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A Curriculum Content Analysis of a Maritime Management Program Against IMO/STCW Standards

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ABSTRACT

Maritime vocational and higher-education institutions routinely advertise graduate career pathways into regulated maritime and logistics roles, yet whether their published curricula explicitly cultivate the regulatory, communication, and safety competencies those roles presuppose is rarely verified through direct document analysis rather than assumed from accreditation status alone. This study conducts a qualitative curriculum content analysis of a Bachelor's-level Maritime Transportation Management program's seven core courses and practicum structure, coding each against competency domains derived from the IMO STCW Convention and associated Model Course specifications, using a constructive-alignment curriculum-mapping approach applicable to any comparable maritime management program. The analysis finds strong alignment on regulatory and operational management competencies, direct alignment between the program's mandatory practicum and STCW's practical-training philosophy, but no dedicated course addressing Maritime English/communication competency or basic safety training, despite both appearing as explicit STCW-associated expectations for maritime-sector graduates generally. These gaps are consistent with, and offer a curriculum-level explanation for, independently reported cross-major curriculum-practice misalignment findings from the same institutional context. The study offers a replicable, low-cost curriculum audit method and a specific, actionable basis for curriculum revision ahead of upcoming accreditation review.

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1. INTRODUCTION

A curriculum document and a competency framework speak two different languages, and the gap between them is easy to overlook precisely because both languages sound similar: a course titled "Kebijakan dan Regulasi Transportasi" and a competency standard requiring "knowledge of relevant international maritime conventions" both invoke regulation, but only a close reading of what each course actually covers can establish whether the former genuinely produces the latter. This distinction matters acutely for maritime higher-education institutions, because their graduates enter a labour market — shipping companies, port authorities, logistics firms,

and government transportation agencies — that is itself governed by an unusually dense and specific international regulatory architecture, anchored by the International Maritime Organization's Standards of Training, Certification and Watchkeeping (STCW) Convention [1] and its associated Model Course specifications [2]. A curriculum that names the right general topics without cultivating the specific competencies this architecture presupposes produces graduates who are credentialed but not, in a specific and checkable sense, fully prepared.

This concern is not speculative in the Indonesian maritime education context specifically. A recent cross-major qualitative study of Indonesian maritime cadets across Nautical, Marine Engine, and Port and Shipping Management programmes found a consistent curriculum-practice misalignment theme across all three majors, alongside a shared pattern of sustainability awareness present without corresponding operational application [3] — a finding that identifies the existence of a curriculum-practice gap but does not, because it was not designed to, specify which particular courses or competency domains are responsible for producing it. Complementary research on Indonesian cadets' post-internship reflections similarly finds that cadets are acutely, critically aware of specific mismatches between what their formal coursework prepared them for and what their sea practical training actually demanded [4]. Both studies establish that a gap exists and that cadets themselves can perceive it; neither provides the document-level analysis needed to locate the gap within the curriculum's actual course structure.

Curriculum theory supplies the method this gap analysis requires. Constructive alignment holds that a curriculum's stated intended learning outcomes, its teaching and learning activities, and its assessment methods should be deliberately designed to reinforce one another, and that misalignment among these elements — rather than any single element's inadequacy — is typically what produces the gap between credentialed knowledge and demonstrated competence [5]. Applied to a maritime programme specifically, this principle implies that alignment should be assessed not by whether a curriculum's course titles gesture toward relevant topics, but by whether its actual content, granted the practical constraints of a business-management rather than a certification-track programme, cultivates the specific competency domains — regulatory literacy, operational management, safety awareness, and maritime-specific communication — that STCW and its associated Model Courses treat as foundational for maritime-sector graduates [1], [2]. The legal-governance literature on STCW's own architecture reinforces why this document-level specificity matters: the Convention deliberately sets internationally uniform minimum standards while leaving their translation into actual institutional curricula and shipboard or shore-side practice substantially to national, institutional, and programme-level discretion [6], meaning that two programmes with superficially similar course titles can differ substantially in the competencies they actually cultivate, and only a direct content analysis can distinguish between them.

The broader transport-planning literature adds a final, relevant framing consideration: curriculum design, like transport policy more generally, is prone to privileging the technical and managerial content that is easiest to document and assess over the more tacit, practice-embedded competencies — communication under operational pressure, safety judgement, regulatory literacy applied in context — that are harder to specify in a syllabus but are precisely what employers and international conventions expect graduates to possess [7]. This suggests that curriculum-practice gaps of the kind reported in the Indonesian cadet literature [3], [4] may be a structural tendency of curriculum design generally rather than a defect specific to any one institution, making a transparent, replicable document-analysis method — rather than a one-off institutional critique — the more valuable contribution.

This study therefore conducts a curriculum content analysis of a Bachelor's-level Maritime Transportation Management programme's published core curriculum, addressing three objectives: first, to code each core course and the programme's practicum structure against STCW- and Model-Course-derived competency domains; second, to identify which competency domains are strongly, partially, or not addressed by the current curriculum structure; and third, to determine whether the resulting gap pattern is consistent with the curriculum-practice misalignment already reported independently in the Indonesian cadet literature [3], [4]. The study's contribution is threefold. Theoretically, it applies constructive alignment [5], an established general higher-education curriculum theory, to a maritime-sector-specific competency standard [1], [2] where this combination has not previously been demonstrated in published form. Methodologically, it offers maritime higher-education institutions a low-cost, document-analysis-only curriculum audit method requiring no new data collection. Practically, it converts a previously general, cadet-perception-based finding of curriculum-practice misalignment [3] into a specific, course-level account of where that misalignment originates, directly actionable ahead of curriculum revision or accreditation review.

2. LITERATURE OR THEORETICAL REVIEW

Constructive alignment is the dominant framework in higher-education curriculum theory for evaluating whether a programme's structure actually produces its intended competencies, resting on the principle that

intended learning outcomes, teaching and learning activities, and assessment tasks must be deliberately designed as a mutually reinforcing system rather than assembled independently [5]. Its central diagnostic claim — that misalignment between what a curriculum states it intends to produce and what its actual content and assessment structure can plausibly produce is the primary mechanism generating graduate competency gaps — provides the present study's core analytic lens: rather than assessing a maritime curriculum by its course titles or credit-hour allocation, constructive alignment directs attention to whether specific course content plausibly cultivates the specific competencies a relevant external standard, here STCW, specifies as necessary.

The STCW Convention itself provides that external standard, but its application to a management-track rather than certification-track maritime programme requires care. STCW's core competency tables are written primarily for seafarers pursuing watchkeeping and engineering certification [1], and a Bachelor's programme in Maritime Transportation Management, oriented toward shore-side operational, regulatory, and logistics roles rather than shipboard certification, is not directly bound by STCW's certification requirements in the way a Nautical or Marine Engineering programme is. However, STCW-associated Model Course specifications — including Model Course 3.17 on Maritime English, which specifies functional maritime communication competency independent of watchkeeping certification [2] — and the Convention's broader emphasis on safety awareness and regulatory literacy as foundational maritime-sector competencies remain directly relevant to management-track graduates, who will, in their advertised career pathways as transportation analysts, operations managers, and logistics consultants, need to interpret, apply, and communicate about the same regulatory and safety framework that governs the vessels and ports they will work with or around. Legal-governance analysis of STCW's own structure supports treating these competencies as broadly relevant beyond certification-track programmes specifically, since the Convention's design philosophy of translating uniform international minimum standards into locally adapted institutional practice [6] does not restrict that translation to seafarer-certification curricula alone.

Empirical Indonesian research provides the specific motivation for expecting a curriculum-level gap rather than assuming curriculum adequacy from accreditation status. The cross-major competency-readiness study found curriculum-practice misalignment as an explicit, named theme across Nautical, Marine Engine, and Port and Shipping Management cadets alike, alongside a shared pattern of sustainability awareness without corresponding operational application [3], while post-internship research found that cadets themselves are capable of detailed, critically reflective identification of specific gaps between formal coursework and operational reality [4]. Read through the constructive-alignment lens, these two findings jointly imply that the misalignment cadets perceive is unlikely to be evenly distributed across all curriculum content; some competency domains are more likely than others to be well-served by typical management-track course design, while others — particularly the more tacit, practice-embedded competencies transport-planning theory identifies as chronically under-prioritised relative to technical and managerial content [7] — are more likely to be systematically under-cultivated.

No published study has yet applied a direct, course-by-course constructive-alignment content analysis to a specific Indonesian maritime management curriculum to test this expectation. The cadet-perception literature [3], [4] establishes that a gap is felt; the present study's document-analysis method is designed to establish, at the level of specific curriculum content, where that gap most plausibly originates, extending both the constructive-alignment literature [5] and the Indonesian maritime education literature [3], [4] into a combination neither has previously demonstrated.

3. METHOD

This study conducts a qualitative document/content analysis of a Bachelor's-level Maritime Transportation Management programme's published core curriculum, comprising seven core courses (Fundamentals of Transportation Management; Transportation System Planning; Transportation Mode Operational Management; Transportation Policy and Regulation; Sustainable Transportation; Information Technology in Transportation; and Logistics and Supply Chain Management) together with the programme's mandatory practicum, field study, and industry/government internship component, as published in the institution's own programme description. This curriculum, rather than a sample of curricula, was selected as the unit of analysis because the study's aim is to demonstrate and apply a replicable content-analysis method to a real, complete curriculum structure, consistent with document-analysis designs in which analytic depth on a single, fully accessible document set is prioritised over breadth across multiple partially accessible ones.

The comparison standard against which this curriculum was coded comprised the IMO STCW Convention's competency framework [1], relevant STCW-associated Model Course specifications, specifically Model Course 3.17 on Maritime English [2], and the general safety-training expectations (personal safety, safety awareness, and regulatory literacy) that STCW's broader framework establishes as foundational

for maritime-sector personnel. Following constructive alignment's emphasis on evaluating actual content rather than course titles alone [5], each of the seven core courses and the practicum component was coded against five competency domains derived from this comparison standard: regulatory and legislative literacy, operational and management competency, sustainability and environmental awareness, maritime-specific communication competency, and basic safety training/awareness. Each course was assigned an alignment rating — direct, indirect, or not addressed — based on whether its stated content plausibly cultivates the competency domain directly, only tangentially, or not at all.

Data collection consisted of close reading of the programme's published curriculum description, cross-referenced against the institution's own reported career-pathway claims (transportation analyst, operations manager, logistics consultant, and government/state-enterprise planning roles) to establish which competency domains those specific career outcomes would presuppose. Data analysis combined this structured coding matrix with thematic analysis of the resulting alignment pattern, following established qualitative coding procedure [8], and cross-group comparison against the independently reported cross-major curriculum-practice misalignment finding [3] to assess whether the present course-level analysis identifies a consistent or divergent account of where that misalignment originates. Narrative synthesis integrated the coding matrix and comparative analysis into the gap-focused account presented in Section 4.

4. RESULTS AND ANALYSIS

Table I presents the curriculum-competency coding matrix produced through the content analysis described in Section 3, mapping each of the programme's seven core courses and its practicum component against the five STCW-derived competency domains.

Table I. Curriculum-Competency Coding Matrix

Course / Component	Regulatory Literacy	Operational Management	Sustainability	Maritime Communication	Basic Safety Awareness
Fundamentals of Transportation Management	Indirect	Direct	Not addressed	Not addressed	Not addressed
Transportation System Planning	Indirect	Direct	Indirect	Not addressed	Not addressed
Transportation Mode Operational Management	Indirect	Direct	Not addressed	Not addressed	Indirect
Transportation Policy and Regulation	Direct	Indirect	Indirect	Not addressed	Indirect
Sustainable Transportation	Not addressed	Indirect	Direct	Not addressed	Not addressed
Information Technology in Transportation	Not addressed	Indirect	Not addressed	Not addressed	Not addressed
Logistics and Supply Chain Management	Indirect	Direct	Indirect	Not addressed	Not addressed
Practicum / Industry-Government Internship	Indirect	Direct	Not addressed	Not addressed	Indirect

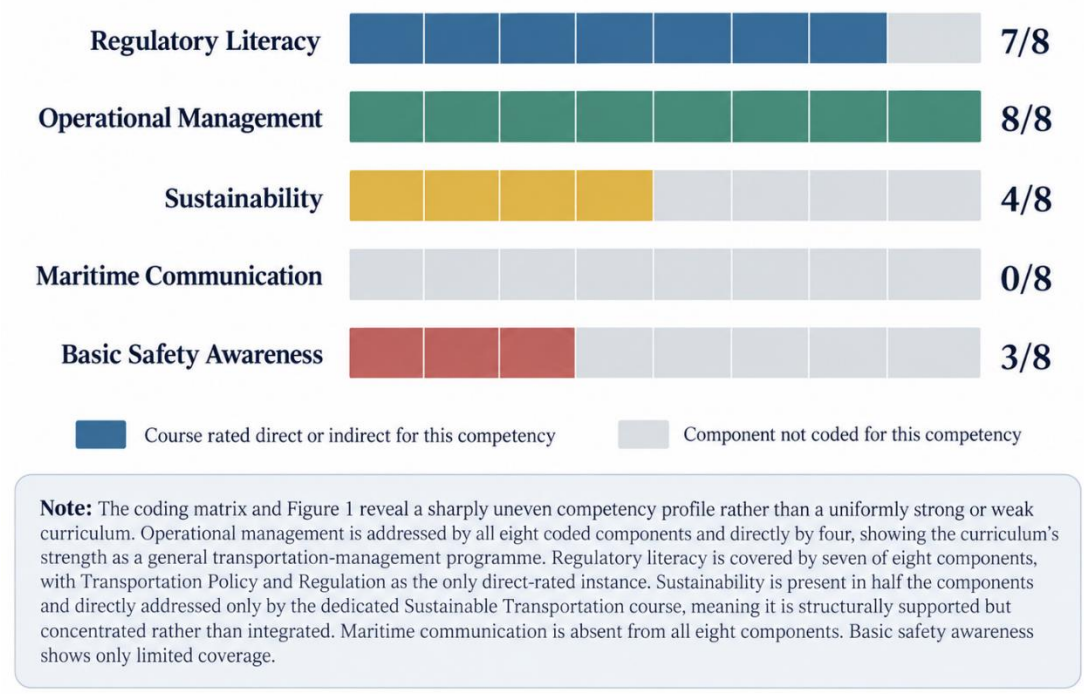


Figure 1. Competency Domain Coverage Across the Curriculum

The coding matrix and Figure 1 reveal a sharply uneven competency profile rather than a uniformly strong or weak curriculum. Operational management competency is addressed, at least indirectly, by every one of the eight coded components, and directly by four of them, reflecting the curriculum's evident design strength as a general transportation-management programme. Regulatory literacy is nearly as well covered, addressed by seven of eight components, with the Transportation Policy and Regulation course providing the curriculum's only direct-rated instance; this is consistent with constructive alignment's expectation that a course explicitly named for a competency domain is more likely, though not guaranteed, to cultivate it directly [5]. Sustainability coverage is more moderate, present in half the coded components and directly addressed only by the dedicated Sustainable Transportation course, indicating that sustainability awareness is structurally supported but concentrated in a single course rather than integrated across the curriculum — a pattern directly consistent with the cross-major study's finding of sustainability awareness present without corresponding cross-curricular operational integration [3].

The two domains showing the weakest coverage are also the two domains STCW and its associated Model Courses treat as most directly tied to maritime-sector-specific, rather than general-management, competency. No coded component — not even the practicum, which places students directly in industry and government transportation settings — was rated as addressing maritime-specific communication competency, the domain Model Course 3.17 specifies as foundational for maritime-sector personnel who must interpret and communicate using maritime-specific terminology and conventions [2]. This is a striking finding precisely because it is not a matter of insufficient regulatory or operational content — those domains are, as shown above, well covered — but a specific, structural absence of any course or component explicitly cultivating maritime English or maritime-specific communication competency as such. Basic safety awareness fares only somewhat better, present indirectly in three of eight components (Transportation Mode Operational Management, Transportation Policy and Regulation, and the Practicum) but never as a direct, dedicated focus, consistent with a curriculum oriented toward management and planning competency rather than the safety-critical operational competencies STCW's framework was originally designed around [1].

A simple quantification of Table I sharpens this picture further. Across the eight coded components and five competency domains — forty cells in total — only three cells (7.5%) receive a Direct rating, fourteen (35%) receive Indirect, and the remaining twenty-three (57.5%) are rated Not Addressed. This distribution indicates that even where the curriculum can be said to "cover" a competency domain in some sense, that coverage is disproportionately tangential rather than deep: a component rated Indirect contributes to a competency domain as a secondary or incidental effect of content designed primarily for another purpose, whereas a Direct rating reflects content deliberately structured around that specific competency. Assigning each cell a simple depth score (Direct = 2, Indirect = 1, Not Addressed = 0) and summing by course produces a rough per-course depth ranking: Transportation Policy and Regulation scores highest (5 of a possible 10),

followed by four courses tied at 4 (Transportation System Planning, Transportation Mode Operational Management, Logistics and Supply Chain Management, and the Practicum), with Sustainable Transportation at 3, Fundamentals of Transportation Management at 2, and Information Technology in Transportation lowest at 1. This ranking is offered as a descriptive summary of the same coding data presented in Table I rather than as an independently validated instrument, but it usefully identifies Information Technology in Transportation as the curriculum's single least competency-dense course under this framework, a finding the raw Direct/Indirect/Not-Addressed matrix alone does not immediately surface.

The concentration of Direct ratings in only three of forty cells also has a specific bearing on how the maritime-communication and safety-awareness gaps identified above should be weighted. Because Direct ratings are already rare even within the domains the curriculum covers comparatively well — regulatory literacy achieves only one Direct rating across seven components showing any coverage at all, and operational management achieves direct coverage in exactly half its eight components — the complete absence of any Direct or Indirect rating for maritime communication is not simply the curriculum's weakest domain among several moderately-covered ones; it is a qualitatively different kind of gap, since every other domain examined here has at least some indirect institutional presence to build upon, while maritime communication currently has none.

Read against the independently reported cross-major curriculum-practice misalignment finding [3], this course-level analysis offers a specific, corroborating explanation rather than a contradicting one: if the reported misalignment reflects, at least in part, systematic under-cultivation of maritime-specific communication and safety-awareness competencies relative to well-covered general management and regulatory competencies, the present curriculum's coding pattern is exactly what that explanation would predict. The practicum's Direct rating for operational management alongside its Indirect rating for safety awareness and Not-Addressed rating for maritime communication further suggests that even the curriculum's strongest experiential component does not, on its own, close the two gaps this analysis identifies most clearly.

5. DISCUSSION

This curriculum content analysis set out to determine which STCW-derived competency domains a Maritime Transportation Management programme's curriculum cultivates strongly, partially, or not at all, and whether the resulting pattern helps explain the curriculum-practice misalignment already reported for this institutional context. The findings answer both questions with reasonable specificity: the curriculum strongly cultivates operational management and regulatory literacy, moderately cultivates sustainability awareness through a single dedicated course, and does not cultivate maritime-specific communication competency at all, while only weakly and indirectly cultivating basic safety awareness — a pattern that, read against the cross-major misalignment finding [3], offers a course-level explanation that the original cadet-perception study could identify as a felt gap but not localise within the curriculum itself.

This finding sharpens constructive alignment theory's general claim in a maritime-specific way. Biggs and Tang's framework predicts that misalignment produces competency gaps generally [5], but does not itself predict which specific competencies are most likely to be under-cultivated in any given curriculum; the present analysis suggests that, at least in this maritime management context, the domains most vulnerable to under-cultivation are precisely those transport-planning theory identifies as the tacit, practice-embedded competencies chronically under-prioritised relative to technical and managerial content that is easier to specify and assess [7] — maritime communication and safety judgement are harder to teach through conventional lecture-and-assessment course design than regulatory content or operational management frameworks, and the curriculum's coding pattern reflects exactly this asymmetry.

The absence of any maritime-communication-coded component deserves particular emphasis, because it is not a partial or graded weakness but a complete structural gap: no course among the seven core offerings, nor the practicum, was coded as addressing this domain even indirectly. Given that the programme's own advertised career pathways include roles — transportation analyst, logistics consultant, operations manager — that plausibly require interpreting and communicating about international shipping and logistics documentation, standards, and correspondence, often maritime-English-specific in register and terminology, this gap is not merely a theoretical STCW-alignment shortfall but a practical graduate-employability concern the curriculum's own stated outcomes imply should be addressed.

The study's principal limitation is that it analyses a single published curriculum document rather than actual classroom delivery, meaning that a course coded as "Indirect" or "Not addressed" based on its published description could, in practice, incorporate relevant content through instructor-level choices not visible in the curriculum document itself; conversely, a course coded "Direct" based on its title and description could underdeliver on that content in actual practice. This limitation is intrinsic to document analysis as a method and is best addressed by pairing this curriculum-level

analysis with the kind of direct cadet- or graduate-perception research already available for this institutional context [3], [4], rather than by treating either method alone as sufficient.

For institutional practice, the clearest implication is a targeted, low-cost curriculum revision: introducing an explicit Maritime English or maritime communication component, whether as a standalone course or as an integrated module within existing courses such as Transportation Policy and Regulation, and strengthening safety-awareness content within the practicum's learning objectives rather than leaving it to incidental exposure during industry placement. For scholarship, the study demonstrates that constructive alignment [5] combined with an STCW-derived competency framework [1], [2] offers other maritime higher-education institutions a replicable, document-only method for converting general curriculum-practice concerns into specific, revision-ready findings.

6. CONCLUSION

This curriculum content analysis coded a Maritime Transportation Management programme's seven core courses and practicum against five STCW-derived competency domains, finding strong coverage of operational management and regulatory literacy, moderate and course-concentrated coverage of sustainability, and a complete structural absence of maritime-specific communication competency alongside weak, indirect-only coverage of basic safety awareness. These findings offer a specific, course-level explanation for curriculum-practice misalignment previously reported only at the level of cadet perception, and identify introducing dedicated maritime communication content as the single most actionable curriculum revision this analysis supports. The study demonstrates a replicable, document-only curriculum audit method that other maritime higher-education institutions can apply to their own curricula at minimal cost ahead of accreditation review or programme revision.

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