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Management in Vocational Schools in the Shipping Sector: Analysis of the Role of Leaders as Leaders in Improving the Quality of Education and Training

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Abstract

This research aims to analyze the role of leaders in educational management in vocational schools, especially in the shipping sector, with a focus on improving the quality of education relevant to the maritime industry's needs. This research aims to examine the role of leaders in educational management at vocational schools in the shipping sector, focusing on efforts to improve the quality of graduates ready to meet the demands of the maritime industry. Vocational education in the shipping sector faces unique challenges, such as demands for special technical skills, compliance with international safety standards, and adaptation to modern technological developments in navigation and ship operations. With the challenges of globalization and the increasing need for skilled labor in the shipping sector, shipping vocational schools must be able to produce graduates who have technical skills and character and are ready to face industry demands. This research uses a qualitative case study approach at a leading shipping vocational school in Indonesia. Data was collected through in-depth interviews with school principals, teaching staff, and industrial partners in the maritime sector. The research results show that leaders at shipping vocational schools have a strategic role in developing industry-based curricula, managing adequate training facilities, increasing the competency of teaching staff, and strengthening partnership relationships with shipping companies. Analysis of research results reveals that effective leaders in shipping vocational schools carry out several strategic roles, namely: (1) developing competency-based curricula that are in line with industry standards, (2) providing adequate training infrastructure, including simulators and training vessels, (3) strengthening teacher competencies and skills through training and certification programs, and (4) building strategic partnerships with shipping companies to support internship programs and graduate absorption. Effective LeadershipLeadership has been proven to improve the quality of education and the relevance of graduates to the job market's needs. Leadership that is oriented toward collaboration and innovation has a positive impact on the quality of education, graduate skills, and the competitiveness of shipping vocational schools. It is hoped that the implications of this research can become a reference for the development of leadership-based vocational education management in the shipping sector to produce superior graduates who are in line with the needs of the maritime industry. It is hoped that the implications of the results of this research can be a guide for shipping vocational schools in implementing leadership-based educational management strategies to achieve quality standards that meet the demands of the maritime industry.

Keywords: education management, vocational schools, basic safety training, leadership, quality of education

1. Introduction

In recent years, the shipping industry has experienced rapid development, both in technology and in demand for workforce competency (Junus et al., 2024). As an essential sector for international trade, the shipping industry requires a workforce that is not only technically skilled but also has a deep understanding of safety standards, operational management, and the latest technology in navigation. Vocational schools in the shipping sector have an important responsibility in preparing workers who meet these requirements through relevant and quality education (Özdemir, 2024).

In Indonesia, vocational education in the shipping sector is faced with various challenges, including limited educational facilities and infrastructure that meet international standards, a lack of access to modern technology, and differences between industry needs and graduate competencies (Yoto et al., 2024). Apart from that, limited human resources who

have special skills in the shipping sector also pose a challenge in the learning process. This condition requires the role of leaders of shipping vocational schools to be able to manage education effectively and innovatively so that the resulting graduates are ready to meet the needs of a dynamic industry.

The role of leaders in sailing vocational schools is a key factor in facing this challenge (Muthumuni & Mokoena, 2024). Effective LeadershipLeadership includes not only administrative skills but also the capacity to create a vision that is in line with industry developments, manage resources optimally, build strategic partnerships with industry, and encourage the development of the competencies of teaching staff and students. Leaders who can carry out this role can improve the quality of education in shipping vocational schools, both in terms of curriculum that aligns with job market needs and infrastructure and facilities that support the learning process.

However, there is not much research that specifically discusses the role of leaders in improving the quality of education in vocational schools (Shen, 2022). This research is essential to fill this gap and guide shipping vocational schools in developing effective educational management strategies. Through this study, it is hoped that appropriate and effective leadership approaches can be found in the context of shipping vocational schools, which will ultimately positively impact the quality of graduates and their relevance in the world of work.

The shipping industry plays an essential role in global trade, where around 80% of goods sent between countries are transported by sea (Guo et al., 2022). This industry relies heavily on a workforce with high navigation skills, ship operational management, safety, and an understanding of modern maritime technology. Along with technological developments, such as digital-based navigation systems and automated ships, demands for workforce competency in the shipping sector are also increasing. This condition makes the role of vocational schools in the shipping sector increasingly strategic in preparing graduates who can compete in the international job market.

However, in practice, vocational education in the shipping sector in Indonesia still faces various significant challenges (Abraham, 2017). One of the main challenges is the gap between educational curricula and industry needs. The curriculum in many shipping vocational schools can still not accommodate the technical and non-technical skills needed in the field. For example, although basic technical skills such as navigation and safety techniques are taught, soft skills related to time management, decision-making, and teamwork are not emphasized enough. This impacts the readiness of graduates when entering the world of work.

Indonesia, as the largest maritime country in the world (Dao, 2024), has a strategic role in the international supply chain, and the shipping industry functions as the backbone of global trade in this region. This strategic role places Indonesia in a critical position to develop competent human resources in the shipping sector, primarily through vocational education institutions focusing on maritime skills. However, various significant challenges confront this effort, from aspects of the curriculum, facilities, and competence of teaching staff to leadership models in managing sailing vocational schools.

In this context, the role of leaders in vocational schools in the shipping sector is a key factor in facing and overcoming these challenges (Day et al., 2016). A leader with a strategic vision can design innovative and adaptive steps in managing schools, including curriculum updates, optimizing resources, and developing collaborative networks with industry. Amid increasingly competitive global conditions, leaders at shipping vocational schools must be able to function not only as administrators but also as drivers who can motivate and direct all elements of the school to achieve a vision and mission that is relevant to the needs of the job market.

1. Education Management in Vocational Schools

Vocational education management has unique characteristics that differentiate it from academic education management in general. According to Dahalan et al., 2024), vocational education focuses on developing practical skills that suit industry needs. In vocational schools, education management not only includes managing the curriculum and human resources but also requires a valuable approach that is adequate to meet the competency standards desired by the world of work. Furthermore, (EL-Nwasany et al., 2024) stated that educational management in vocational schools must be responsive to technological developments and changing industrial demands to produce graduates who are ready to work.

In the context of vocational schools in the shipping sector, educational management challenges are increasingly specific, especially in meeting safety standards, technical knowledge, and special maritime skills. (Paraggua et al., 2022) Shows that educational management at shipping vocational schools must be able to provide training infrastructure, such as simulators and training vessels, as well as update the curriculum according to international standards. This shows that effective educational management relies heavily on schools' ability to build strategic partnerships with industry and maritime authorities.

Educational management in vocational schools is a complex process oriented towards developing practical skills needed by industry. According to Terry, Educational management does not only include administrative aspects but also how

schools can adapt to industry needs. Vocational education requires effective management to ensure that the curriculum, facilities, and teachers meet competency standards. In vocational shipping schools, the management approach must consider safety standards and special certifications required by international maritime authorities. In line with this, (Nugroho et al., 2024) stated that educational management focusing on practice can support graduates to be more work-ready and adaptive to industrial changes.

2. The Role of Leaders as Leaders in Education

Leaders in educational organizations, especially in vocational schools, play an essential role in determining the direction and quality of the institution. According to Robbins and Coulter (2016), effective LeadershipLeadership includes the ability to provide a vision, mobilize resources, and motivate a team to achieve set goals. In an educational context, a leader must have the ability to understand educational needs and challenges and translate them into practical action. The leader's role in vocational schools focuses on improving the quality of education through curriculum management, increasing the competency of teaching staff, and optimizing educational facilities.

Research (Emeanulu & Sayed, 2024) on transformational LeadershipLeadership shows that effective leaders can inspire positive change in institutions. In shipping vocational schools, leaders with a transformational leadership style can encourage the development of industrial competency-based curricula, improve the skills of teaching staff, and expand collaboration networks with external parties. This is in line with Hughes et al., 2018) opinions that effective education leadership requires the leader's ability to innovate, manage change, and strengthen the link between education and industry needs.

Research by (Nurabadi et al., 2021) shows that strong LeadershipLeadership positively affects the quality of learning and improves the performance of teachers and students. In vocational education in shipping, leaders need to have a clear vision and skills to mobilize resources and support professional development for teaching staff. This is because, without adequate leadership support, efforts to improve the quality of education are often hampered by structural problems and limited resources.

3. Industry-Based Curriculum in Vocational Education

An industry-based curriculum is a learning approach designed to align with applicable industry needs and standards. According to (Manajemen et al., 2020), an industry-based curriculum is essential in vocational education because it provides relevant and appropriate learning. In the shipping sector, the curriculum developed must pay attention to safety standards, technical skills, and developments in navigation technology and ship operations. This is supported by the opinion of (Chukwuka D. Offodum & Stephen Oyelami, 2022), who emphasize that an industry-based curriculum requires close partnerships with companies so that the learning material delivered aligns with current industry needs.

4. Facilities and Infrastructure in Vocational Education

Facilities and infrastructure are essential elements in vocational education oriented towards practical skills. According to (Kebede et al., 2024), vocational schools need adequate facilities to provide students with applicable and practical learning experiences. In vocational schools in the shipping sector, facilities such as simulators, training ships, and engineering laboratories are essential elements to equip students with expertise that is appropriate to the real work environment. However, limited facilities are still an obstacle in many vocational schools, especially in developing countries like Indonesia.

5. Collaboration with Industry in Vocational Education

Collaboration with industry is an essential strategy in vocational education management. Sources from (Malhotra et al., 2023) show that partnerships between schools and industry can provide significant benefits for students, including internship programs, training, and the provision of relevant skills. This collaboration also helps schools update curricula, develop teacher training programs, and provide opportunities for students to gain hands-on experience in the field.

Collaboration between schools and industry is an essential element in vocational education. This collaboration allows schools to access a range of resources from industry, including support in curriculum development, training facilities, and internship programs. Based on research (Ahmad et al., 2024), partnerships between schools and industry can increase the relevance of learning and provide students with valuable practical experience. In the shipping sector, links with the shipping industry open up opportunities for students to engage in project-based training and internships at shipping companies, significantly improving their readiness for the world of work.

6. Transformational Leadership and Educational Effectiveness

Transformational LeadershipLeadership is a leadership approach that focuses on inspiration, motivation, and positive change in organizations. (Normen Ahamed Mafaz et al., 2024) Transformational LeadershipLeadership can significantly change organizations by providing a clear vision, encouragement, and support. In vocational schools, leaders with a

transformational leadership style can encourage change in educational management, curriculum development, and facility management. This study will examine how transformational LeadershipLeadership can improve the effectiveness of education and the quality of graduates in vocational schools in the shipping sector.

The transformational leadership model is an approach that emphasizes inspiration, motivation, and commitment to a long-term vision. Leaders with this model can positively change and increase active participation from all elements of the organization. (Normen Ahamed Mafaz et al., 2024) state that transformational LeadershipLeadership in education encourages leaders to set good examples, pay attention to individual development, and motivate staff to innovate. In vocational schools, transformational LeadershipLeadership can help overcome educational management challenges, such as curriculum adjustments and facility development.

In maritime vocational schools, leaders with a transformational approach can motivate teachers and students to achieve high standards and be actively involved in improving the quality of education. Research (Karjuni, 2024) shows that transformational LeadershipLeadership has a positive impact on staff satisfaction and performance levels, which in turn contributes to improving the quality of education. Inspiring leaders are also able to build a work culture that is proactive, innovative, and responsive to change, which is very important in facing challenges in the dynamic world of vocational education.

7. The Urgency of Research on Leadership in Sailing Vocational Education

In previous research, vocational education leadership in the shipping sector still received little attention, even though its role was vital in improving the quality of education and graduate readiness. This research seeks to fill this gap by exploring the role of LeadershipLeadership in shipping vocational schools, especially in curriculum development, provision of facilities, and collaboration with industry. By understanding the characteristics of effective LeadershipLeadership, it is hoped that vocational schools can implement relevant leadership strategies and improve the overall quality of education (Dyantyi et al., 2024).

Education Management in Vocational Schools (Theoretical Reinforcement).

Educational management in shipping vocational schools requires leaders capable of navigating technical, regulatory, and safety complexities. These demands align closely with Adaptive Leadership, which emphasizes the leader's ability to help institutions adjust to challenges that require learning and innovation rather than technical fixes. For instance, insufficient maritime simulators or outdated training facilities represent adaptive challenges requiring collaborative problem-solving rather than routine management.

At the same time, Transformational Leadership becomes relevant in motivating teachers to upgrade their maritime skills and embrace ongoing professional development (Nugroho et al., 2024). Leaders must encourage staff to adopt new pedagogical approaches and technologies, moving beyond traditional teaching patterns toward industry-aligned practices.

The Role of Leaders in Education (Explicit Theory Integration).

Effective leaders aligns strongly with the principles of Transformational Leadership, which highlight the importance of articulating a vision, motivating employees, and stimulating innovation. In shipping vocational schools, transformational leaders can champion the development of maritime competencies, inspire teachers to pursue global certifications, and initiate improvements in instructional practices.

Furthermore, Adaptive Leadership provides an additional lens for understanding LeadershipLeadership in this context. Adaptive leaders help schools respond to fluctuating maritime industry requirements, such as evolving safety standards or digital navigation systems. They facilitate learning, manage resistance to change, and guide the organization through uncertain conditions—capabilities critical for maritime vocational institutions facing dynamic global demands.

Industry-Based Curriculum in Vocational Education (Leadership-Theory Link Added)

Developing an industry-based curriculum requires leaders who can motivate stakeholders and navigate the complexities of aligning school curricula with international maritime standards. Transformational leaders play a key role by mobilizing teachers to update learning materials, embracing industry feedback, and adopting innovative naval technologies.

Meanwhile, Adaptive Leadership explains how leaders help schools confront gaps between current curriculum practices and industry expectations. Adaptive leaders encourage experimentation, pilot programs, and iterative changes, enabling the curriculum to continuously evolve in line with technological and regulatory shifts.

Facilities and Infrastructure (Theoretical Strengthening)

Addressing facility limitations—such as insufficient simulators or outdated equipment—reflects a need for Adaptive Leadership, as these challenges involve systemic issues that require creative, collaborative solutions. Leaders must

engage stakeholders, build partnerships, and secure resources to close infrastructure gaps.

From a Transformational Leadership perspective, visionary leaders can inspire both staff and external partners to support facility development initiatives, fostering shared commitment toward improving maritime training environments.

Collaboration with Industry (Clearer Theory Connection)

Strong industry collaboration in maritime vocational education requires leaders who can build trust, negotiate partnerships, and establish a shared vision with naval companies. These competencies closely align with Transformational Leadership, which emphasizes relationship-building, inspirational motivation, and the pursuit of collective goals.

At the same time, the need to adjust school practices to industry feedback and evolving maritime technologies reflects Adaptive Leadership, where leaders guide organizations through complex adaptation processes and help stakeholders confront necessary changes.

Transformational Leadership and Educational Effectiveness (Deepening Theory Use)

Transformational LeadershipLeadership is particularly relevant for maritime vocational schools due to its emphasis on vision, motivation, and institutional change. Transformational leaders are well-positioned to cultivate a culture of innovation, encourage continuous professional development among instructors, and align institutional goals with global maritime competencies.

Adaptive LeadershipLeadership complements this by focusing on how leaders manage the adaptive challenges inherent in maritime education—such as integrating new simulation technologies, responding to regulatory changes, and closing gaps between industry needs and school capacity. Together, these leadership theories provide a robust academic framework for understanding how LeadershipLeadership drives educational effectiveness in shipping vocational schools.

Urgency of Research (Theory-Driven Justification)

The limited research on LeadershipLeadership in shipping vocational schools underlines the need to investigate LeadershipLeadership approaches through established theories such as Transformational and Adaptive Leadership. These theories offer valuable insights into how leaders can effectively manage curriculum development, facility provision, and industry collaboration—areas central to improving graduate quality and readiness. By grounding the research in these theories, the study can contribute more meaningfully to the academic discourse on vocational education leadership and provide actionable recommendations for maritime institutions.

2. Method

This research uses a qualitative approach with a case study method (Gammelgaard, 2017) to understand in depth the role of leaders in shipping vocational schools in improving the quality of education. A qualitative approach was chosen because it can reveal the phenomenon of educational LeadershipLeadership and management in depth and detail, which is difficult to explain only with quantitative data. Case studies allow researchers to focus on a specific unit, namely a shipping vocational school, by paying attention to the particular context in educational management and the challenges leaders face in carrying out their roles.

The qualitative approach used in this research provides an in-depth understanding of the role of LeadershipLeadership in educational management at shipping vocational schools. A qualitative approach emphasizes interpreting social interactions and individual experiences (Dzogovic & Bajrami, 2023), so it is very suitable for analyzing phenomena related to LeadershipLeadership in vocational school environments that are complex and have exceptional standards, such as the field of shipping.

This research is a case study because it focuses on one specific context, namely vocational schools in the shipping sector. Case studies allow researchers to explore the context in depth, comprehensively study aspects of educational management and LeadershipLeadership in vocational schools, and identify specific factors that influence the quality of education in these schools (Basuki et al., 2024).

This research focuses on three main aspects: The Role of Leadership in Curriculum Development: How can shipping vocational school leaders ensure that the curriculum implemented is relevant to industry needs and aligned with national and international standards? Facilities and Infrastructure Management: How leaders manage and maintain adequate educational infrastructure to support the practical learning process for shipping students. Relations with Industry: How leaders build relationships with shipping companies and related industries to support competency-based education and increase graduate work readiness.

The subjects of this research are leaders, teaching staff, and administrative staff at vocational schools in the shipping sector that have good accreditation and meet national education and exceptional shipping standards in Indonesia. The location of this research was determined purposively at several shipping vocational schools with a reputation for implementing quality and industry-oriented educational management.

Data collection techniques in this research include in-depth interviews, participant observation, and documentation studies. Interviews were conducted with school leaders, teachers, and staff to gain views on educational management, leadership strategies, and the challenges faced. Semi-structured interviews are used so that sources can provide detailed and flexible answers. Researchers conducted observations in the school environment to understand the educational management process, the condition of facilities, and interaction patterns between leaders, teachers, and students. These observations will help researchers understand how leaders play a role in supporting and improving the quality of education. Documentation in curriculum, school performance reports, and school development plans will be analyzed to understand the planning and evaluation carried out by leaders in educational management. This data provides additional objective information to complement the results of interviews and observations.

The main instrument in this research is the researcher, who plays a role in collecting, analyzing, and interpreting data. Researchers used interview guides, observation sheets, and a list of documents that needed to be studied as supporting instruments in the data collection process. This instrument was developed based on a literature review and research objectives to ensure relevant and quality data.

1. In-depth Interviews

a. Sample Size and Participant Selection

Interviews were conducted with 15–20 participants consisting of: 3–4 school leaders (principal, vice principals for curriculum, facilities, and industry partnerships), 8–10 teaching staff representing general, productive (shipping-related), and practical instructors, 3–5 administrative and support staff involved in management, quality assurance, and documentation.

Participants were selected using purposive sampling based on their involvement in curriculum development, infrastructure management, and industry collaboration. Additional participants were recruited through snowball sampling when initial informants suggested key personnel who could provide deeper insights.

b. Interview Procedure

Interviews were semi-structured, using an interview guide developed from literature and the research objectives. Each interview lasted 45–90 minutes, conducted in Indonesian to ensure clarity and depth of meaning. Interviews were conducted in private meeting rooms within the school to ensure confidentiality and minimize distractions. With participants' consent, conversations were audio-recorded and supplemented by field notes documenting non-verbal cues, contextual information, and initial reflections.

c. Data Coding and Interpretation

Interview recordings were transcribed verbatim. Data analysis used thematic coding, following Braun & Clarke's six-step framework: Familiarization with data, Generating initial codes, Searching for themes, Reviewing themes, Defining and naming themes, and Producing the report. Coding was conducted manually or with the assistance of NVivo to organize transcripts and segment text according to emerging categories such as leadership roles, curriculum alignment, infrastructure management practices, and industry relationship strategies. To ensure dependability, inter-coder checking was performed with another qualitative researcher to compare coding consistency on selected transcript samples.

2. Participant Observation

a. Observation Focus and Setting

Observations were conducted to capture leadership practices in their natural context. The researcher spent 2–4 weeks within the vocational schools in various settings: leadership meetings, teacher working groups, school facility management activities, industry collaboration events, classroom, and workshop/practical sessions.

b. Observation Method

A participant-as-observer approach was used, meaning the researcher interacted with staff but primarily maintained an observing role. Observation sheets guided attention to specific elements, including: leadership communication patterns, decision-making processes, supervision of teaching and practical activities, utilization and maintenance of facilities, and interactions with industry representatives. Field notes documented behaviors, events, environmental conditions, and reflective comments.

c. Data Interpretation

Observation data was analyzed through: descriptive coding to label significant actions or interactions; pattern coding to identify recurring leadership behaviors or management practices; triangulation by comparing observation findings with interview accounts and documents, enhancing the credibility of interpretations.

3. Document Analysis

a. Types of Documents Reviewed

Documents were collected purposively and included: school curriculum documents (syllabi, learning outcomes, lesson plans), school accreditation reports, facilities management records and equipment inventories, partnership agreements or MoUs with shipping companies, school annual reports and strategic plans, student competency assessment records, and performance evaluation forms for teachers and leaders.

b. Document Selection Criteria

Documents were selected based on their relevance to the three main focus areas: curriculum development and implementation, facilities and infrastructure management, and industry collaboration.

c. Data Extraction and Interpretation

Documents were read repeatedly to identify information relevant to leadership roles and management practices. Data was coded using content analysis to categorize information according to themes (e.g., curriculum relevance, compliance with standards, facility adequacy, industry involvement). Comparative study to identify alignment or discrepancies between written plans (documents) and actual practices (interviews and observations). Document analysis served as an objective complement to interview and observational data, strengthening data triangulation and ensuring a comprehensive understanding of educational LeadershipLeadership in the shipping vocational context.

4. Ensuring Data Validity and Reliability

To enhance the trustworthiness of the study, several strategies were employed: Triangulation, combining interviews, observations, and documents to verify themes. Member checking: participants reviewed summaries of their interview statements for accuracy. Peer debriefing: discussing emerging themes with fellow researchers to enhance analytical rigor. Audit trail: maintaining detailed records of data collection procedures, coding decisions, and analytic memos.

3. Results and Discussion

1. The Role of Leaders in Curriculum Development that Suits Industry Needs

The research results show that shipping vocational school leaders play an essential role in ensuring that the curriculum meets industry standards and is applicable. Leaders are actively involved in developing a curriculum that accommodates practical needs in the shipping field, such as technical skills, navigation skills, safety knowledge, and ship management. This role is carried out through collaboration with shipping companies, both national and international, to obtain input regarding the skills needed by graduates in the workplace.

Through this collaborative approach, leaders not only adapt the curriculum to industry needs but also introduce international certification programs necessary for students to be competitive in the global job market. This approach is in line with previous research (Vats & Malik, 2024), which states that the role of leaders in vocational education is to prepare competent graduates by integrating industry needs into the school curriculum. Visionary and proactive leaders succeed in bridging the needs between the world of education and work so that graduates are better prepared and competitive.

2. Management of Learning Support Resources and Facilities

Effective marine vocational school leaders are also responsible for managing facilities and resources to support quality education. Based on the results of observations, leaders strive to provide adequate practicum facilities, such as ship simulators, navigation rooms, and marine safety facilities. Leaders are trying to maximize the school budget for updating equipment in line with international standards, as well as planning the use of funds from industrial collaboration to overcome the limited funds provided by the government.

The research results show that the availability of adequate facilities positively correlates with student competence in carrying out practice in the field. With sufficient facilities, students can carry out simulations and exercises relevant to the demands of work in the shipping sector. This strategy shows that effective leaders not only focus on the curriculum aspect but also ensure that every aspect of educational support, especially infrastructure, is appropriately considered. This is by (Istakri et al., 2024), who emphasize the importance of infrastructure support as one of the factors that improve the quality of education in vocational schools.

3. Leadership in Building a Culture of Collaboration with Industry

The role of leaders in building strong relationships with the shipping industry was also found to contribute to improving

the quality of education. Leaders actively play a role in establishing strategic partnerships with shipping companies for internship programs and student recruitment so that students gain direct experience in the field. The interviews showed that the leaders entered into a cooperation agreement that was beneficial to both parties, where the school had the opportunity to send students as apprentices. At the same time, the company received prospective workers who had been trained.

The relationships built between the school and industry leaders allow graduates to have better job opportunities, ultimately enhancing the school's reputation. In this research, effective leaders not only play a role in internal school management but are also proactive in building external networks that benefit students. This finding aligns with (Ahmad et al., 2024) studies that show that collaborative LeadershipLeadership in vocational schools can provide practical learning experiences for students and strengthen connections with the industrial sector.

4. Strategy for Increasing the Competency of Teachers and Teaching Staff

Sailing vocational school leaders also have an essential role in improving teacher competency in education. Based on interviews, it was found that leaders organize training and development programs that involve training from industry professionals. Leaders provide regular training for teachers to continually update their skills in line with technological developments and the latest competency requirements in the shipping sector.

Developing teacher competency not only impacts improving their technical and pedagogical abilities but also improves the quality of learning provided to students. Teachers who have an understanding of industry needs will find it easier to teach relevant skills to students. The leader's role in ensuring that teachers receive this training shows visionary LeadershipLeadership and supports improving the quality of teaching, which is a key element in the vocational education system (Liu et al., 2024).

5. Challenges in Implementing Educational Management in Sailing Vocational Schools

During the research, several main challenges in implementing educational management in shipping vocational schools were discovered, including budget limitations, difficulty retaining qualified teaching staff, and adaptation to technological developments. Even though school leaders have attempted various strategies to overcome these challenges, there are still obstacles to implementing ideal educational management.

Budget Limitations: Sailing vocational schools often face limited funding for providing state-of-the-art facilities and training for teachers. Leaders must be able to carry out effective budget management and seek alternative funding sources, such as through collaboration with industry.

Quality of Teaching Staff: Finding teaching staff who have direct experience in the shipping sector is often a challenge, primarily due to competition with industries that offer higher salaries. Leaders must strive to retain quality staff through incentives and a supportive work environment.

Technological development: The shipping sector is experiencing rapid technological developments, such as the use of automation technology and computer-based simulations. School leaders need to be proactive in aligning curriculum and training with these technological developments so that graduates remain relevant.

6. Leadership Implications for Education Quality

The findings of this research indicate that the role of leaders has a significant impact on improving the quality of education in vocational schools in the shipping sector. Effective leaders not only focus on internal aspects such as curriculum and teacher competency development but also pay attention to external relations with industry and the ability to overcome managerial challenges schools face.

The role of leaders who focus on improving the quality of education is based on the concept of transformative LeadershipLeadership, which emphasizes the importance of leaders in motivating and inspiring members toward positive change. Thus, leaders who can overcome challenges in shipping vocational education management can help schools achieve their vision and mission to produce graduates who are competent and ready to compete in the world of work.

7. Implementation of Leadership Values in Building a Culture of Discipline and Professionalism

A culture of discipline is an essential aspect of vocational education in the shipping sector because the maritime world requires a high level of obedience and professionalism. Leaders at sailing vocational schools not only act as managers but also as figures who instill the values of discipline, responsibility, and integrity. Based on the results of interviews and observations, it is known that leaders apply a systematic approach to instilling disciplinary values in students. For example, leaders adopt strict standard operating procedures (SOPs) in students' daily activities, including attendance, dress, and compliance with safety rules.

Consistent application of SOPs and rules, supported by regular monitoring, helps students internalize the professional attitudes needed in future employment—LeadershipLeadership, which influences subordinate behavior through example and supervision. Leaders who can demonstrate discipline in their daily actions will be an example for students, who, in turn, adopt these values as part of their habits.

In addition, implementing a culture of discipline in schools directly influences the quality of education. Teachers are also more encouraged to adhere to teaching standards and create a structured and focused learning environment. Thus, this culture of discipline supports the school's vision to produce graduates who are ready to work and able to compete in the shipping sector.

8. Innovation in Developing Technology-Based Learning Programs

In the digital era, innovation in education is inevitable, especially in the vocational sector, which requires mastery of high technology. Innovative sailing vocational school leaders strive to integrate cutting-edge technology into the learning process. Based on the research results, it is known that school leaders are trying to implement technology-based learning, such as the use of simulators for navigation and safety training at sea. By implementing this technology, students not only gain practical experience that approaches situations in the field but are also trained to face challenges that may arise in real situations.

Leaders are essential in initiating this technology procurement program and involving third parties in funding and training for teaching staff. Apart from that, training for teachers to understand and use new technology is also a strategic step taken by leaders to ensure that this innovation is practical. Thus, technology development is not only a technical responsibility but also a visionary leadership strategy in supporting the continuation of high-quality learning.

9. Continuous Evaluation and Performance Improvement

A critical aspect of LeadershipLeadership in educational management is regular performance evaluation and improvement. Based on the results of observations and interviews, shipping vocational school leaders implemented an evaluation system that involved feedback from teachers, students, and industry partners. For example, in evaluating the success of an internship program, leaders not only request reports from students but also from supervisors at the internship site to gain a comprehensive perspective on the skills students have mastered. Leaders then use this information to adapt the curriculum and provide relevant additional training for teachers where necessary.

In addition, leaders adopt key performance indicators (KPI) to measure the effectiveness of educational management in schools. Through this KPI, leaders can monitor achievements such as teacher attendance, curriculum completion, student satisfaction levels, and graduation results. This evaluative approach shows that effective leaders are not only results-oriented but also towards a process of continuous improvement, thereby encouraging a culture of high performance in schools. This is in line with the principles of educational management put forward by (Sonmez Cakir & Adiguzel, 2020), which state that leaders need to implement regular performance evaluations to achieve effectiveness and efficiency in the organization.

10. The Role of Leaders in Building an Inclusive and Collaboration-Oriented Learning Environment

In a vocational school environment in the shipping sector, good leaders can build an inclusive learning environment and support collaboration. This inclusive environment is essential so that all students, without exception, can feel comfortable and have equal opportunities to develop. Based on the results of the interviews, school leaders encourage a collaborative learning approach that involves students from different backgrounds working together on group assignments. This approach trains students to work together and appreciate differences, which are essential skills in the world of work.

11. Development of a Fair Reward and Punishment System

Leaders also play an essential role in managing the reward and punishment system in schools as part of efforts to create a conducive culture. Based on the results of observations, the LeadershipLeadership of the sailing vocational school implemented a reward system for outstanding students, both in academics and practice. For example, students who demonstrate high skills in seafaring practices are allowed to undertake internships at partner companies, which serves as motivation for other students to achieve similar achievements.

On the other hand, leaders also implement clear disciplinary rules for students who violate school regulations. A punishment system that is applied consistently and transparently makes students understand the consequences of their actions so that discipline can be maintained. The application of fair and transparent rewards and punishments not only increases student motivation but also creates an environment that values hard work and responsibility.

12. Implications of Research Results for Vocational Education Policy Development in the Shipping Sector

The results of this research have implications for policy development in the field of vocational education, especially for the

shipping sector. The role of a strong and focused leader in developing curriculum, facilities, and relationships with industry is an essential factor that can be used as a reference for policymakers to improve the overall quality of vocational education. The government and related institutions are expected to support the role of leaders in vocational schools through leadership training, granting wider authority, and adequate budget allocation to develop educational facilities.

13. Leadership in Managing Internationalization Programs

As the need for skilled labor in the global maritime sector increases, shipping vocational schools are also encouraged to prepare students to be competitive in the international market. School leaders are essential in facilitating internationalization programs that allow students to gain global experiences, such as student exchanges, internships with foreign shipping companies, or international certification programs.

14. Strengthening Monitoring and Supervision Systems to Improve Learning Quality

Effective sailing vocational school leaders also pay special attention to monitoring and supervision systems to ensure that the teaching and learning process runs well. In the context of vocational education, monitoring carried out by leaders includes classroom observations, evaluating the use of practicum facilities, and assessing student competency achievement.

The research results show that leaders who regularly supervise and provide feedback to teachers play a significant role in improving the quality of teaching. For example, leaders may identify areas that need improvement, such as teaching techniques that must be adapted to student needs or more effective practicum approaches. In addition, leaders who regularly evaluate teacher performance can help create a work culture based on quality and continuous improvement. Previous research (Tarimo & Lekule, 2024) supports this view, emphasizing that regular supervision from leaders who focus on improving the quality of teaching significantly influences the success of vocational education.

15. Application of Data-Based Leadership in Decision Making

One of the approaches that is developing in educational management is data-based LeadershipLeadership. In sailing vocational schools, leaders who use data as a basis for decision-making can formulate policies that are more effective and right on target. In this research, it was found that successful leaders in educational management utilize data from various sources, such as student attendance data, academic grades, practical results, and feedback from industry partners.

Utilizing this data not only makes it easier for leaders to identify school needs but also helps in designing quality improvement strategies. For example, if data shows that student success rates in seafaring practicals are declining, leaders can conduct a thorough evaluation of facilities, quality of teaching, and curriculum to find the cause. This data-based approach shows that leaders can utilize accurate and relevant information as a basis for making decisions that are more responsive to vocational education needs.

16. Risk Management Strategy in Sailing Vocational Education

Vocational schools in the shipping sector have unique challenges, especially related to security risks in practical activities in the field. School leaders manage these risks through various safety policies and risk mitigation procedures. Based on the results of interviews, school leaders carry out routine safety training for students and teachers and provide adequate safety equipment, such as life jackets, fire extinguishers, and emergency communication systems.

Good risk management is an indicator of responsible LeadershipLeadership, where leaders not only focus on academic aspects but also on the welfare and safety of all individuals involved in the educational process. This strategy ensures that teaching and learning activities can occur safely and without obstacles so that possible risks do not compromise the quality of education. In this case, an effective leader plays a driving role in creating a safe and conducive student environment.

17. Adaptive Leadership Approach to Policy Change

Leadership at shipping vocational schools cannot be separated from the influence of policy changes often implemented by the government. Adaptive leaders can adapt to these policy changes and translate them into relevant programs for the school. For example, when the government introduced an international competency certification policy, school leaders could adapt curriculum and training to meet these requirements.

Based on research results, leaders who can anticipate changes and quickly adapt education management strategies tend to be more successful in maintaining the quality of education in vocational schools. These adaptive leaders also demonstrate a commitment to updating their knowledge and managerial abilities so that they can manage challenges that arise along with the development of vocational education policies. This is in line with research conducted by (Özen & Yavuz, 2024), which found that adaptive LeadershipLeadership is an essential element in maintaining the quality and sustainability of education amidst the dynamics of change.

18. Human Resources Development Through Collaboration with Industrial Training Centers

Human resource development is one of the priorities in vocational education management. Effective leaders often build collaborations with industrial training centers to improve the competence of teachers and teaching staff. Based on research, school leaders who establish relationships with the shipping industry for teacher training show positive results in improving the quality of teaching.

This collaboration allows teachers to gain hands-on experience in the industry, which they can then apply to their teaching. Teachers who understand industry trends and needs will be better able to provide relevant training to students. Thus, through continuous human resource development, leaders have created a cycle of consistent quality improvement in vocational education.

This research identifies that the role of leaders in shipping vocational schools is not only limited to administrative management but also includes various strategic aspects that directly influence the quality of education. Effective leaders in vocational education can integrate industry needs into the curriculum, create a culture of discipline, support technology-based learning innovation, and manage risks well.

By focusing on data-based management, leaders can make decisions that are more accurate and responsive to school needs. In addition, leaders who are adaptive to policy changes and able to build partnerships with industry demonstrate a holistic and transformative leadership role. The results of this research can be a reference for leaders in vocational education institutions to continue to improve competence and formulate appropriate policies to produce quality graduates ready to compete at national and international levels.

a. Implications for Government and Policy Makers

The study shows that leadership effectiveness is strongly tied to curriculum alignment, facility development, and adaptive responses to technological changes. These insights can guide policy makers to: Strengthen leadership development programs; Findings indicate the need for transformational and adaptive leadership competencies. The government can institutionalize leadership training modules focusing on curriculum innovation, industry networking, and technology adoption.

Allocate targeted funding for high-cost maritime facilities: Simulators, navigation labs, and safety equipment require substantial investment. Policies can adopt a needs-based funding model for maritime schools, supported by public–private co-financing schemes.

Standardize national maritime competency frameworks: Leaders currently struggle to keep curricula updated with global standards. The government can develop a unified national maritime vocational curriculum aligned with STCW and other international standards.

Facilitate internationalization and certification pathways: Support for student and teacher exchanges, global internships, and international certification will enhance workforce competitiveness.

b. Implications for Maritime Vocational Schools

Based on the findings, maritime schools can take the following action steps:

Embed leadership-driven continuous curriculum renewal: Leaders should establish curriculum councils that include shipping companies and certification bodies, Develop structured professional development tracks for teachers, Implement mandatory upskilling cycles involving industrial attachments, simulator training, and maritime safety certifications, Institutionalize data-based decision making, The use of KPIs, competency tracking, and internship performance data should guide instructional improvements, Build internal cultures of discipline and professionalism, Leaders must consistently model maritime discipline values aligned with industry expectations. Integrate advanced technology systematically, establish long-term technology adoption plans (e.g., simulation-based training, automation modules).

c. Implications for Industry Partnerships

The study highlights that collaboration with shipping companies significantly enhances student readiness and school performance. Recommendations for industry include:

Formalize long-term partnership frameworks: Industry partners should adopt MOU-based models providing internships, scholarships, and training resources—co-develop micro-credential and certification programs. Short courses in navigation software, marine engine automation, or maritime safety can be jointly delivered. Provide industrial mentors for teachers and students: This ensures real-world alignment of competencies and supports ongoing teacher professionalization. Include schools in tech-transfer initiatives. As maritime technologies evolve, the industry can support schools in acquiring and integrating updated systems.

Unique Contribution of the Study to Existing Literature. This study offers several distinct contributions to the limited body of literature on vocational LeadershipLeadership in the maritime sector:

1. Empirical Insights in an Under-Researched Context

While LeadershipLeadership in vocational education is widely studied, research focused specifically on maritime vocational LeadershipLeadership—particularly in developing countries like Indonesia—is exceptionally scarce. This study fills that gap by providing: empirical evidence on how leaders manage specialized maritime curricula, real-world strategies for building industry collaborations in the shipping sector, insights into facility management unique to maritime training (simulators, safety labs, ship-based practice).

2. Integration of Transformational and Adaptive Leadership in Maritime Education

Most existing studies examine LeadershipLeadership in general educational settings. This study uniquely: applies Transformational Leadership to curriculum development, teacher capacity building, and culture formation; uses Adaptive Leadership to explain leader responses to policy changes, technological evolution, and industry dynamics. This dual-framework approach provides a more holistic understanding of leadership effectiveness in maritime vocational institutions.

3. Practical Leadership Strategies Grounded in Real Conditions

The research contributes new knowledge on: How leaders navigate budget limitations using industry partnerships, strategic practices for facility upgrading in resource-constrained environments, development of maritime-specific professional cultures (discipline, safety, compliance), data-based leadership in maritime skills assessment. These findings extend the current literature by offering context-specific leadership practices relevant for countries with emerging naval industries.

4. A Comprehensive Model of Maritime Vocational Leadership

By synthesizing findings across curriculum, facilities, human resources, risk management, and internationalization, the study offers a multi-dimensional leadership model tailored for maritime vocational schools. This model can serve as a theoretical and practical reference for maritime education stakeholders globally.

4. Conclusions

This research shows that leaders at shipping vocational schools have a significant role in improving the quality of education through various innovative and adaptive management strategies. Some of the main points that can be concluded from this research are as follows:

The Strategic Role of Leaders in Developing Curriculum and Education Programs: Leaders at shipping vocational schools are not only responsible for administrative aspects but also play a strategic role in aligning the curriculum with the needs of the shipping industry. Through this approach, leaders can prepare graduates who are competent and ready to work in the competitive maritime sector.

Development of a Culture of Discipline and Professionalism: Leaders play an essential role in instilling the values of discipline and professionalism through consistent implementation of school rules and culture. This culture contributes significantly to the formation of students' character by the standards of the world of work in the shipping sector.

Technology-Based Learning Innovation: Leaders who encourage the use of technology in the learning process can increase students' technical competence. With technology such as navigation simulators and safety tools, students can gain practical experience that is relevant and close to real conditions in the field.

Adaptive Leadership to Policy Change: Leaders who are adaptive to changes in vocational education policies demonstrate good abilities in adapting school programs and management to government and industry demands. This shows that flexible and responsive LeadershipLeadership is the key to maintaining educational quality.

Collaboration with Industry for HR Development: Partnerships with the shipping industry play an essential role in developing the competence of teachers and staff. This collaboration enables the transfer of industry knowledge and practices into learning so that students receive training that meets market needs.

Strengthening Teacher Competence in Practical Learning: The role of leaders in improving teacher competency through training and collaboration with industry has proven effective in adapting teacher abilities to the standards required by the world of work. Teachers who are competent and have appropriate practical experience will be better able to transfer technical knowledge optimally to students.

Applying Participative Leadership to Increase Staff and Student Engagement: The participatory LeadershipLeadership applied by vocational school leaders in the shipping sector has a positive impact on creating a collaborative environment where teachers, staff, and students feel involved in the decision-making process. This approach encourages

active involvement from the entire school community, improving the quality and effectiveness of educational programs.

Developing Students' Social Competence through a Collaborative Learning Approach: Apart from technical competence, leaders at vocational schools in the shipping sector also play a role in developing students' social skills. With a collaborative learning approach and group projects, students learn to work together and develop interpersonal skills that are much needed in the world of work.

Implementation of Structured Evaluation to Identify and Overcome Educational Barriers: Research shows that effective leaders use structured evaluation methods regularly to assess the quality of curriculum, teaching methods, and student learning outcomes. Through this evaluation, leaders can identify areas that need improvement and formulate appropriate solutions to overcome various educational obstacles.

The Role of Leaders in Forming a Positive Image of Sailing Vocational Schools: Leaders also have a responsibility to build a positive image of vocational schools in the eyes of society and industry. With a good reputation, it will be easier for a school to attract qualified prospective students and gain support from various stakeholders, including industry and government.

Based on the conclusions above, several suggestions that can be put forward are as follows:

Improved Leadership Development Program for Vocational School Leaders: The government and related educational institutions are advised to organize special leadership training for vocational school leaders, especially in the shipping sector. This program must include training on risk management and educational technology innovation, as well as developing partnerships with industry, so that leaders can carry out their roles optimally.

Increased Budget for Procurement of Learning Technology: Technology is an essential aspect of vocational education, and therefore, it is recommended that the authorities allocate an adequate budget for the provision of practicum facilities and learning technology. Using modern tools like simulators and safety equipment will provide a better practical experience for students.

Expansion of Partnership with the Shipping Industry and Maritime Academy: Collaboration with the shipping industry and international maritime academies needs to continue to be developed to expand student access to internship opportunities, student exchange, es, and international certification. This will help students to have global insight and internationally recognized competencies.

Implementation of a Data-Based Monitoring and Evaluation System: Vocational school leaders need to implement a data-based monitoring and evaluation system to measure and improve the quality of learning on an ongoing basis. With accurate data, leaders can more easily identify areas that need improvement and formulate more appropriate policies.

Strengthening the Reward and Punishment System: To create a conducive school culture, leaders are advised to implement a fair and transparent reward and punishment system. This will increase student motivation and encourage better discipline and academic performance.

Increasing Teacher Skills in Maritime Education Technology: It is recommended that training programs focusing on maritime-specific technologies, such as shipping simulation, radar,r, and maritime safety equipment, be improved for teachers. This will enrich the student learning experience and ensure that learning is in line with evolving industry standards.

Implementation of an Assessment System that Emphasizes Practical Competency: School leaders are expected to develop an assessment system that emphasizes the practical competencies and applied skills possessed by students. This assessment system needs to include direct competency tests involving industry-appropriate equipment and procedures so that graduates are truly skilled in practice.

Student Empowerment in Character Development Programs: Apart from technical education, developing student character is an essential aspect of producing graduates who have high work ethics. Programs such as LeadershipLeadership, cooperation, and social responsibility training can be implemented regularly with the support of school leaders and teachers.

Increasing Parental Involvement in the Education Process: A more intensive approach is needed to involve students' parents in vocational education programs. This can be through effective communication programs, workshops with parents, or providing regular information regarding student progress. Parental support will help motivate students and strengthen the disciplinary values instilled at school.

Policy Development to Increase Student National and International Competition: It is recommended that school leaders collaborate with institutions organizing national and international competitions. Students' participation in the competition will test and improve their abilities and build the school's reputation as an institution that produces high-quality graduates.

Providing Incentives and Awards for Outstanding Staff and Teachers: To increase the motivation and commitment of teaching staff, school leaders can implement incentive programs for teachers and staff who excel to improve the quality of education. This transparent reward system will increase work morale and create a conducive work environment.

Alumni Assistance in Developing Careers in the Shipping Sector: As part of ongoing support, leaders are advised to design mentoring programs for alums, especially when entering the job market. This can include additional skills training, career seminars, and networking with the industry to support graduates' career development.

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Authors contributions

Darul Prayogo was responsible for designing the study framework and supervising the overall research process. Okvita Wahyuni conducted data collection and contributed to the analysis of findings. Wahyu Prasetya Anggrahini carried out the literature review and assisted in interpreting the qualitative data. Desi Aryani drafted the initial version of the manuscript, while Indira Ari Putri revised and refined the manuscript for intellectual content. All authors discussed the results, contributed to the final version, and approved the final manuscript. Darul Prayogo and Okvita Wahyuni contributed equally to the conceptualization of this study.

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