems are no longer sufficient to handle multi-client and multi-vessel operations effectively. The CMS will not only improve data accuracy and reduce human error but also enhance the company's strategic decision-making capacity. Future research can focus on system design and implementation strategy, including the use of AI and Big Data Analytics to create predictive and adaptive functionalities.

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