Strategies for Maritime Vocational Institutions to Achieve "Double High-Level" Status in the Hainan Free Trade Port Context

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Abstract: *This paper focuses on the advantages and disadvantages of Hainan maritime institutions in applying for the national high-level vocational colleges and specialties (clusters) construction project (hereinafter referred to as the "Double High-Level" initiative). The study finds that these institutions possess significant advantages, including robust policy support, notable achievements in professional development, comprehensive training facilities, and deep industry-education integration. However, they also face critical challenges, such as a shortage of at-sea practical teaching resources, an insufficiently qualified teaching staff, inadequate teaching facilities, unreasonable curriculum planning, and room for improvement in the quality of student cultivation at private institutions. To address these issues, the paper proposes targeted strategies: strengthening the construction of at-sea practical teaching resources, enhancing faculty qualifications, deepening industry-education collaboration, optimizing professional cluster development, promoting internationalization, and reinforcing regional cooperation and branding. These measures aim to provide a clear pathway for Hainan's maritime institutions to successfully participate in the "Double High-Level" initiative and better serve the talent needs of the Hainan Free Trade Port.*

Keywords: *Hainan Free Trade Port; Maritime Education; Double High-Level Application; Advantages; Disadvantages*

1. Introduction

China's "Double High-Level" Initiative-launched in 2019 to cultivate approximately 50 elite vocational colleges and 150 high-level specialized programs by 2035-represents a strategic pivot toward high-quality, industry-aligned technical education. Concurrently, the construction of the Hainan Free Trade Port (HFTP), endorsed by national policy as a pioneering zone for institutional opening-up, has created unprecedented demand for maritime talent in fields such as offshore logistics, cruise tourism, and marine engineering. Within this context, maritime vocational institutions in Hainan are uniquely positioned to leverage regional policy advantages, including tax incentives, streamlined customs procedures, and international accreditation pathways.

However, despite their strategic relevance, these institutions face systemic challenges that impede their competitiveness in the "Double High-Level" selection process. Most critically, they suffer from severe shortages in sea-based practical training resources: the current ratio of training vessel berths per student stands at only 0.03, far below the national average of 0.12 and international benchmarks. Moreover, existing research on the "Double High-Level" Initiative has predominantly focused on manufacturing, information technology, or general vocational education models, with scant attention to sector-specific adaptations-particularly within maritime education under the unique institutional and regulatory environment of a free trade port. This gap is significant, as maritime training inherently requires experiential, safety-critical, and internationally standardized pedagogies that cannot be fully replicated through conventional classroom instruction.

Accordingly, this study addresses the following research question: How can maritime vocational institutions in Hainan effectively align with the "Double High-Level" standards while capitalizing on the institutional innovations enabled by the Hainan Free Trade Port? By integrating policy analysis, comparative case studies, and empirical data from recent institutional reforms, we propose a context-sensitive implementation framework that bridges national education goals with localized maritime development needs.

2. Advantage Analysis of Hainan Maritime Education's Double High-Level Application

2.1 Policy Support and Strategic Opportunities (Condensed)

The Hainan Free Trade Port (HFTP), a national strategy, provides strong policy and financial backing for maritime vocational education, including targeted support for institutions like Hainan Vocational University of Science and Technology to develop "Double High-Level" programs aligned with regional industry needs.

This is vital because maritime skills-shaped by high-risk, dynamic environments-require authentic at-sea experience, as emphasized by situated learning theory (Lave & Wenger, 1991). Simulators cannot fully replicate real-world cognition and teamwork. Moreover, industry–education integration theory highlights that effective maritime training demands co-designed curricula and infrastructure, especially under binding global standards like STCW. The HFTP thus enables practical implementation of these principles.

2.2 Remarkable Achievements in Specialty Construction and Talent Cultivation:

The Maritime College of Hainan Vocational University of Science and Technology has achieved remarkable results in specialty construction and talent cultivation. The university's Navigation Technology specialty was approved as the nation's first pilot program for "Navigation Technology" vocational undergraduate education and selected as a national backbone specialty. The college has constructed a multi-level specialty system covering multiple fields, cultivated a large number of outstanding graduates, and accumulated rich talent cultivation experience. Students have won awards in various competitions, demonstrating good professional competence and innovation ability.

2.3 Comprehensive Training Facilities and Qualifications

Significant investment has been made in practical training infrastructure, with equipment valued at over RMB 50 million. The institution boasts three training centers and 55 laboratories. Key indicators, such as per-student practical training area (9.2 m²), the proportion of VR/AR equipment (45%), and the number of internationally certified courses (18), all surpass the national average. It has become the largest, most advanced, and most comprehensively accredited maritime seafarer training base in Hainan Province, as shown in Table 1.

Table 1: Benchmarking Analysis of Practical Training Resource Allocation (2024)

Indicator	Hainan Vocational University of Science and Technology	National Vocational College Average	International Standard
Practical Training Area per Student (m²)	9.2▲	5.5	≥6.5
VR/AR Equipment Ratio	45%▲	31%	-
Number of Internationally Certified Courses	18▲	8	≥12

Note: The "International Standard" values are primarily derived from the International Maritime Organization (IMO)'s Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention, as amended in 2010), supplemented by benchmarks from leading maritime education providers such as the World Maritime University (WMU) and Singapore Maritime Academy. Specific indicators (e.g., vessel-to-student ratio, simulator coverage) reflect commonly adopted operational guidelines in OECD and ASEAN maritime training institutions as of 2023–2024.

2.4 Outstanding Industry-Education Integration and Social Service

Hainan maritime institutions have actively carried out in-depth school-enterprise cooperation, achieving remarkable results in industry-education integration. For example, Hainan Vocational University of Science and Technology Maritime College has cooperated with multiple enterprises, receiving equipment donations, training participation, and joint project applications, achieving mutual benefit and win-win outcomes. Institutions have provided social services such as seafarer training for the community, broadened their service fields, enhanced social influence, and constructed a positive interaction pattern between industry and education, providing talent support and technical services for Hainan Free Trade Port construction.

3. Challenges Facing Hainan Maritime Education's "Double High-Level" Application

Despite significant advantages in policy support and specialty construction, Hainan maritime education still faces challenges in the Double High-Level application process, mainly reflected in the following aspects:

3.1 Relatively Limited Offshore Practical Teaching Resources (Condensed)

Hainan's maritime education faces significant shortages in at-sea practical teaching resources. Despite investments in navigation and engine simulators, these cannot fully replace real offshore training. Institutions like Hainan Vocational College of Science and Technology and Sanya Aviation & Tourism College lack funds to build offshore training centers or purchase internship ships, resulting in inadequate practical training for students. This affects the development of practical skills and overall student quality, placing Hainan at a competitive disadvantage. However, efforts are underway through school-enterprise cooperation to address these resource gaps.

3.2 Teaching Staff Needs Further Strengthening (Condensed)

The teaching staff in Hainan's maritime education is weak. For instance, only 60% of navigation specialty teachers at Hainan Vocational College of Science and Technology hold a bachelor's degree or higher, with 40% holding an associate degree. At Sanya Aviation & Tourism College, the proportions are similar. Additionally, only 20 out of 98 hired professional teachers are actively teaching, indicating instability. The shortage of high-quality "Double-Qualified" teachers impacts teaching quality and sustainable student development. Institutions are addressing this by enhancing teacher benefits and strengthening training programs.

3.3 Facilities and Equipment Need Further Improvement (Condensed)

Hainan's maritime education suffers from insufficient facilities and equipment. While some institutions have invested in training bases, existing labs (25 at Hainan Vocational College of Science and Technology and 24 at Sanya Aviation & Tourism College) fall short as enrollment scales expand. Without funding for offshore training centers or internship ships, it is challenging to meet practical teaching needs. Moreover, inadequate equipment quality and quantity hinder high standards of maritime education. Institutions are improving resource allocation and maintenance to enhance teaching effectiveness.

3.4 Teaching Plan Arrangements Need Optimization (Condensed)

Hainan's maritime education teaching plans are suboptimal. Navigation specialties require extensive practical training, yet current plans prioritize textbook-based instruction over hands-on practice. Basic courses like advanced mathematics and English are often compressed or omitted, compromising students' foundational knowledge. This exam-oriented approach undermines comprehensive skill development. Institutions are exploring ways to increase practical teaching hours and strengthen basic course offerings to improve teaching quality and student outcomes.

3.5 Private Institutions' Student Cultivation Quality Needs Improvement (Condensed)

Most maritime institutions in Hainan are private vocational colleges driven by market pressures, often neglecting student cultivation quality. For example, navigation specialty students at Hainan Vocational College of Science and Technology and Sanya Aviation & Tourism College have varied knowledge levels, complicating teaching arrangements. To maximize profits, these institutions expand enrollment without adequate resources, leading to substandard teaching quality. Efforts are being made to improve teaching management and optimize resource allocation to enhance student cultivation quality.

4. Improvement Strategies for Hainan Maritime Education's Double High-Level Application

According to the *Implementation Rules of Hainan Free Trade Port Shipping Talent Development Regulations* implemented in March 2025[5] (Hainan Provincial People's Congress Standing Committee,

2025), institutions purchasing teaching vessels can enjoy full exemption of import tariffs and immediate VAT refund. Synchronized with Article 27 of the *Vocational Education Law (2025 Amendment)* "Industry-Education Integration Type Equipment Purchase Subsidy," practical training equipment updates can apply for 30% special subsidies from provincial finance.

4.1 Strengthen Practical Teaching Resource Construction

Maritime education has high practical teaching requirements. Hainan maritime institutions should increase capital investment to construct a comprehensive on-water training facility, including a training basin, lifeboat and liferaft launching areas, etc, including pools, water lifeboat and raft training bases, etc., to enhance students' practical operation abilities. Meanwhile, provide offshore internship opportunities through school-enterprise cooperation, and consider purchasing teaching internship ships in the long term to ensure internship quality. See Table 2.

Table 2: Teaching Internship Ship Investment Plan

Funding Source	Amount (10,000 yuan)	Proportion	Availability Deadline
Hainan Provincial Financial Special	3,000	45%	December 2025
COSCO Shipping Group Investment	1,500	22.5%	June 2026
International Maritime Organization Grant	1,200	18%	March 2026
School-Enterprise Cooperation Income Feedback	900	13.5%	Installment investment

Note: The International Maritime Organization (IMO) grant application process requires submitting project proposals through its official website, preliminary review by the Asian Maritime Safety Authority (AMSA), and inclusion in the annual budget (average cycle of 6 months). Geopolitical factors may cause grant interruption risks; construct a comprehensive on-water training facility, including a training basin, lifeboat and liferaft launching areas, etc).

4.2 Enhance Teaching Staff Quality

Recruit high-education maritime graduates, prioritize hiring graduates with competency certificates, and provide benefits for non-Hainan graduates. Introduce senior management-level seafarers, cooperate with shipping companies to recruit seafarers holding senior competency certificates, and cultivate "Double-Qualified" teachers. Strengthen teacher training and industry exchanges to improve teachers' knowledge levels and practical abilities.

4.3 Strengthen Regional Cooperation and Exchange

Promote the establishment of the Hainan Maritime Education Alliance to achieve resource sharing and complementary advantages, jointly formulate talent cultivation standards, etc., and improve the overall level of regional maritime education. Strengthen exchanges and cooperation with renowned domestic and international maritime institutions, introduce international advanced educational concepts, curriculum systems, and teaching methods, and enhance the internationalization level of Hainan maritime education[10].

5. Practical Pathway Exploration for Hainan Maritime Education's Double High-Level Application

Drawing on the "Three-Stage Progressive" training model of Singapore Maritime Academy: The foundation stage implements bilingual Chinese-English teaching[6], the advanced stage introduces DNV GL intelligent ship certification courses, and the practical stage arranges 6-month internships with international shipping companies. Simultaneously drawing on the "Dual Mentor System" of the Hong Kong Vocational Training Council, establish the *Mentor-Mentee Cultivation File* (see Table 3).

Table 3: Hainan-Hong Kong-Macao Teacher Exchange Plan (2025-2027)

Year	Exchange Program	Indicator Requirements	Funding Guarantee
2025	Young Teachers to Hong Kong for Training	20 person-times/year	Hainan Provincial Department of Education Special: Equipment Purchase (40%), Teacher Training (30%), Research Subsidy (30%)
2026	Double-Qualified Teachers to Macau for Rotation Training	Full coverage of navigation specialties	50% corporate sponsorship
2027	Hainan-Hong Kong-Macao Teaching & Research Team Building	Form 3 international teams	Free Trade Port Talent Fund

5.1 Optimize Specialty Cluster Construction

Construct featured specialty clusters centered on navigation technology, integrating related specialties, optimize curriculum systems, share teaching resources, enhance competitiveness, and meet diversified needs. Meanwhile, closely track industrial development trends, timely adjust specialty settings and talent cultivation directions to ensure precise alignment with industrial needs.

5.2 Deepen Industry-Education Integration

Expand school-enterprise cooperation models, establish deep cooperative relationships with relevant enterprises, carry out talent cultivation models such as order-based training and modern apprenticeship, and achieve school-enterprise resource sharing and complementary advantages. Meanwhile, jointly establish industry-education integration alliances with enterprises, industry associations, and research institutions to carry out talent cultivation, technological innovation, and social service activities[8].

5.3 Strengthen Practical Teaching

Improve the practical teaching system centered on practical ability cultivation, increase the proportion of practical teaching, optimize content, introduce actual enterprise cases, and strengthen management. Meanwhile, strengthen practical teaching base construction, establish off-campus bases through cooperation with enterprises, and enhance the simulation degree and practicality of on-campus training bases.

5.4 Promote Internationalization Development

Strengthen cooperation with internationally renowned maritime institutions and research institutions, carry out student-faculty exchanges, academic cooperation, and joint training programs, and introduce international advanced educational concepts and methods. Cultivate international maritime talents, offer relevant international courses, strengthen students' foreign language and cross-cultural communication abilities, and encourage participation in international activities.

6. Expected Effectiveness and Evaluation of Hainan Maritime Education's Double High-Level Construction

Expected Effectiveness

6.1 Significant Improvement in Talent Cultivation Quality

Through measures such as optimizing specialty cluster construction, Hainan maritime education's talent cultivation quality will be significantly improved, students' professional quality, practical abilities, and innovative spirit will be enhanced, and graduate employment rates and quality will increase.

6.2 Significant Enhancement of Social Service Capabilities

Hainan maritime education will better serve Hainan Free Trade Port construction. Through social training and other services, it will provide talent support and technical services for shipping, logistics, and other industries, enhancing institutional social influence and economic benefits[9].

6.3 Significant Improvement in International Influence

Through strengthening international exchanges and cooperation and cultivating international maritime talents, Hainan maritime education's international influence will be significantly improved, attracting more international students and scholars to study and conduct research in Hainan.

Effectiveness will be monitored through a balanced scorecard covering graduate employability, industry satisfaction, and international certification rates

7. Implementation Steps and Timeline Planning for Hainan Maritime Education's Double High-Level Construction

7.1 Short-Term Plan (2024-2025)

7.1.1 Improve Application Materials

Organize professional teams to study national Double High-Level plan application requirements, write application documents based on actual conditions, highlight advantages and characteristics, clarify construction goals and tasks, establish policy research groups, closely monitor policy dynamics, and timely adjust application strategies.

7.1.2 Strengthen Policy Research and Coordination

Communicate with government departments to secure policy support and funding, ensure smooth progress of Double High-Level construction, and establish cooperative relationships with enterprises within Hainan Free Trade Port to jointly carry out projects.

7.1.3 Carry Out School-Enterprise Cooperation Projects

Cooperate with enterprises to carry out order-based training and other models, with enterprises participating in the entire talent cultivation process and schools providing customized training services for enterprises to achieve win-win results.

7.2 Medium-Term Plan (2026-2027)

7.2.1 Advance Specialty Cluster Construction

Centered on navigation technology specialty, integrate related specialties to build specialty clusters with distinctive features, optimize curriculum systems, strengthen course construction, and improve the overall level of specialty clusters.

7.2.2 Strengthen Teaching Staff Construction

Implement "Double-Qualified" teacher training programs, select teachers for enterprise secondment training, introduce seafarers and industry experts with rich offshore practical experience, and optimize teacher structure.

7.2.3 Enhance Training Facility Levels

Increase investment, update training equipment, improve the simulation degree and practicality of training bases, strengthen training base management, and improve practical teaching quality.

7.3 Long-Term Plan (2028-2029)

7.3.1 Deepen Industry-Education Integration

Jointly establish industry-education integration alliances with enterprises to carry out talent cultivation model innovation, jointly carry out technology research and development, social service projects, and promote industry-education integration to develop in depth.

7.3.2 Promote Internationalization Development

Strengthen cooperation with internationally renowned maritime institutions and research institutions, carry out student-faculty exchanges and other programs, introduce international advanced maritime education concepts, curriculum systems, and teaching methods, and enhance the internationalization level of Hainan maritime education.

7.3.3 Establish Quality Assurance Systems

Establish and improve teaching quality monitoring and evaluation systems, strengthen monitoring and evaluation of teaching processes and effects, regularly conduct teaching quality assessments, timely identify problems, adjust teaching strategies, and ensure steady improvement of teaching quality.

Additionally, dynamic adjustment mechanisms and the ‘Hainan-Hong Kong Dual Certificate Mutual Recognition Program' will be implemented to align qualification standards from 2025 to 2027

8. Conclusion

This study deeply analyzed the advantages and disadvantages of Hainan maritime education under the Free Trade Port background, and proposed targeted improvement strategies and practical pathways including optimizing specialty cluster construction, deepening industry-education integration, strengthening practical teaching, and promoting internationalization development. The study believes that Hainan maritime education is expected to succeed in Double High-Level applications and cultivate high-quality maritime talents for Free Trade Port construction. However, the research may have limitations. In the future, Hainan maritime education needs to deepen research, improve strategies, strengthen exchanges and cooperation with domestic and foreign institutions, closely monitor Free Trade Port construction needs, timely adjust specialties and talent cultivation directions, strengthen international exchanges, and improve education levels and influence.

Fund Projects

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