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Teaching Maritime English for Safety Communication: Evidence from Vessel Traffic Service Operation

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Effective use of Maritime English is essential for maintaining navigational safety and preventing communication failures in international waters, particularly within Vessel Traffic Service environments where real time decisions influence vessel movements and risk levels. Despite the global adoption of Standard Marine Communication Phrases as a safety protocol, there remains limited empirical evidence on how these phrases are enacted in authentic operational settings and how such practices inform the teaching of Maritime English. This study investigates the real-world application of Maritime English for safety communication at Benoa Vessel Traffic Service in Indonesia. Using a qualitative descriptive design, data were generated through analysis of five communication transcripts, eleven semi structured interviews with operators, and three days of field observations. Findings reveal selective adherence to standard phrases during routine procedures, frequent shifts to simplified English and code switching in complex multilingual situations, and pragmatic prioritization of clarity and time sensitive coordination over strict protocol. These patterns highlight gaps between prescribed language taught in training and communicative realities faced by operators. The study contributes empirical insight for refining Maritime English pedagogy by integrating authentic communication tasks, simulation of multilingual scenarios, and training for adaptive yet safety-oriented language practices. In a broader context, the findings reinforce the importance of aligning ESP curriculum design with real operational discourse to support global maritime safety and enhance English language preparedness among future maritime professionals.

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1. Introduction

Maritime communication has long been acknowledged as the backbone of navigational safety and operational efficiency. In global shipping networks, where thousands of vessels traverse narrow sea lanes each day, the exchange of clear and accurate messages is not merely procedural but lifesaving. Effective communication ensures coordination between ships and shore-based authorities, prevents collisions, and facilitates emergency response. Yet, despite technological advancements in navigation and automation, the human element remains the most decisive factor in maritime safety. Misunderstandings and ambiguous exchanges between seafarers and traffic operators continue to be identified as root causes of marine accidents, underscoring the irreplaceable role of language competence in safe maritime operation (Hetherington et al., 2006; Chauvin et al., 2013; Proctor, 2014).

The urgency of improving linguistic clarity is magnified by the exponential growth of global maritime trade. According to UNCTAD (2023), world seaborne trade reached 11.9 billion tonnes in 2022, intensifying the density of global shipping routes and heightening the complexity of multilingual interactions at sea. In this expanding environment, crews often comprise members from different national and linguistic backgrounds, making English the de facto lingua franca for maritime communication. However, variations in pronunciation, grammar, and pragmatic usage can easily lead to misinterpretation, particularly during time-critical operations (Cole, 2010; Trenkner & Cole, 2018). Thus, teaching and mastering English in the maritime domain have evolved beyond linguistic competence toward communicative accuracy, intercultural understanding, and adherence to standardized discourse for safety.

To address these challenges, the International Maritime Organization (IMO) introduced the Standard Marine Communication Phrases (SMCP) in 2001 as a global linguistic framework designed to minimize ambiguity and foster a unified mode of communication across 174 member states (IMO, 2001). SMCP provides standard expressions for both routine operations and emergency situations, ensuring that speakers from diverse linguistic backgrounds can exchange information clearly and concisely. Cole (2010) describes SMCP as a "safety net" that supports non-native English speakers, while Pritchard (2009) emphasizes its pedagogical value in Maritime English training programs. Despite its mandatory status, however, strict adherence to SMCP remains inconsistent in actual ship-to-ship and ship-to-shore communication, prompting researchers to question how these standard phrases function in practice and how they can be better integrated into English language teaching for maritime contexts.

Numerous studies have documented these inconsistencies and identified several factors contributing to partial or non-standard usage. Trenkner and Cole (2018) observed that although SMCP is widely taught, it is often adapted in operational contexts where time pressure demands rapid comprehension. Ranjbar et al. (2015) found that cadets frequently deviated from SMCP under stressful conditions, prioritizing functional clarity over rigid protocol, while Çakır (2020) and Sutopo (2021) highlighted that linguistic limitations and cultural habits often lead operators to "strike a balance between protocol and clarity" (p. 34). Marhandani (2021) added a regional perspective by revealing that in Indonesian training settings, local languages often dominate classroom interactions, reducing authentic exposure to standardized Maritime English. Although these studies provide valuable insights, most were conducted in simulated training environments rather than authentic operational contexts, leaving a significant gap in understanding real-world language practices at sea.

Equally important is the absence of empirical studies focusing on Vessel Traffic Services (VTS), which function as the nerve centers of maritime safety. VTS operators are responsible for monitoring vessel movements, issuing navigational advice, and coordinating traffic in congested waterways (IALA, 2016). Errors in VTS communication can have cascading consequences across multiple vessels, yet most research on SMCP application has centered on shipboard training rather than live VTS environments. The scarcity of authentic field-based studies limits the ability of language educators and policymakers to design training programs that reflect the actual communicative challenges operators face in multilingual and high-pressure conditions (Sutopo, 2021; Marhandani, 2021). This study therefore addresses a critical empirical and pedagogical gap by examining how Maritime English is practiced within an operational VTS setting.

The niche and novelty of this research lie in its focus on the authentic use of Maritime English for safety communication at Benoa VTS in Indonesia, a key control point along Archipelagic Sea Lane II, one of Southeast Asia's busiest maritime corridors. Unlike previous works conducted in classroom simulations, this study offers evidence from real communication transcripts, field observations, and operator interviews. It investigates how VTS officers implement, adapt, and deviate from SMCP under varying operational pressures, revealing how formal linguistic standards are negotiated in practice. This authentic evidence contributes to the growing body of English for Specific Purposes (ESP) research, situating Maritime English within a dynamic framework of professional language adaptation and pragmatic negotiation.

The significance of this study extends to both applied linguistics and maritime education. It aims to analyze patterns of language use among VTS operators, identify factors influencing adherence or deviation from SMCP, and evaluate how communicative strategies align with safety objectives. By uncovering the interplay between prescribed language norms and real-time operational demands, the study provides a foundation for rethinking how Maritime English is taught and assessed. Its central aim is to bridge the pedagogical divide between theoretical training and authentic language performance in professional maritime contexts.

In the broader field of English Language Teaching (ELT), the study underscores the importance of contextualizing ESP instruction within real operational discourse. Teaching Maritime English should not be limited to rote memorization of standardized phrases but should include simulation of authentic communicative constraints such as time pressure, code-switching, and cross-cultural mediation. The implications of this research, therefore, extend beyond the maritime sector, illustrating how ESP teaching can evolve toward experiential, adaptive, and safety-driven communication models that reflect the realities of professional English use in globalized workplaces.

2. Literature Review

2.1 Standard Marine Communication Phrases (SMCP)

The Standard Marine Communication Phrases were established by the International Maritime Organization (IMO, 2001) to create a unified communication system that reduces ambiguity and enhances safety at sea. Their primary goal is to ensure clarity and promote shared understanding among multilingual seafarers who rely on English as the lingua franca of maritime communication. Cole (2010) explains that SMCP provide a concise and standardized linguistic foundation that helps speakers from diverse backgrounds communicate with accuracy and confidence. The critical importance of SMCP is supported by continuous evidence that communication failures significantly contribute to maritime incidents. Hetherington et al. (2006) demonstrated that miscommunication and human error remain dominant causes of operational failures, while Chauvin et al. (2013) observed that incomplete or vague information can escalate risks during navigation. Proctor (2014) similarly emphasized the role of linguistic inaccuracy as a recurring factor in maritime accidents. Collectively, these findings illustrate why SMCP remain central to maritime navigational safety and why their consistent usage is expected in both routine and emergency maritime operations.

2.2 Challenges in SMCP Implementation

Despite the formal adoption of SMCP, research has consistently revealed challenges in ensuring strict adherence in real communication contexts. Pritchard (2009) found that maritime cadets often revert to informal expressions when placed under operational pressure, implying that theoretical knowledge alone does not guarantee performance. This challenge is echoed by Ranjbar et al. (2015), who observed reduced compliance under time pressure, demonstrating that speed and comprehension often take precedence over formal phrase accuracy. Çakır (2020) further explained that limited English proficiency may lead to partial or modified SMCP usage in operational settings. Sutopo (2021) added that operators frequently balance protocol and clarity when navigating real time situations, indicating that adaptation is often a pragmatic necessity. Marhandani (2021) highlighted the influence of cultural and linguistic contexts, showing that Indonesian maritime training environments frequently rely on local languages, reducing opportunities for authentic SMCP practice. These studies collectively illustrate that real world operational conditions frequently challenge the idealized expectations of consistent SMCP usage, especially when safety, time sensitivity, and communicative clarity intersect.

2.3 Vessel Traffic Service (VTS) Communication

Vessel Traffic Services play a vital role in monitoring maritime movement, issuing guidance, and maintaining safe navigation within congested and strategic waterways (IALA, 2016). Their communication responsibilities require both linguistic precision and operational awareness. However, although SMCP are intended to standardize maritime discourse across all levels of operation, most existing research has focused on shipboard communication and cadet training contexts rather than VTS environments. Trenkner and Cole (2018) discussed SMCP implementation broadly, but without emphasis on real time VTS operations. Similarly, Sutopo (2021) and Marhandani (2021) examined SMCP awareness and training practices yet did not extend their investigations to VTS settings where communication responsibilities carry institutional authority and involve constant high stake interaction. Considering that VTS operators act as key safety coordinators in complex maritime networks, the lack of empirical studies addressing SMCP usage in VTS communication indicates a clear knowledge gap in maritime linguistics and operational communication research.

2.4 Integrating Evidence and Positioning the Study

Scholarly evidence consistently highlights the role of standardized maritime communication in preventing operational failures, with SMCP functioning as a key safety mechanism designed to avoid miscommunication at sea (Hetherington et al., 2006; Chauvin et al., 2013; Proctor, 2014). However, although SMCP are formally embedded in maritime training, research shows that seafarers often diverge

from standard phrasing due to operational urgency, multilingual interaction, and varied English competence (Pritchard, 2009; Ranjbar et al., 2015; Çakır, 2020; Sutopo, 2021; Marhandani, 2021). These studies indicate that practical communication frequently requires flexibility and rapid meaning negotiation rather than strict formulaic application. Yet, most investigations focus on simulation settings and cadet performance, leaving a lack of empirical knowledge about SMCP use in authentic Vessel Traffic Service communication, particularly within the multilingual and high traffic context of Southeast Asia.

Responding to this gap, the present study examines real communication at an Indonesian VTS center, revealing selective adherence, code switching, and pragmatic adaptation strategies. These insights position Maritime English as a dynamic professional register shaped by operational realities. The study also enriches English for Specific Purposes pedagogy by emphasizing authentic communication tasks, multilingual awareness, and adaptive language strategies as essential components of Maritime English instruction.

3. Method

3.1 Research Design

This study employed a *qualitative descriptive design* to explore the authentic use of Standard Marine Communication Phrases (SMCP) within Vessel Traffic Service (VTS) operations. The qualitative approach was chosen to capture real communicative behavior rather than test hypotheses statistically. This design allowed an in-depth examination of how VTS operators apply and adapt SMCP in daily practice while managing multilingual and high-pressure communication contexts.

3.2 Population and Sampling

The study population comprised all communication activities and personnel at Benoa VTS, a strategic maritime traffic center managing part of Indonesia's Archipelagic Sea Lane II. Using purposive sampling, data were selected to represent varied operational conditions, including different shifts and levels of vessel density. The participants included eleven VTS operators of differing seniority, educational backgrounds, and service durations. The sampling ensured that both experienced and less experienced operators were represented, thereby capturing a comprehensive picture of communicative practices.

3.3 Data Collection Procedures

Data collection was conducted over three weeks in 2023 and involved three complementary sources:

1) **Communication transcripts**: Five recorded communication logs between VTS operators and vessels were analyzed. Each transcript was anonymized to maintain confidentiality.

2) **Semi-structured interviews**: Eleven operators were interviewed to elicit insights into their familiarity with SMCP, real-world challenges, and communicative decision-making. Interviews lasted 30–45 minutes and were conducted in either Bahasa Indonesia or English.

3) **Field observations**: Three full-day observations were carried out in the VTS control room to document operator behavior, code-switching patterns, and environmental factors such as noise or technical disruptions.

This triangulated approach strengthened the reliability of the findings by combining naturally occurring data with self-reported and observed behavior.

3.4 Data Analysis

Data were analyzed using the Miles and Huberman qualitative framework, which involves four iterative stages: data reduction, coding, data display, and conclusion drawing. During data reduction, all transcripts, interviews, and notes were screened to isolate communication segments involving SMCP. Each utterance was coded as Standard (S), Partial (P), or Non-standard (N) according to its adherence to SMCP structure. The data display stage organized excerpts into categorized tables and narrative summaries for cross-

comparison. Triangulation was applied by comparing transcripts with interview responses and observational notes to verify the consistency of identified communication patterns. This analytic procedure ensured that the emerging interpretations accurately reflected operational realities.

3.5 Scope and Limitations

The scope of this research was confined to Benoa VTS and did not include other Indonesian VTS centers. Although five transcripts and three observation days provided sufficient qualitative depth, they limit broader generalization. Furthermore, reliance on self-reported interview data may introduce minor subjectivity. Nevertheless, the use of multiple data sources and verification through triangulation enhanced validity and provided a credible portrayal of SMCP implementation in one of Indonesia's busiest maritime corridors.

4. Results

This section presents the findings of the study, which aimed to explore how Vessel Traffic Service operators apply Standard Marine Communication Phrases in authentic operational settings and how real-world communication behaviors align with or diverge from standardized maritime language protocols. The results are organized to first describe participant demographics and professional backgrounds, followed by analysis of SMCP implementation patterns based on communication transcripts, interview responses, and field observations. The presentation begins with an overview of the operational workforce to contextualize communicative practices observed across routine and high-pressure interactions.

4.1 Participant Demographics and Professional Background

A total of eleven Vessel Traffic Service operators participated in this study, representing a range of operational roles within Benoa VTS. The group consisted of one VTS manager, three supervisors, and seven operators, offering a balanced perspective on institutional practice and communication patterns across hierarchical levels. Participants varied in age, academic qualifications, and service experience, contributing a diverse lens to understanding real-time maritime communication competence. Table 4.1 summarizes participant characteristics.

Table 4.1 Participant Demographics

Participant	Age Range	Educational Background	Position	Years of Service
AP_1	35–45	Bachelor's	Head of VTS	>10
AM	45–50	Bachelor's	Operator	3–5
PO	>50	Bachelor's	Supervisor	5–10
IPD	30–35	Diploma & Foreign Training	Operator	>10
IKR	>50	Bachelor's	Supervisor	>10
NSY	>50	Bachelor's	Operator	>10
TD	45–50	Diploma	Operator	3–5
MIR	20–25	Bachelor's	Operator	<3
FF	35–45	Bachelor's	Supervisor	5–10
IPDW	35–45	Bachelor's	Operator	>10
AP_2	35–45	Bachelor's	Operator	5–10

Overall, the data reveal a workforce primarily composed of highly experienced operators, with more than half having served for over ten years. This suggests a strong institutional knowledge base and consistent exposure to real-time maritime communication demands. Most participants held bachelor's degrees, providing an educational foundation aligned with professional communication expectations in maritime control environments. The presence of personnel with international training experience further enriches the communicative environment by incorporating exposure to global maritime practices.

A unique feature in the participant profile is one operator who had not attended formal VTS training, where SMCP are typically embedded within the curriculum. Instead, this individual reported acquiring maritime communication knowledge through informal digital platforms such as YouTube and TikTok. This finding points to the emergence of alternative learning pathways and highlights how informal digital resources may supplement or substitute structured instruction in professional maritime communication. The varied training experiences observed among participants provide a useful lens for interpreting differences in communication behavior and adaptability described in subsequent results.

4.2 SMCP Implementation Patterns in Operational Context

Analysis of communication logs, fieldnotes, and interviews revealed distinct patterns in the use of SMCP in daily VTS communication. SMCP were used consistently during routine procedures, yet adapted flexibly during multilingual and time-sensitive scenarios. The following table 4.2 and sub-sections illustrate these patterns with tagged qualitative evidence and analytic interpretation.

Table 4.2 Summary of Linguistic Behavior Patterns

Pattern Identified	**Operational Influence**	**Communication Outcome**
Routine SMCP compliance	Normal operations	Clear procedural accuracy
Abbreviated SMCP forms	Low-risk conditions	Faster communication
Informal phrasing	Building rapport	Efficient interaction
Code-switching	Multilingual breakdowns	Successful mediation
Simplified English	Time-critical events	Quick comprehension
Environmental noise	Operational constraints	Adapted speech strategies

4.2.1 Standard SMCP Use in Routine Operations

Operators consistently demonstrated full adherence to SMCP protocol during routine vessel contact and channel coordination.

Data Extract T1 (Transcript Excerpt: Routine Call)

Operator: "Motor Vessel Academos, Motor Vessel Academos, call sign five Lima Romeo Whiskey Three. This is Benoa VTS, calling channel one six, how do you read me?"
Vessel: "This is Motor Vessel Academos, go ahead."
Operator: "Change to channel six eight, over."
Vessel: "Channel six eight, go ahead Sir."

Coding Label: Standard SMCP compliance
Researcher Analytic Memo: The communications follow correct call initiation, repetition, and channel-switch structure, suggesting institutional mastery of baseline SMCP tasks.
Interpretive Insight: VTS officers maintain strict adherence to protocols when time pressure and ambiguity are minimal.

This pattern reflects a systematic and procedural communication culture where operators rely on structured phraseology to establish clarity and authority at the start of interactions. Consistency in call sign identification and channel assignment indicates a deeply internalized communication routine supported by formal training and operational repetition. Within the broader analytical coding framework, this behavior falls under planned, low-cognitive-load communication events, where adherence to standardized phrases ensures predictable and efficient exchanges. Such interactions establish a communicative foundation where standard SMCP routines serve as the baseline reference point against which deviations and adaptive strategies in later high-pressure situations can be meaningfully interpreted.

4.2.2 Accurate Information Request and Verification

Data Extract T2 (Transcript Excerpt: Information Exchange)

Operator: "We monitor your vessel entering TSS. Request information, your last port of call, over."
Vessel: "Singapore."
Operator: "Copy Singapore. Destination Port Headland Australia, correct?"
Vessel: "Correct."

Coding Label: Structured safety inquiry
Researcher Analytic Memo: Clear sequencing of inquiry and confirmation aligns with SMCP maritime reporting expectations.
Interpretive Insight: Standard verification routines reflect systematic safety communication culture.

This interaction demonstrates adherence to formal inquiry and confirmation procedures, illustrating operators' role in ensuring accurate navigational records. The concise exchange shows an embedded procedural rhythm where vessel movement, origin, and destination are confirmed as routine safety checks within a regulated traffic environment. The operator initiates communication with a monitoring statement, followed by a structured request for information and explicit verification. This aligns with the coding framework category of *predictable, low-stress communicative conditions,* where standardized phrasing can be fully enacted without disruption. Moreover, the exchange highlights the significance of confirmation loops as a preventative measure, reinforcing a culture where safety responsibilities are shared between vessel crew and traffic control. As such, these instances serve as linguistic benchmarks for operational precision that contrast sharply with adaptive practices observed in more dynamic and linguistically complex scenarios later in this section.

4.2.3 Informal Expression During Low-Risk Exchanges

Data Extract T3 (Transcript Excerpt: Informal Greeting)

Vessel: "Good evening Sir."
Operator: "Good evening. Question last port. Over."
Vessel: "Walcott. Next Qingdao."
Operator: "Copy. Navigate with caution."

Coding Label: Informal operational phrasing
Researcher Analytic Memo: Non-standard markers ("Good evening," "Copy") replace SMCP forms; intelligibility remains intact.

Interpretive Insight: Informality appears to support rapport and efficiency during non-critical interactions.

This example illustrates how operators adjust language when communicative stakes are low and operational clarity has already been established. Instead of a full SMCP greeting sequence and standardized request phrasing, the operator uses a brief acknowledgement and simplified inquiry. The shortened structure suggests that highly experienced operators draw on contextual awareness and situational judgment to determine when a full SMCP sequence is not necessary. Within the analysis framework, this pattern demonstrates *pragmatic variation*, categorized as communication under low cognitive load where efficiency and interpersonal rapport take precedence. The use of conversational tone also signals familiarity and operational comfort, reflecting an internalized understanding that rigid formality is less critical when vessel identity, status, and trajectory are already known. This adaptive shift reinforces the idea that SMCP operates as a flexible communicative resource rather than a fixed linguistic code, allowing operators to prioritize fluidity and human connection while still supporting maritime safety.

4.2.4 Non-Standard Safety Announcements in Real-Time Situations

Data Extract T4 (Transcript Excerpt: Navigation Warning)

Operator: "Reminder: MV Mike Tango Hipo has trouble engine north of TSS. Inbound vessels avoid and navigate with caution."

Coding Label: Modified safety broadcast
Researcher Analytic Memo: Safety content remains accurate but deviates from formal "Navigation Warning" marker.
Interpretive Insight: Safety priority is preserved through clarity rather than structural adherence, showing *functional adaptation.*

In this exchange, the operator prioritizes immediacy and clarity rather than following full SMCP format. While the vocabulary and tone deviate from prescribed phrasing, the intent and meaning remain precise, demonstrating *a pragmatic communication choice*. This reflects operator judgement in dynamic contexts where maintaining traffic safety outweighs strict linguistic conformity. From the analysis perspective, this behavior fits within situational adaptation routines, emerging under increased operational demand. The concise directive style shows that experienced operators shift toward intuitive, easily understood phrasing to ensure rapid situational awareness, reinforcing that SMCP functions as a flexible resource shaped by real-world pressures rather than a rigid script.

4.2.5 Code-Switching as a Communication Mediation Strategy

Data Extract T5 (Transcript Excerpt: Multilingual Coordination)

Vessel 1: "My friend, you do not understand navigation. Change starboard."
Vessel 2: "We change one two zero."
Operator (Bahasa Indonesia): "Prima Nusantara, haluan belum berubah, hati-hati tabrakan."
Vessel 2: "Iya Pak, masih proses."

Coding Label: Code-switching for conflict resolution
Field Observation Note: "Operator switched to bahasa to ensure immediate comprehension when foreign crews miscommunicated."
Researcher Analytic Memo: Operator becomes *linguistic mediator*; bilingual intervention prevents escalation.
Interpretive Insight: Code-switching functions as a *safety tool*, not a protocol violation, supporting situational clarity in multilingual waters.

In this interaction, the operator intervenes as a linguistic mediator when two vessels struggle to communicate clearly in English. By switching to Bahasa Indonesia, the operator ensures the local vessel receives critical navigational instructions without delay. This behavior demonstrates deliberate, context-driven adaptation where the priority is preventing collision risk rather than maintaining strict SMCP usage. Within the analytic framework, this episode reflects *adaptive multilingual practice*, emerging when clarity and urgency outweigh rigid language protocol. The exchange illustrates that in complex multilingual settings, the ability to seamlessly alternate languages becomes an essential operational skill, reinforcing that effective maritime communication extends beyond standardization to situational fluency and cultural awareness.

4.2.6 Simplified English for Emergency Clarity

Data Extract T6 (Transcript Excerpt: Rapid Coordination)

Operator: "Slow little your speed. Prima Nusantara will take your stern."
Vessel: "Okay clear."

Coding Label: Simplified English adaptation
Researcher Analytic Memo: Operator intentionally reduces syntax to ensure immediate understanding.
Interpretive Insight: Reduced linguistic complexity reflects *cognitive load and urgency*, affirming communication efficiency over grammatical precision.

This exchange reflects operators' instinctive shift toward simplified English to accelerate understanding during urgent traffic interactions. Despite grammatical inaccuracy, the instruction is direct and comprehensible, demonstrating that communicative efficiency supersedes linguistic precision under stress. Within the analytic coding lens, this instance exemplifies *compressed directive language* used when rapid decision-making is essential. The operator prioritizes intelligibility and response speed, reinforcing that maritime communication in high-pressure contexts is guided by safety-driven pragmatism rather than strict adherence to standardized form. This pattern underscores the reality that SMCP proficiency coexists with flexible linguistic strategies shaped by cognitive load, situational urgency, and the shared need for clear and fast coordination.

4.2.7 Environmental Factors Influencing Communication

Field Observation Note (Environment Impact)

"Audio volume low, foreign officer accents difficult to decode, operational space noisy due to simultaneous radio activity."

Coding Label: Environmental noise and accent strain
Researcher Analytic Memo: External disruptions shape phrasing choices and may contribute to simplification or repetition.
Interpretive Insight: Operational realism underscores the necessity of *phonetic clarity, accent tolerance, and acoustic resilience* training in Maritime English.

Environmental conditions in the VTS control room and radio bandwidth challenged message clarity, requiring operators to adjust delivery in real time. These adaptations ranged from speaking louder to repeating instructions or simplifying phrasing when dealing with accented speech or radio distortion. Within the analytic framework, this reflects *context-responsive speech modification,* demonstrating how physical and auditory conditions influence communicative strategy. This behavior highlights the need for operators to possess not only linguistic competence but also situational awareness and communication resilience. It further underscores that SMCP training should incorporate acoustic stressors and accent-rich simulations, preparing operators for authentic, unpredictable maritime communication environments.

5. Discussion

5.1 SMCP Implementation Patterns: Between Standard Compliance and Operational Pragmatism

The findings of this study reveal a complex implementation pattern of Standard Marine Communication Phrases (SMCP) at Benoa VTS, characterized by what can be termed "selective adherence" - operators demonstrate competency in basic SMCP protocols during routine operations but systematically deviate during complex, time-sensitive scenarios. The communication transcripts analyzed demonstrated consistent patterns where operators successfully executed standard vessel identification procedures and channel management protocols, as evidenced in the Motor Vessel Academos interaction, yet abandoned prescribed standards during multi-vessel coordination scenarios involving MV Condorous and KM Prima Nusantara.

This selective implementation pattern reveals a fundamental tension between protocol compliance and operational effectiveness that extends beyond simple training inadequacies. The systematic nature of these deviations - including the substitution of "just want to remind you" for "NAVIGATION WARNING," the use of "slow little" instead of "reduce your speed," and the consistent closure of communications with "thank you" rather than "out" - suggests that operators have developed pragmatic communication strategies that prioritize immediate comprehension over formal adherence. This finding challenges the assumption that SMCP implementation failures primarily result from insufficient training or operator incompetence, instead indicating that contextual factors systematically influence communication choices.

Maritime communication often reflects selective adherence to Standard Marine Communication Phrases as operators adjust formal language to meet immediate operational demands, a tendency consistent with sociolinguistic adaptation principles (Trenkner & Cole, 2018). In high-risk settings at sea, this flexibility becomes critical since unclear messages can directly affect safety. Scholars note that maritime training frequently struggles to bridge the gap between textbook SMCP and real operational demands, creating tension between procedural accuracy and practical clarity (Stankov & Stankov, 2019; Simanjuntak et al., 2024). This highlights the need to ensure that communication strategies remain efficient without sacrificing precision, especially when seafarers navigate unpredictable or urgent situations (Sijabat et al., 2024).

Enhancing language proficiency and integrating systematic training, including SMCP and risk assessment frameworks endorsed by the International Maritime Organization, are vital to preparing cadets for operational realities (Chaal et al., 2022; Hu et al., 2023). Strong maritime English skills support both safety and coordination on board vessels, reinforcing the role of education in fostering competent communication practices (Sijabat et al., 2024; Simanjuntak et al., 2024). A balanced approach that prioritizes clarity and consistency, supported by structured training and informed risk management, can strengthen maritime safety culture and improve operational reliability.

5.2 Multilingual Challenges and Code-Switching as Adaptive Strategy

One of the most significant findings of this study is the extensive use of code-switching between English and Indonesian, particularly evident in the Prima Nusantara coordination scenario where the VTS operator functioned as a linguistic mediator between English-speaking and Indonesian-speaking vessels. This code-switching behavior represents more than simple language preference; it demonstrates operators' recognition that SMCP's English-only framework may be inadequate for multilingual operational environments where immediate comprehension takes precedence over protocol adherence. This aligns with (Bocanegra-Valle, 2016) (Bocanegra-Valle, 2015), who notes that English as a lingua franca at sea is negotiated in practice, with authenticity and intelligibility often prioritized over strict standardization.

The multilingual challenges observed extend beyond accent variation and non-standard English usage noted by previous research (Trenkner & Cole, 2018). The current findings suggest that these challenges are compounded by the operational context of Benoa VTS, which serves as a convergence point for vessels from diverse linguistic backgrounds operating within Indonesia's Archipelagic Sea Lane II. The documented communication barriers - including difficulties with Chinese vessel officers' accents, workplace noise interference, and technical disruptions - create an environment where rigid adherence to English-only protocols may actually impede rather than facilitate effective communication.

The successful resolution of the MV Condorous and KM Prima Nusantara coordination conflict, achieved through strategic code-switching and simplified English constructions, demonstrates that operators

develop sophisticated adaptive communication strategies that serve safety objectives while deviating from prescribed protocols. These findings highlight the urgency for international maritime policy to address the realities of multilingual communication at sea. Regional communication protocols must reflect linguistic diversity while safeguarding operational safety, particularly in Vessel Traffic Service contexts where proficiency and cultural sensitivity directly influence performance. Existing evidence shows that language barriers increase the likelihood of miscommunication, revealing gaps in current training models that emphasize technical competence but insufficiently prepare crews for communicative flexibility and cultural nuances in diverse maritime settings (Sijabat et al., 2024; Barus et al., 2024; Frolova, 2021). As operations grow more multicultural, the risk of misunderstanding heightens, underscoring the need for updated policy and pedagogical responses.

Current SMCP training requires refinement to better accommodate multilingual realities and prepare personnel for authentic interaction demands. Maritime education should integrate cultural awareness and adaptive language strategies alongside technical instruction to enable effective coordination across diverse crews (Frolova, 2021; Barus et al., 2024; Fabian-Perona, 2025). Research further emphasizes that a strong safety culture depends on communication systems that recognize linguistic and cultural variations, reinforcing the link between inclusive communication, teamwork, and incident prevention (Adikwu et al., 2024). A comprehensive training framework that blends linguistic competence, cultural sensitivity, and interpersonal skills is therefore essential for strengthening communication, promoting safety, and minimizing operational risks in global maritime environments (Msomi et al., 2025; Saridaki, 2023; Pujiastuti et al., 2023; Sijabat et al., 2024; Fabian-Perona, 2025).

5.3 Environmental and Operational Constraints on Communication Quality

The study identified several environmental factors that significantly impact SMCP implementation, including insufficient operator voice volume, accent comprehension difficulties, workplace noise interference, and technical equipment disruptions. These environmental challenges, documented through direct field observation, create systematic pressures that force operators to abandon prescribed protocols in favor of more immediately comprehensible communication approaches.

The operational pressure and time constraints that emerged during complex multi-vessel coordination scenarios represent a particularly significant finding. The analysis revealed that SMCP adherence deteriorated systematically when operators were required to manage conflicting vessel movements under time pressure, supporting (Kang, 2019) observation that VTS operators systematically abandon standardized protocols during time-sensitive operations. However, this study extends that finding by documenting the specific linguistic strategies operators employ - including the use of simplified vocabulary, grammatically reduced constructions, and direct imperatives - when protocol compliance conflicts with operational effectiveness.

Operational pressure and time constraints in multi-vessel coordination significantly influence communication behavior in vessel traffic services. The findings show that adherence to Standardized Maritime Communication Phrases weakens when operators must manage simultaneous and conflicting vessel movements under time pressure, supporting evidence that standardized protocol use declines during urgent situations as operators prioritize efficiency over strict compliance (Poe et al., 2019; Calderone et al., 2025). Operators commonly employ simplified vocabulary, reduced structures, and direct imperatives to convey urgency and accelerate information exchange, demonstrating adaptive language strategies required for real-time decision-making (Yasrab et al., 2023; Janša et al., 2023; Yadav, 2025). While standardization is vital for safety, such adaptations reflect a pragmatic response to operational realities where rapid clarity becomes essential (Wicaksono & Saraswati, 2024; Dadà et al., 2020).

These findings reinforce the need for maritime communication training that balances protocol mastery with adaptive communication skills. Operators must maintain traffic flow and navigational safety, creating a tension between procedural compliance and communicative efficiency, especially during high-stress scenarios. The successful conflict resolution observed through non-standard but effective communication reflects limitations in current training, which may not fully prepare operators for real-time pressures where rigid protocol use could hinder safety goals. This aligns with research showing that communication failures often relate to deeper safety culture issues and that initial training requires continuous reinforcement and flexibility for operational demands (Wu & Morris, 2020; Alderton & Saieva, 2013; Zehentner, 2021).

5.4 VTS Operators as Communication Mediators and Safety Facilitators

Despite implementation inconsistencies, the study highlights the pivotal role of VTS operators as communication mediators and linguistic safeguards in the maritime environment. The documented intervention in the MV Condorous and KM Prima Nusantara scenario demonstrates how VTS operators function not merely as traffic controllers but as active communication facilitators who must interpret, clarify, and mediate between vessels with varying communication competencies. This finding reinforces (Kahveci et al., 2017) observation that VTS operators serve not only as traffic regulators but also as linguistic safeguards, reducing the risk of miscommunication-related accidents.

The mediatory function becomes particularly critical in high-density traffic environments like the ALKI 2 corridor, where vessels from different cultural and linguistic backgrounds must coordinate navigation decisions rapidly. The study revealed that successful mediation often required operators to abandon strict SMCP protocols in favor of more flexible communication approaches that prioritized immediate comprehension over formal adherence. The documented progression from vessel-to-vessel communication breakdown ("My friend, you don't understand navigation") to successful VTS-mediated resolution illustrates the sophisticated linguistic and diplomatic skills operators must deploy in complex scenarios. (Tang & Zhang, 2021) further demonstrate through accident report analyses that VTS operators often act as the last line of defense against miscommunication-related failures, reinforcing their mediatory role.

The observed adaptive communication behavior among Veterinary Technical Specialists highlights the need for training that extends beyond traditional Standard Marine Communication Phrases models, emphasizing communicative flexibility and cultural sensitivity as core competencies. In diverse veterinary settings, practitioners act as linguistic and cultural mediators who must uphold safety protocols while navigating interpersonal nuances. Effective safety programs therefore require more than procedural instruction; they must empower staff to voice safety concerns, foster dialogue, and cultivate a questioning attitude toward safety practices. Studies show that communication-centered training and visible managerial commitment significantly enhance safety performance and workplace climate (Ismail et al., 2023; Yu et al., 2025), supporting the view that cultural awareness strengthens interactions with clients from varied backgrounds (Kogan et al., 2021).

Cultural competence is essential in veterinary practice, involving behaviors and attitudes that promote inclusive and respectful interactions to build trust and improve animal health outcomes (Kogan et al., 2021; Biletska et al., 2021). Training must therefore evolve to position communicative flexibility, cultural awareness, and technical expertise as integrated skills. Frameworks that evaluate these competencies and strengthen communication pathways contribute to stronger safety cultures and better service delivery (Jiang et al., 2019). Developing these broader professional capacities prepares veterinary practitioners to operate effectively in complex, multicultural environments where communication, collaboration, and safety are closely intertwined.

5.5 Technological Integration and Communication Support Systems

The study documented the successful integration of automated alert systems that enhance situational awareness without replacing human communication functions. The triple-redundancy voice alert system ("a vessel is entering TSS") effectively complemented visual AIS information, demonstrating how technological aids can support SMCP implementation without constraining operator flexibility. The integration of advanced technology into Vessel Traffic Services holds promise for improving communication and supporting safe operations, particularly in multilingual settings. Systems such as Sea Traffic Management services have shown potential in reducing miscommunication by enabling clearer closed-loop exchanges (Aylward et al., 2020), yet challenges remain due to factors like accent variation and audio quality issues that limit full automation in high-pressure environments (Smith et al., 2020). These findings underscore that technology alone cannot replace the need for human adaptability, situational judgment, and effective interpersonal communication within VTS roles.

Addressing environmental noise and varying acoustic clarity requires technological innovation that assists operators while prioritizing usability and trust. Research highlights the importance of human-centered system design and participatory development approaches to ensure that digital tools, including AI-based communication systems and enhanced data networks, strengthen operators' decision-making in complex situations (Wei et al., 2021; Veitch & Alsos, 2021; Yudianto et al., 2024). As automation advances, systems must be designed to augment human skills and process diverse accents and languages effectively, reinforcing

the need to support rather than replace human expertise in multilingual maritime operations (Xu et al., 2020; Filina-Dawidowicz & Durczak, 2023).

5.6 Theoretical Implications: SMCP as Dynamic Communicative Practice

The theoretical significance of this study lies in its empirical documentation of how SMCP functions as a dynamic communicative practice rather than a static protocol system. Previous scholarship has largely focused on cadet training, simulation-based studies, or theoretical discussions of SMCP implementation (Bocanegra-Valle, 2013; Pritchard, 2020). By contrast, this study provides authentic operational evidence of how SMCP is negotiated in practice, revealing the persistent gap between prescribed conventions and field application while documenting the sophisticated adaptive strategies operators develop to maintain communication effectiveness.

The findings suggest that Standardized Maritime Communication Protocols (SMCP) should be reconceptualized as an adaptive framework rather than a rigid protocol system. This perspective aligns with the Exploration, Preparation, Implementation, Sustainment (EPIS) framework, which emphasizes the necessity for careful navigation through various implementation phases and the adaptation of protocols according to contextual needs (Moullin et al., 2019). The observed patterns of selective adherence, contextual modification, and successful mediation illustrate that operators are developing practical communication strategies that effectively balance protocol requirements with operational effectiveness and safety objectives. Such adaptability is crucial within the maritime context, where urgency and complexity are paramount due to diverse operational environments and high safety stakes.

In tackling these adjustments, we can observe principles of sociolinguistics at play, where language users make concerted modifications to formal systems to meet specific communicative needs. While bilingualism research suggests that cognitive processes adapt to environmental demands, it is important to specify that this adaptability is particularly relevant within contexts where language use is influenced by situational factors (Beatty-Martínez et al., 2020). Similarly, when individuals navigate different linguistic contexts, they may optimize their lexical access in ways that align with the communicative situation at hand. This dynamic interacts with various layers of sociolinguistic competence, which encompasses the ability to adjust language use based on situational needs and audience comprehension (Mialkovska et al., 2024).

Moreover, the context surrounding maritime communication necessitates a more robust and nuanced approach to language use. In particular, the uniqueness of various maritime environments can require modifications to standard communication protocols, thereby reflecting a need for flexibility in operational procedures. Operators are increasingly aware of the impact of cultural diversity and contextual factors on effective communication, further amplifying the complexity of adaptation efforts. Such awareness ensures that communication strategies not only fulfill regulatory requirements but also enhance overall operational safety and efficiency within the maritime industry (Beatty-Martínez et al., 2020; , Mialkovska et al., 2024). The study also reveals the limitations of treating SMCP as a universal solution for maritime communication challenges. The documented success of code-switching strategies and simplified communication approaches suggests that effective maritime communication may require frameworks that acknowledge linguistic diversity while maintaining essential safety standards. This finding challenges assumptions about the adequacy of monolingual communication protocols for increasingly multilingual and multicultural maritime operational environments. (Schröder-Hinrichs et al., 2012) remind us of that lessons from past maritime disasters show a recurring failure to integrate communication and human factor issues into operational safety systems, underscoring the need for adaptive frameworks.

5.7 Practical Implications and Training Program Development

The findings strongly emphasize that Maritime English instruction within ESP and ELT frameworks must extend far beyond memorization of Standard Marine Communication Phrases. Although operators followed SMCP during routine procedures, they consistently shifted to adaptive communication in multilingual, time-sensitive, or high-pressure scenarios. This confirms that professional communicative competence at VTS centers requires both linguistic accuracy and pragmatic flexibility, which traditional phrase-based training often fails to develop. Therefore, Maritime English pedagogy must intentionally cultivate interactional awareness, rapid meaning negotiation, and clear decision-making in real operational contexts.

To achieve this, VTS training programs should incorporate communicative task design, role-play simulations, and scenario-based learning that replicate real-world operational pressures, multilingual breakdowns, and cultural diversity. The mediation strategies demonstrated by operators highlight the importance of integrating conflict management, cross-cultural communication, and safety-driven language choices into ESP curriculum design. This approach aligns with contemporary ELT principles, including Communicative Language Teaching and Task-Based Language Teaching, which prioritise authentic communication, intelligibility, and performance-based competence in high-stakes professional environments.

Furthermore, the inclusion of systematic feedback loops, such as structured analysis of authentic VTS recordings, can support reflective learning and reinforce effective linguistic behaviour. Such formative assessment techniques allow operators to evaluate their communicative judgements, recognise when SMCP adherence is essential, and understand when adaptive strategies promote safety. By embedding accuracy, adaptability, intercultural awareness, and reflective practice into Maritime English education, institutions can better prepare VTS personnel to uphold global communication standards while responding effectively to the linguistic and operational realities of modern maritime traffic control.

5.8 Regional Context and International Maritime Policy

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The findings from Indonesian VTS operations provide meaningful insight into how global maritime communication standards operate in culturally diverse and high-density regional waters. The successful use of adaptive communication strategies, including code-switching and simplified English, demonstrates that strict adherence to prescribed protocols may not always support communication clarity in authentic multilingual environments. This raises important considerations regarding whether current international standards sufficiently address the linguistic realities of contemporary maritime operations, especially in regions where English is used as a lingua franca among speakers with varied linguistic backgrounds.

These observations highlight the need for international frameworks, including SMCP guidelines, to recognise and accommodate legitimate regional linguistic adaptation without compromising safety. While global standardization remains essential, the findings illustrate that effective communication also depends on sensitivity to cultural and linguistic diversity, as well as situational demands. For ELT and ESP curriculum designers, this underscores the importance of preparing maritime professionals not only for protocol-accurate language use, but also for context responsive communication, intercultural competence, and strategic language adjustment in real operational settings.

In addition, environmental and operational challenges documented in the Indonesian context, such as limited equipment, workplace noise, and varying levels of English proficiency among crews, reveal broader issues related to institutional infrastructure and resource allocation. These systemic constraints require coordinated policy responses that extend beyond individual operator training to include technological upgrades, improved facility design, and collaborative regional procedures. Consistent with Mazaheri et al. (2013), risks of vessel collision are closely tied to both VTS systems and human communication performance, indicating the importance of integrating human factors and communication competence into maritime risk management, including language policy and maritime English education strategies.

6. Conclusion

This study demonstrates that Standard Marine Communication Phrases in Vessel Traffic Service operations are not applied as fixed formulas, but are actively negotiated in real time through selective adherence, code switching, and simplified English to maintain safety in multilingual and high pressure environments. The findings show that VTS officers operate as communicative mediators who balance international linguistic protocols with situational judgement, confirming that Maritime English functions as a dynamic professional register shaped by contextual constraints such as time sensitivity, accent variation, and intercultural interaction. This perspective reveals SMCP as a flexible communicative resource rather than a rigid linguistic script, highlighting the need to align maritime communication standards with the realities of global navigation and multilingual operations.

These results hold significant implications for English Language Teaching, particularly within the English for Specific Purposes domain. Maritime English training must move beyond phrase memorization and incorporate scenario based simulation, intercultural communication strategies, problem solving communication tasks, and analysis of authentic VTS recordings to develop adaptive linguistic competence. Such instructional design aligns with communicative and task based pedagogy that prioritises operational clarity, intercultural sensitivity, and performance readiness in safety critical environments. Accordingly, curriculum developers and policy actors should embed realistic communication challenges into training so that cadets build the professional flexibility required to apply SMCP with accuracy and strategic judgement. Future research is encouraged to examine cross national VTS practices, explore artificial intelligence assisted communication support, and assess how adaptive Maritime English pedagogy influences long term safety culture and communicative performance in global shipping contexts.

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