Optimizing the Role of Applied Maritime Science Education on Logistics Transformation Based on the Automatic Identification System (AIS) in Islamic Countries

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Abstract
This study underscores the pivotal role of applied maritime education in driving the transformation of logistics through the Automatic Identification System (AIS) in Islamic countries. By integrating AIS technology, which enables real-time vessel tracking and monitoring, this research employs a multifaceted approach encompassing literature review, surveys, data analysis, and case studies to assess the current state of maritime education and AIS implementation. The findings emphasize the significance of specialized AIS curricula within maritime education programs and the importance of modern training facilities for fostering practical expertise in AIS technology and logistics management. Collaborative efforts among Islamic countries in curriculum development and facility investments are identified as essential to enhance maritime education's role in AIS transformation. This regional cooperation can facilitate knowledge sharing, best practices, and research, ultimately elevating maritime education standards and global competitiveness while nurturing a more skilled maritime workforce. In conclusion, regional cooperation and investment in modern training facilities are key to unlocking the potential of maritime education, promoting safer and more efficient maritime operations, and driving economic growth and security in Islamic countries.

Keywords ; AIS, Maritime Science Education, Islamic Countries

Introduction

The applied scientific education in the field of maritime navigation plays a crucial role in supporting the transformation of logistics based on the Automatic Identification System (AIS) in Islamic countries. This transformation is an integral part of efforts to enhance the efficiency and security of the movement of goods and vessels in the waters of Islamic countries. AIS is a technology that integrates automatic identification systems for ships at sea, enabling real-time tracking and monitoring. Optimized applied maritime education will be a key driver for the successful implementation of AIS in the context of maritime logistics. In this introduction, we

will explain why applied maritime scientific education plays a crucial role in the AIS logistics transformation in Islamic countries.[1]

Islamic countries possess significant potential in maritime trade, given that many of them have access to vast seas. Efficient maritime logistics are crucial to support economic growth and regional security. Therefore, the implementation of the Automatic Identification System (AIS) is an urgent need to enhance visibility and surveillance in sea-based logistics.[2]

Islamic countries, with geographical characteristics such as long coastlines and extensive sea access, have tremendous potential in the maritime trading industry. The thousands of kilometers of coastline, as seen in some countries in the Persian Gulf and the Red Sea regions, provide invaluable opportunities for international trade and economic growth. This potential also supports connectivity among Islamic countries, allowing for more efficient resource exchange.[3]

The AIS (Automatic Identification System) technology has substantial potential to enhance the efficiency of vessel operations, navigation, and overall maritime safety. Therefore, applied maritime scientific education should provide comprehensive training on AIS usage, ranging from device installation to the analysis of generated data. With a strong understanding of this technology, sailors will be able to maximize the benefits of AIS in supervising and tracking vessels in their vicinity. In addition to technical understanding of AIS, applied maritime scientific education should also encompass logistics management relevant to the maritime industry. Good logistics management is necessary to coordinate vessel movements, cargo handling, and route planning. With in-depth knowledge of logistics management, sailors will be able to effectively integrate AIS technology into their logistic processes, thereby expediting and refining the flow of goods and vessels in the waters.[4]

The enhancement of maritime workforce competence through quality education is a crucial step in optimizing the role of AIS in logistics. By training a skilled and knowledgeable generation of sailors in AIS technology and logistics management, we can improve efficiency and safety in maritime trade. This will result in tangible benefits in terms of economic growth and water security in Islamic countries.

The optimal implementation of AIS can help reduce the risk of ship accidents, enhance maritime safety, and minimize negative environmental impacts. Quality applied

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[1] Smith, J. (2019). The Role of AIS in Maritime Logistics: A Comprehensive Review. *Journal of Maritime Technology and Logistics*, 10(2), 123-138.

[2] Islam, A., & Khan, S. (2020). Enhancing Maritime Security Through AIS and Education in Islamic Countries. *International Journal of Maritime Safety, Security and Environment*, 10(3), 269-283.

[3] Shirvani, A. B., Shayan, E., & Tavana, M. (2021). *A maritime logistics model for offshore oil and gas platforms in the Persian Gulf: A case study of Iran*. Transportation Research Part E: Logistics and Transportation Review, 152, 102368.

[4] Smith, J. *The Role of AIS in Maritime Logistics,,,Loc.Cit*

maritime scientific education will train sailors to understand AIS technology well, enabling its effective use in maritime security. A successful transformation of AIS logistics will create new opportunities for trade and economic growth in Islamic countries that have access to the sea. Enhanced applied maritime education will create a more skilled and professional workforce in managing sea-based logistics.

The optimal implementation of the Automatic Identification System (AIS) has significant potential to bring positive and substantial impacts to the maritime sector. One of the main benefits of proper AIS implementation is the reduction of ship accident risks. With AIS's capability to provide real-time position and identification information, the chances of collisions between vessels can be significantly minimized.[5] This directly contributes to the improvement of maritime safety and reduces the risk of human and material losses. Furthermore, the effective use of AIS can also positively contribute to environmental sustainability. Considering the increasingly concerning negative impacts of maritime pollution and climate change, AIS helps mitigate adverse environmental effects by providing early warnings of potential incidents such as oil spills or other environmental damages. This enables quick and efficient responses to address environmental issues in the waters.[6]

To achieve the optimization of the role of applied maritime scientific education, Islamic countries need to collaborate in the development of relevant curricula and invest in modern training facilities. Collaboration among Islamic countries in addressing maritime logistics challenges can yield better results. Regional cooperation in the development of relevant curricula will enable Islamic countries to share experiences and best practices in applied maritime scientific education. This can help identify specific needs that require teaching within the regional context, ensuring that graduates from these education programs are better prepared to face challenges relevant to their maritime environment.[7]

Investment in modern training facilities is also necessary for applied maritime scientific education to meet global standards. Adequate training facilities with modern equipment will provide a better training experience for sailors and aspiring sailors. This will also help ensure that maritime workforce has access to the necessary resources to understand AIS technology and logistics management in depth.[8]

Collaboration among Islamic countries in addressing maritime logistics challenges, including the implementation of AIS, will strengthen their position in the global maritime

[5] Evans, D., Pawlik, T., & Jurdjevic, V. (2019). *Navigational Safety and Collision Avoidance System Using AIS*. *Sensors*, 19(17), 3661.

[6] Tang, C. S., & Xu, S. *Maritime logistics research: Past, present, and future,,Loc.Cit*

[7] United Nations Conference on Trade and Development (UNCTAD). (2019). *Review of Maritime Transport 2019*. United Nations.

[8] *Ibid*;

community. By sharing knowledge and resources, these countries can collectively tackle shared issues and achieve better outcomes in their efforts to optimize maritime logistics and enhance security and economic growth in their regions.

In this research, we will refer to various relevant literature to support our arguments. Further discussion in this study will involve an in-depth analysis of how applied maritime scientific education can be optimized to support the AIS logistics transformation in Islamic countries. We will also evaluate the expected positive impacts of this optimization.

Collaboration among Islamic countries in addressing maritime logistics challenges, including the implementation of AIS, will strengthen their position in the global maritime community. By sharing knowledge and resources, these countries can collectively tackle shared issues and achieve better outcomes in their efforts to optimize maritime logistics and enhance security and economic growth in their regions.

Therefore, the objective of this study is to identify the role of applied maritime scientific education in optimizing the transformation of AIS-based logistics in Islamic countries. In this research, we will refer to various relevant literature to support our arguments. Further discussion in this study will involve an in-depth analysis of how applied maritime scientific education can be optimized to support the AIS logistics transformation in Islamic countries. We will also evaluate the expected positive impacts of this optimization.

Method

The research methodology employed in this study combines literature review, surveys, and data analysis. A literature review was conducted to identify existing theoretical foundations, recent trends, and challenges in applied maritime scientific education, as well as the implementation of AIS in maritime logistics. Subsequently, surveys were conducted among maritime educational institutions, sailors, and relevant stakeholders to understand the level of understanding of AIS, the effectiveness of current education, and potential obstacles. Interviews with maritime education experts and AIS professionals were also conducted to gain deeper insights. Data obtained from surveys and interviews were then analyzed qualitatively and quantitatively. Additionally, case studies of specific Islamic countries that have successfully optimized the role of applied maritime scientific education in AIS logistics transformation were integrated into this research.

The research findings were then used to develop a conceptual framework detailing concrete steps to enhance the role of applied maritime scientific education in the context of AIS logistics transformation in Islamic countries. Validation of the research findings involved relevant stakeholders, and based on the findings, recommendations will be formulated to support improvements in education and the implementation of AIS in maritime logistics.

Result and Discussion

In the research themed "Optimizing the Role of Applied Maritime Science Education on the Transformation of AIS-Based Logistics in Islamic Countries," we found that applied maritime science education plays a key role in optimizing the AIS-based logistics transformation in Islamic countries. The research results indicate that education focusing on the applied maritime science aspects can enhance understanding of AIS and support positive changes in logistics in Islamic countries. With a better understanding of AIS through education, efficiency and security in the logistics chain in these countries can be improved. Suggestions for further research include conducting a more in-depth analysis of the impact of applied maritime science education on logistics transformation in Islamic countries and involving field research to confirm these findings in a broader context. In the context of optimizing the role of applied maritime science education related to the transformation of AIS-based logistics in Islamic countries, the following are two methods or techniques that can be employed:

1. Specialized AIS Curriculum: Integrating a curriculum specifically addressing AIS in applied maritime science education programs. This may include in-depth subjects on AIS, covering its usage, AIS data management, data analysis, and AIS applications in logistics management. Consequently, maritime students and practitioners will acquire a strong understanding of how to optimize AIS in a logistics context.
2. Practical Training: Providing practical training involving the use of AIS devices and related software in real-world situations. In this training, participants can directly understand how AIS is used in various logistics aspects, such as ship tracking, route management, and identification of potential logistics issues. Practical training of this nature will assist them in applying theoretical knowledge to real-world practices.

By integrating a specialized AIS curriculum and providing practical training to maritime students and practitioners, the role of applied maritime science education can be optimized in supporting the AIS-based logistics transformation in Islamic countries. Here are some optimization strategies for the role of applied maritime science education regarding the transformation of AIS-based logistics in Islamic countries, including the following:

Implementation of Regional Collaboration in Curriculum Development

Collaboration among Islamic countries in developing the curriculum for applied maritime science education is a key step in optimizing the role of AIS in maritime logistics. This collaboration enables the sharing of knowledge, best practices, and experiences that can enhance the overall quality of maritime education. By incorporating a regional perspective, the curriculum can be tailored to the demands and relevant needs in that specific region. Regional collaboration in developing the curriculum for applied maritime science education has a

significantly positive impact on achieving the optimization of the Automatic Identification System (AIS) in maritime logistics in Islamic countries. Some crucial aspects to consider in the development of this collaboration include:

1. Development of Relevant Curriculum: Collaboration among Islamic countries allows for the development of a curriculum that is relevant to the unique challenges and opportunities in the region. A curriculum tailored to the regional environment will produce graduates better prepared to face situations relevant to the maritime conditions in Islamic countries.
2. Sharing Knowledge and Best Practices: Regional collaboration opens the door to sharing knowledge and best practices in applied maritime science education. Countries can leverage successful experiences from their peers in integrating AIS into their curricula. This will help ensure that sailors receive comprehensive training on AIS technology.
3. Enhancement of Education Quality: Regional collaboration can enhance the overall quality of maritime education. By focusing on higher standards, continuously evolving curricula, and benchmarking against international best practices, applied maritime science education in Islamic countries will become more effective and relevant
4. Research Collaboration: In addition to curriculum development, regional collaboration also facilitates better research collaboration. Joint research on the implementation of AIS in maritime logistics can yield deeper insights into the benefits of this technology and how to optimize it for safety and efficiency.

With regional collaboration in the development of the curriculum for applied maritime science education, Islamic countries can create a strong educational foundation for their maritime workforce. This will ensure that sailors have the knowledge and skills necessary to integrate AIS technology into their operations, ultimately leading to better maritime safety and sustainable economic growth in the region. Regional collaboration in the development of the curriculum for applied maritime science education can also provide significant additional benefits. Here are some additional aspects to consider:

1. Standardization of Maritime Education: Regional collaboration can create joint efforts to improve the standardization of maritime education among Islamic countries. With uniform standards, graduates from maritime education programs will be more easily recognized internationally. This will also instill confidence in stakeholders that the maritime workforce from the region possesses globally recognized quality.
2. Improving Access to Support Resources: Regional collaboration can facilitate better access to support resources, such as maritime simulation laboratories and advanced training equipment. This is a crucial aspect of providing high-quality education to sailors. By sharing modern training facilities, Islamic countries can save costs and resources.
3. Strengthening Networks and Connections: Regional collaboration will also strengthen networks and connections between maritime education institutions in the region. This

can facilitate the exchange of students, faculty, and researchers. By interacting more with counterparts from neighboring countries, sailors can gain richer insights into regional maritime dynamics.

4. Enhancing Global Competitiveness: Through regional collaboration, Islamic countries can enhance their global competitiveness in the maritime sector. With well-trained graduates and in-depth knowledge of AIS technology, they will be more sought after by international shipping companies. This has the potential to bring significant economic benefits and strengthen the role of Islamic countries in the global shipping industry.
5. International Recognition: Regional collaboration in the development of maritime education curricula can also help Islamic countries achieve international recognition for their educational programs. International references, such as the Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) Convention issued by the International Maritime Organization (IMO), are essential guidelines used to assess the quality of maritime education. Regional collaboration can help Islamic countries ensure that their programs meet international standards.
6. Collaboration in Maritime Research: In addition to curriculum development, regional collaboration can also facilitate joint maritime research. This can include research on the application of AIS to improve maritime logistics efficiency, reduce environmental impact, and other relevant aspects. Joint research can yield new insights and innovative solutions in optimizing the implementation of AIS.

Through strong regional collaboration in maritime education, research, and curriculum development, Islamic countries can achieve better outcomes in optimizing the role of AIS in maritime logistics and enhancing the capabilities of their maritime workforce. In this comprehensive context, regional collaboration in the development of the curriculum for applied maritime science education will open up broad opportunities to improve maritime education, optimize the role of AIS in maritime logistics, and drive sustainable economic growth in the region of Islamic countries.

Procurement of Investment in Modern Training Facilities

Investing in modern training facilities is crucial to support effective applied maritime science education. Advanced training facilities enable sailors to gain real-world experience in using AIS technology and practicing logistics management. This also helps ensure that they have the knowledge and skills required to confidently and efficiently address modern maritime logistics challenges.

Investing in modern training facilities is an essential component in ensuring that applied maritime science education can create a maritime workforce that is of high quality, skilled, and ready to face evolving maritime logistics challenges. Modern training facilities play a crucial role in enhancing the effectiveness of applied maritime

science education in Islamic countries. Here are some aspects to consider in this context:

a. **Practical Experience with AIS Technology: Modern training facilities allow sailors and prospective sailors to gain practical experience in using AIS technology. This includes training on how to install, operate, and effectively utilize AIS technology. Through sophisticated training facilities, sailors can undergo simulations of real-world situations involving AIS, enabling them to master this technology before sailing in actual maritime environments.**[9]
b. **Realistic Logistics Management Practices: Applied maritime science education should incorporate logistics management elements relevant to the maritime industry. Modern training facilities can facilitate practical exercises in route planning, cargo management, and coordination of various maritime logistics aspects. Sailors will have the opportunity to better address the challenges they face in managing sea-based logistics, thereby enhancing the efficiency and effectiveness of their operations**.[10]
c. **In-Depth Understanding of Maritime Security: In addition to AIS technology and logistics management, modern training facilities can also provide specialized training on maritime security. This involves simulations of emergency actions, responses to security threats, and understanding how AIS can be used in maritime security surveillance. This understanding is crucial for addressing situations that may arise at sea, such as pirate attacks or suspicious activities.**[11]
d. **Maintenance and Repair of AIS Technology: Investment in modern training facilities can also include the development of AIS technology maintenance and repair laboratories. Sailors need to understand how to properly maintain and repair AIS devices. Comprehensive training facilities can provide a space for routine maintenance, troubleshooting, and repair exercises for malfunctioning AIS devices**.[12]

[9] Yang, T., Ma, J., & Liu, H. (2020). *Research on AIS-Based Risk Evaluation of Vessel Traffic at Port Approaches*. IEEE Access, 8, 201343-201353.

[10] Smith, J. (2019). The Role of AIS in Maritime Logistics: A Comprehensive Review. *Journal of Maritime Technology and Logistics*, 10(2), 123-138.

[11] Tang, C. S., & Xu, S. (2018). Maritime logistics research: Past, present, and future. *Transportation Research Part E: Logistics and Transportation Review*, 119, 162-175.

[12] Khalid, M., Sattar, S., & Butt, N. F. (2019). Application of AIS Data in Maritime Domain Awareness: A Review. *In International Conference on Cyber Warfare and Security* (pp. 323-329).

Investing in modern training facilities for applied maritime science education can also bring additional benefits to Islamic countries and the maritime industry as a whole:

a. Improved Quality of Education: Modern training facilities enable maritime education to achieve higher standards in content delivery and training. This involves using cutting-edge technology in teaching processes, such as high-level simulations that can replicate complex maritime situations. Consequently, sailors will have a deeper understanding of AIS technology and logistics management that they can apply in the real world.[13]
b. Cost and Time Efficiency: Modern training facilities can also save costs and time for sailors and prospective sailors. They can access realistic and in-depth training without having to travel to distant physical locations or take risks. This is particularly important in the era of globalization, where sailors often have to navigate international waters.[14]
c. Increased Attractiveness of the Maritime Profession: Investment in modern training facilities can enhance the attractiveness of the maritime profession among the younger generation. Prospective sailors will be drawn to sophisticated and realistic training that prepares them for promising careers in the maritime industry. This can help address the maritime workforce shortages faced by some countries.[15]
d. Meeting International Standards: Modern training facilities help Islamic countries meet international standards in maritime education. In highly regulated industries like shipping, compliance with international standards is a necessity. With sophisticated training facilities, these countries can assure international stakeholders that they have an adequate education system.[16]

In other words, investing in modern training facilities is an investment in the future of the maritime industry in Islamic countries. It will help create a more skilled, professional maritime workforce ready to face modern maritime logistics challenges. Along with optimizing the implementation of AIS, this will positively impact safety, efficiency, and economic growth in the maritime sector.

In the overall context, modern training facilities are a valuable asset in preparing a competent maritime workforce ready to face changes in maritime logistics. Investments made

[13] Islam, A., & Khan, S. *Enhancing Maritime Security Through,,,Loc.Cit*

[14] Zheng, Y., Zhao, M., & Zhang, Y. (2019). *A Study on the AIS-Based Ship Collision Avoidance Decision-Making Algorithm in a VTS*. IEEE Access, 7, 138440-138451.

[15] United Nations Conference on Trade and Development (UNCTAD). *Review of Maritime Transport 2019,,Loc.Cit*

[16] International Maritime Organization (IMO). *STCW Convention and Code, including,,,Loc.Cit*

in sophisticated training facilities will help Islamic countries optimize the implementation of AIS in maritime logistics and enhance safety and efficiency.

Conclusion

The development of maritime logistics and the implementation of Automatic Identification System (AIS) technology have become top priorities for Islamic countries with access to the sea. Collaboration among these countries in addressing maritime logistics challenges and maximizing the benefits of AIS is a crucial step to enhance maritime safety, logistics efficiency, and sustainable economic growth. With a reduction in the risk of ship accidents, improved operational efficiency, and better maritime security monitoring, Islamic countries can create a safer and more favorable maritime environment for international trade. Investments in modern training facilities and human resource development are also essential parts of preparing to tackle maritime logistics challenges and maximizing the role of AIS. Thus, collaboration among Islamic countries in facing these challenges will have a significantly positive impact on the stability and prosperity of the region, as well as providing broader global benefits.

Moreover, collaboration among Islamic countries in addressing maritime logistics challenges and implementing AIS also creates opportunities for innovation and the development of more advanced maritime technologies. By focusing on standardization, data exchange, training, and maritime security supervision, these countries can better confront changes and shifts in the shipping industry. Therefore, this cross-country collaboration lays the foundation for creating a brighter and sustainable future for maritime logistics, benefiting not only Islamic countries but also making a positive contribution to the global economy and a safer marine environment.

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