

## СОЦІАЛЬНІ ТА ПОВЕДІНКОВІ НАУКИ

UDC 656.61.052:378.147:159.9

DOI <https://doi.org/10.35546/kntu2078-4481.2026.2.58>

O. V. BAIRAMOVA

Candidate of Philosophical Sciences, Associate Professor,  
Acting Head of the Department of Social and Humanitarian Disciplines  
Separated Structural Unit "Danube Institute of Water Transport  
of the National Transport University"  
ORCID: 0000-0002-3199-0612

### DEVELOPMENT OF NON-TECHNICAL COMPETENCIES IN MARITIME EDUCATION IN ACCORDANCE WITH THE REQUIREMENTS OF THE STCW CONVENTION

*This article presents a comprehensive analysis of the problem of developing non-technical skills in the training of maritime professionals in specialty J5 Maritime and Inland Water Transport. The relevance of the research is determined by the fact that, according to the European Maritime Safety Agency, the human element is associated with over 80 % of investigated marine casualties and incidents, with a significant proportion of errors caused by insufficient levels of non-technical competencies: leadership, teamwork, communication, situational awareness and decision-making. The evolution of safety science paradigms from technical determinism to resilience engineering (Safety-II) is examined, including the theoretical contributions of J. Reason's organisational accident model and the concept of high-reliability organisations. The STCW Convention requirements for non-technical skills at operational and management levels are systematised, and methods for developing and assessing non-technical skills in the educational process are analysed, with particular attention to simulator-based training, Crew Resource Management programmes, and reflective practice techniques. The role of psychological safety as a necessary prerequisite for effective non-technical skills development is substantiated, alongside the significance of institutional culture in maritime higher education. The article identifies key barriers to integrating non-technical skills into existing curricula and proposes a structured competency framework aligned with IMO Model Course requirements. Practical recommendations for implementing the competency-based approach to non-technical skills in maritime higher education institutions are formulated.*

**Key words:** non-technical skills, maritime education, STCW, leadership, teamwork, human factors, Reason's model, competency-based approach, situational awareness, seafarer psychological safety.

O. V. БАЙРАМОВА

кандидат філософських наук, доцент,  
в.о. завідувача кафедри соціально-гуманітарних дисциплін  
Відокремлений структурний підрозділ «Дунайський інститут водного  
транспорту» Національного транспортного університету  
ORCID: 0000-0002-3199-0612

### ФОРМУВАННЯ НЕТЕХНІЧНИХ КОМПЕТЕНЦІЙ У МОРСЬКІЙ ОСВІТІ ВІДПОВІДНО ДО ВИМОГ КОНВЕНЦІЇ ПДНВ

*У статті виконано комплексний аналіз проблеми формування нетехнічних компетенцій у підготовці морських фахівців спеціальності J5 Морський та внутрішній водний транспорт. Актуальність дослідження зумовлена тим, що, за даними Європейського агентства з морської безпеки, людський елемент пов'язаний із понад 80 % розслідуваних морських аварій та інцидентів, при цьому значна частка помилок зумовлена недостатнім рівнем саме нетехнічних компетенцій: лідерства, командної роботи, комунікації, ситуаційної обізнаності та прийняття рішень. Розглянуто еволюцію наукових парадигм безпеки від технічного детермінізму до інженерії стійкості, зокрема теоретичний внесок моделі організаційних аварій Дж. Різона та концепцію організацій із високою надійністю. Систематизовано вимоги Конвенції ПДНВ до нетехнічних компетенцій на операційному та управлінському рівнях, проаналізовано методи формування та оцінювання нетехнічних компетенцій в освітньому процесі – зокрема тренажерна підготовка, програми управління ресурсами екіпажу та технології рефлексивної практики. Обґрунтовано роль психологічної безпеки як необхідної передумови ефективного формування нетехнічних компетенцій, а також значення інституційної*



© O. V. Bairamova, 2026

Стаття поширюється на умовах ліцензії відкритого доступу CC BY 4.0

ISSN 2078-4481

культури морського закладу вищої освіти. Визначено ключові бар'єри інтеграції нетехнічних компетенцій до навчальних програм та запропоновано структуровану компетентнісну рамку, узгоджену з вимогами типових курсів ІМО. Сформульовано практичні рекомендації щодо імплементації компетентнісного підходу до нетехнічних компетенцій у морських закладах вищої освіти.

**Ключові слова:** нетехнічні компетенції, морська освіта, ПДНВ, лідерство, командна робота, людський фактор, модель Різона, компетентнісний підхід, ситуаційна обізнаність, психологічна безпека моряка.

### Statement of the Problem

Maritime transport constitutes a complex sociotechnical system in which safety is determined by the interaction of technical, organisational and human factors. According to the European Maritime Safety Agency (EMSA), during the period 2014–2023, a total of 26,595 marine casualties and incidents were recorded. Analysis of investigations reveals that 58.4 % of events were associated with human action events, whilst 49.8 % of contributing factors related to human behaviour. When both categories are considered jointly, the human element is implicated in over 80 % of investigated casualties [1].

The Manila Amendments to the STCW Convention (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers), adopted in 2010, represented a watershed moment in the recognition of non-technical skills (NTS) in the maritime industry. For the first time at the international level, mandatory competency requirements for leadership and teamwork were introduced for both deck and engine officers at operational and management levels [2]. These amendments reflect a paradigmatic shift in the understanding of maritime safety: from a purely technical approach to a sociotechnical one, in which the human factor is recognised not merely as a source of errors but as a key determinant of system adaptability and resilience.

At the same time, the implementation of STCW requirements concerning NTS in the curricula of maritime higher education institutions (MHEIs) encounters a number of challenges: the absence of established NTS assessment methodologies; insufficient understanding of the relationship between specific NTS and maritime safety; the traditional orientation of maritime education towards technical knowledge and skills; and the lack of scientifically grounded approaches to NTS development in the academic environment. These factors determine the relevance of the present study.

### Analysis of Recent Research and Publications

The problem of non-technical competencies has been most systematically investigated in aviation, where the NOTES (Non-Technical Skills) system has become the standard for pilot assessment. Flin et al. (2008), in their seminal work “Safety at the Sharp End”, synthesised NTS research across high-risk industries and identified five key categories: situational awareness, decision-making, communication, teamwork and leadership [3]. These categories have formed the basis for maritime NTS assessment systems.

James Reason (1990, 1997) developed a systemic model of accident causation (the “Swiss cheese model”), which distinguishes four levels of failure: organisational influences, unsafe supervision, preconditions for unsafe acts and the unsafe acts themselves [4]. This model provided the theoretical foundation for understanding the role of NTS in accident prevention: non-technical competencies serve as barriers that prevent the “alignment of holes” in the system’s defences.

Hollnagel (2014) proposed an alternative approach resilience engineering (Safety-II) – which focuses not on preventing failures but on the system’s capacity to function successfully under variable and unpredictable conditions [5]. From the Safety-II perspective, non-technical competencies represent a key factor in the adaptability of the “vessel–crew–environment” system.

Chauvin et al. (2013) adapted the Human Factors Analysis and Classification System (HFACS) for the maritime domain, adding a level of external factors, and demonstrated the predominant role of organisational and supervisory factors in maritime accidents [6]. Ventikos et al. (2023) conducted a systematic review of the human element as a risk factor in the maritime domain [7].

Among domestic studies, the work of Urum et al. (2025), which analysed the role of communication as a vital element of Bridge Resource Management, merits attention [8]. Plita, Shevchenko, Urum and Lisovskyi (2024) examined the organisation of the navigational watch [9], whilst Shevchenko et al. (2025) investigated issues of seafarer training in the context of modern information technology implementation [10].

Despite the considerable body of NTS research, the following aspects remain insufficiently systematised: the relationship between specific STCW requirements for NTS and scientific safety paradigms; a comprehensive analysis of NTS development and assessment methods within the context of maritime education; and practical recommendations for implementing the competency-based approach to NTS in MHEIs.

### Formulation of the Research Aim

The aim of this article is to provide a comprehensive analysis of the problem of developing non-technical competencies for maritime professionals: to systematise STCW requirements for NTS, to analyse scientific safety paradigms as a theoretical foundation, and to identify approaches to NTS development and assessment in the educational process of maritime higher education institutions.

**Presentation of the Main Research Material**

The understanding of the role of non-technical competencies in ensuring maritime safety is inextricably linked to the evolution of scientific approaches to safety. The contemporary educational paradigm recognises the dialectical interrelationship between technical and non-technical competencies, whereby the effectiveness of a professional is determined not solely by the breadth of specialist knowledge (hard skills) but also by the level of behavioural skill development (soft skills) [11]. The shift in approaches to safety represents a transformation of the fundamental assumptions upon which the scientific and practical understanding of the problem is founded.

The paradigm of technical determinism, which prevailed until the 1970s, reduced the problem of safety exclusively to the technical domain. Accidents were attributed to equipment failures, and their prevention was confined to enhancing the reliability of technology. The human operator was regarded as an agent required to execute instructions correctly. Within this paradigm, non-technical competencies held no independent significance [5].

The human factors paradigm, which took shape during the 1980s–2000s, emerged as a response to a series of catastrophic accidents (Challenger 1986, Chernobyl 1986, Herald of Free Enterprise 1987, Exxon Valdez 1989), which demonstrated that the majority of accidents were associated with human errors. James Reason (1990) proposed a systemic model distinguishing “active failures” (operator errors) from “latent failures” (organisational defects, training deficiencies, ineffective supervision) [4]. Reason’s model became paradigmatic for high-risk industries and substantiated the need for NTS development as safety barriers.

The paradigm of resilience engineering, or Safety-II, formulated by Hollnagel (2014), marked the transition from analysing “what went wrong” to understanding “why things usually go right” [5]. Within the Safety-II framework, the human operator is regarded not as a source of errors but as a key factor in the system’s adaptation to unforeseen situations. NTS – particularly situational awareness, decision-making and communication – constitute the mechanisms of this adaptation.

Table 1

**Evolution of safety paradigms and the role of non-technical competencies**

Paradigm	Period	Key idea	Role of NTS
Technical determinism	Pre-1970s	Safety = equipment reliability	Not recognised
Human factors	1980s–2000s	Human error as the cause of accidents (Reason)	Safety barriers
Safety-II	From 2010s	Human as a factor of adaptation (Hollnagel)	System resilience mechanisms

The STCW Convention, as amended by the Manila Amendments (2010), defines NTS requirements for ship’s officers at two levels: operational and management. These requirements are set out in the competency tables of Part A of the STCW Code [2].

At the operational level (Tables A-II/1 for deck officers and A-III/1 for engineer officers), competencies are required in: application of leadership and teamwork skills; contribution to the effectiveness of the bridge/engine room team; application of task and workload management skills; and understanding and taking measures regarding fatigue management [2].

At the management level (Tables A-II/2 for senior deck officers and A-III/2 for senior engineer officers), additional requirements include: management and motivation of shipboard personnel; Bridge/Engine Room Resource Management (BRM/ERM); planning and coordination of operations; assessment of situations and decision-making; and maintenance of effective communication [2].

Table 2

**STCW requirements for non-technical competencies of ship’s officers**

NTS category	Operational level	Management level
Leadership	Work group leadership, motivation	Strategic management, establishing safety culture
Teamwork	Team contribution, coordination	BRM/ERM, conflict management
Situational awareness	Situation monitoring, attention distribution	Strategic assessment, forecasting
Decision-making	Operational procedural decisions	Strategic decisions under uncertainty
Communication	SMCP, closed-loop communication, reports	Briefing/debriefing, assertiveness, external comms

It is important to note that the STCW Convention defines not only knowledge requirements but also specific behavioural markers against which competency is assessed. This means that NTS assessment must be based on the observation of behaviour rather than solely on theoretical knowledge [2].

*Leadership.* In the maritime context, leadership is defined as the ability to direct team activities towards the goals of safe vessel operation. The STCW Convention distinguishes leadership at the operational level (functioning as a work group leader) and the management level (strategic direction, motivation, establishment of a safety culture). Key behavioural indicators include: setting behavioural standards; clear task assignment; support of subordinates; and acceptance of responsibility for decisions [3].

*Teamwork.* Teamwork aboard ship possesses specific characteristics: multicultural crew composition, hierarchical structure, confined spaces and extended voyages. The STCW Convention requires understanding of team roles, the ability to coordinate actions and to resolve conflicts. The concepts of BRM (Bridge Resource Management) and ERM (Engine Room Resource Management) represent the practical realisation of teamwork, adapted from aviation CRM (Crew Resource Management) [8, 9].

*Situational awareness (SA).* According to the Endsley model (1995), situational awareness encompasses three levels: perception of elements in the current situation (Level 1), comprehension of their meaning (Level 2) and projection of future status (Level 3) [12]. In the maritime context, SA is critical for watchkeeping: an officer must simultaneously monitor the navigational situation, meteorological conditions, vessel status and the actions of other vessels. Loss of SA is one of the most prevalent contributing factors in maritime accidents.

*Decision-making.* Decision-making aboard ship occurs under conditions of uncertainty, time pressure and high consequence of error. Klein (1998) described the Naturalistic Decision-Making (NDM) model, in which experienced operators employ recognition-primed decision-making rather than formal analysis of alternatives [13]. The STCW Convention requires the ability to make decisions in both standard (rule-based) and non-standard (knowledge-based) situations.

*Communication.* Effective communication aboard ship serves as the foundation for all other NTS. The STCW Convention and IMO Standard Marine Communication Phrases (SMCP) define standardised communication protocols [14]. Key elements include: closed-loop communication, in which the recipient confirms the accuracy of the received message; assertiveness – the ability of junior officers to report safety concerns; and briefing/debriefing as coordination instruments [8].

The development of NTS in the educational process of maritime higher education institutions requires specialised pedagogical approaches distinct from traditional lecture-based teaching. The competency-based approach, enshrined in the Higher Education Standard of Ukraine for specialty 271 and in the STCW Convention, demands not merely the acquisition of knowledge but the formation of the ability to apply it in practical situations [15].

*Simulator-based training (SBT).* Simulator training is the primary method of NTS development in maritime education. Navigation and engine simulators enable the modelling of realistic scenarios requiring teamwork, decision-making under pressure and communication. STCW (Section A-I/12) defines requirements for simulators and simulator-based training [2]. The effectiveness of SBT is significantly enhanced through structured debriefing, during which the instructor analyses with students not only the technical aspects of task performance but also the quality of team interaction, communication and decision-making [3].

*Team-based scenario training.* This method involves the development of complex scenarios (emergency situations, storm conditions, fire, collision) in which successful completion depends upon effective team interaction. Unlike individual simulator training, team scenarios facilitate the development of leadership, coordination and communication under conditions approximating reality [9].

*Case-based learning (CBL).* The analysis of actual maritime accidents from a human factors perspective is an effective method of developing situational awareness and decision-making skills. Accident investigation databases (EMCIP, MAIB, NTSB) provide detailed material for instruction. The application of Reason’s model to real accidents enables students to understand the systemic nature of errors and the role of NTS as safety barriers [4, 6].

*Role-play and tabletop exercises.* Role-play exercises facilitate the development of communication skills, assertiveness and leadership without the need for complex simulator equipment. Tabletop exercises are effective for developing decision-making skills in emergency situations, where participants must coordinate actions in real time based on limited information [3].

*Reflective practice and self-assessment.* The development of NTS is impossible without cultivating the capacity for reflection – the critical analysis of one’s own actions and decisions. Debriefing following simulator sessions, maintenance of a reflective journal during sea service and structured self-assessment are instruments for developing metacognitive skills that underpin situational awareness and decision-making. Within the context of university studies, these methods foster an academic culture of critical thinking [15].

Table 3

NTS development methods and competency categories

Method	SA	Decision	Comms	Team	Leader.
Simulator-based training	+++	+++	++	+++	++
Team scenarios	++	++	+++	+++	+++
Case-based learning	+++	+++	+	+	+
Role-play exercises	+	++	+++	++	+++
Reflective practice	++	++	+	+	+

Note: +++ – high effectiveness, ++ – moderate, + – limited.

The assessment of NTS constitutes one of the most challenging aspects of their implementation in the educational process. Unlike technical competencies, which possess clear “correct/incorrect” criteria, NTS require the assessment of behaviour within the context of the situation.

*Behavioural rating scales (BRS).* The NOTECHS system, developed for aviation and adapted for the maritime domain (MarNOTECHS), employs a five-point scale for assessing behavioural indicators across four categories: leadership and management, teamwork, situational awareness and decision-making [16]. Assessment is conducted by trained observers during simulator exercises.

*Structured observation.* During simulator exercises, the instructor employs pre-developed checklists containing behavioural indicators for each NTS category. This ensures the standardisation of assessment and reduces subjectivity. STCW (Section A-I/6) defines the general requirements for competency assessment, including the requirement for demonstration of practical skills [2].

*Self- and peer-assessment.* These methods develop reflective thinking and metacognitive skills. Students evaluate their own behaviour and that of their peers using the same behavioural indicators employed for external assessment. Research demonstrates that the combination of self-assessment with instructor assessment is the most effective approach for NTS development [3].

*Debriefing as an assessment instrument.* Structured debriefing following simulator exercises serves a dual function: assessment (formative, aimed at development) and learning (through reflection). Effective debriefing comprises three phases: description of events (what happened), analysis (why it happened, which NTS were applied effectively or ineffectively) and synthesis (what can be improved) [3, 8].

The concept of psychological safety, introduced by Edmondson (1999), is defined as the shared belief among team members that the team constitutes a safe environment for interpersonal risk-taking – that is, that one may openly express opinions, raise questions and report errors without fear of punishment or humiliation [17]. In the maritime context, psychological safety is of critical importance for several reasons.

Firstly, the hierarchical culture aboard ship may create barriers to the assertiveness of junior officers. Maritime accident investigations have repeatedly identified situations in which junior crew members noticed hazards but did not venture to report them to the master. According to EMSA data, communication failures represent one of the most prevalent types of human element errors [1, 7].

Secondly, the duration of voyages, separation from family and the multicultural composition of the crew create additional psychological pressures. Stress, fatigue and circadian rhythm disruption diminish cognitive function, directly affecting situational awareness and decision-making. The STCW Convention (Section A-VIII/1) defines minimum rest hour requirements (not less than 10 hours in any 24-hour period), although compliance with these standards does not invariably guarantee the absence of fatigue [2].

Thirdly, the development of NTS itself requires a psychologically safe learning environment. Students must feel able to make errors during simulator exercises, to pose questions and to receive constructive feedback. Without this, the formation of assertiveness, leadership and teamwork is not achievable [17].

On the basis of the analysis conducted, recommendations have been formulated for implementing a systematic approach to NTS development in maritime higher education institutions of specialty J5 Maritime and Inland Water Transport.

*Integration of NTS into curricula.* NTS should be developed not solely within dedicated modules (e.g. “Soft Skills and Seafarer Psychological Safety”) but integrated across all professional disciplines. Every simulator exercise in navigation, manoeuvring or engine room management should incorporate NTS assessment as a mandatory component. This aligns with the STCW approach, in which NTS are included in the competency tables of all ship’s officers rather than being separated into a distinct section [2].

*Instructor preparation.* Effective NTS development and assessment requires specially trained instructors. Instructors must possess skills in observing behavioural indicators, conducting structured debriefing and providing constructive feedback. IMO Model Course 6.09 “Training Course for Instructors” and Model Course 6.10 “Train the Simulator Trainer and Assessor” define the relevant requirements [18].

*A systemic approach to understanding errors.* In the context of instructor preparation and the fostering of a safety culture, it is essential to recognise that the modern understanding of “human error” presupposes a systemic approach, in which error is regarded not as a cause but as a consequence of the interaction of organisational, technical and individual factors [19]. Such an approach requires instructors to move from punishing errors to analysing the systemic conditions that gave rise to them.

*Psychological and ethical dimensions of safety culture.* The formation of a safety culture in maritime organisations encompasses not only technical but also psychological and ethical dimensions. Consideration of the political and ethical aspects of safety culture functioning within maritime organisations is a necessary condition for the development of effective seafarer training programmes [20].

*The complexity of the human element.* As confirmed by systematic reviews, the human factor remains the predominant cause of maritime accidents, and the development of non-technical skills constitutes a key instrument for enhancing

maritime safety [21]. Consequently, the integration of NTS across all aspects of maritime education represents not an optional aspiration but a systemic necessity.

*Progressive complexity.* NTS development should proceed incrementally throughout the entire period of study: in the junior years – basic communication and teamwork skills (within university studies and soft skills modules); in intermediate years – situational awareness and decision-making in the context of professional disciplines; and in senior years – leadership and the integration of all NTS within complex simulator scenarios.

*Use of standardised assessment instruments.* It is recommended to adapt the MarNOTECHS system or similar behavioural rating scales for the systematic assessment of NTS during simulator exercises. This will ensure objectivity of assessment, feedback for students and the ability to track NTS development progress throughout the programme [16].

*Creation of a psychologically safe learning environment.* The learning environment should embody the principles of psychological safety: the right to err during training; constructive feedback rather than punishment for mistakes; encouragement of assertiveness and critical thinking; and the use of debriefing as a learning instrument rather than a means of control [17].

Table 4

**Stages of NTS development throughout study at a maritime HEI**

Stage	Priority NTS	Methods	Disciplines
Years 1–2	Communication, basic teamwork	Role-play, discussions, group projects	University studies, Soft skills, English
Year 3	SA, decision-making, communication	CBL, simulators (basic), reflection	Navigation, Safety, Meteorology
Year 4	Leadership, NTS integration	Complex BRM/ERM scenarios, debriefing	Simulator training, Sea service

### Conclusions

The comprehensive analysis of the problem of developing non-technical competencies for maritime professionals has confirmed the systemic nature of this problem and its direct relationship with the assurance of maritime safety.

The evolution of scientific safety paradigms – from technical determinism, through Reason’s human factors model, to resilience engineering (Safety-II) – substantiates the growing significance of non-technical competencies. Within the Safety-II framework, non-technical competencies are regarded not merely as barriers preventing errors but as mechanisms enabling the adaptation of the sociotechnical system “vessel–crew–environment” to variable and unpredictable conditions.

The systematisation of STCW Convention requirements, as amended by the Manila Amendments (2010), demonstrates that the five principal NTS categories – leadership, teamwork, situational awareness, decision-making and communication – are not supplementary but integral competencies of ship’s officers, the requirements for which are established in competency tables on an equal footing with technical knowledge and skills at both operational and management levels.

Effective NTS development requires specialised pedagogical approaches: simulator-based training with debriefing, team scenarios, analysis of real-life accidents and reflective practice. The key condition is the integration of NTS across all professional disciplines rather than their confinement to dedicated courses, which accords with the logic of the STCW Convention. NTS assessment should be based on the observation of behavioural indicators using standardised instruments, and the combination of instructor assessment, self-assessment and peer assessment provides the most comprehensive picture of NTS attainment.

Psychological safety constitutes a necessary prerequisite both for effective teamwork aboard ship and for NTS development in the educational process. The creation of a psychologically safe learning environment, in which students have the right to err and receive constructive feedback, is an essential condition for implementing the competency-based approach.

Further research should be directed towards the development and validation of NTS assessment instruments adapted for domestic maritime HEIs, the investigation of the influence of cultural factors on NTS development in multicultural crews, and the creation of a database of simulator scenarios oriented towards the development of specific NTS categories.

### Bibliography

1. EMSA. Annual Overview of Marine Casualties and Incidents 2024. Lisbon : European Maritime Safety Agency, 2024. 66 p.
2. IMO. STCW Convention and STCW Code, 2017 Consolidated Edition. London : International Maritime Organization, 2017. 432 p.
3. Flin R., O’Connor P., Crichton M. *Safety at the Sharp End: A Guide to Non-Technical Skills*. Aldershot : Ashgate, 2008. 317 p.
4. Reason J. *Human Error*. Cambridge : Cambridge University Press, 1990. 302 p.
5. Hollnagel E. *Safety-I and Safety-II: The Past and Future of Safety Management*. Farnham : Ashgate, 2014. 187 p.

6. Chauvin C., Lardjane S., Morel G., Clostermann J.-P., Langard B. Human and organisational factors in maritime accidents: Analysis of collisions at sea using the HFACS. *Accident Analysis & Prevention*. 2013. Vol. 59. P. 26–37. <https://doi.org/10.1016/j.aap.2013.05.006>.
7. Ventikos N. P., Louzis K., Koimtzoglou A. The human element as a risk factor in the maritime domain: A review. *Maritime Policy & Management*. 2023. Vol. 50, No. 5. P. 539–566. <https://doi.org/10.1080/03088839.2022.2044792>.
8. Urum N. S., Chufarlicheva A. L., Shtrybets V. V., Lisovskyi S. V. Communication as an important element of Bridge Resource Management on sea transport. *Вчені записки ТНУ імені В.І. Вернадського. Серія: Технічні науки*. 2025. Т. 36(75), № 1. С. 375–381.
9. Пліта М. М., Шевченко А. П., Урум Н. С., Лісовський С. В. Організація ходової навігаційної вахти на морському транспорті. *Водний транспорт*. 2024. № 2, Вип. (40). С. 109–116.
10. Шевченко А. П., Якусевич Ю. Г., Дорофєєва З. Я., Тришин В. В. Деякі проблеми підготовки моряків на тлі впровадження сучасних інформаційних технологій на морському транспорті. *Вчені записки ТНУ імені В.І. Вернадського. Серія: Технічні науки*. 2025. Т. 36(75), № 1. С. 382–388.
11. Bairamova O. The dialect of hard and soft skills: a philosophical reflection on 21st century educational paradigms. *Перспективи. Соціально-політичний журнал*. 2025. Вип. 1. С. 138–144. <https://doi.org/10.24195/spj1561-1264.2025.1.18>.
12. Endsley M. R. Toward a Theory of Situation Awareness in Dynamic Systems. *Human Factors*. 1995. Vol. 37, No. 1. P. 32–64. <https://doi.org/10.1518/001872095779049543>.
13. Klein G. *Sources of Power: How People Make Decisions*. Cambridge, MA : MIT Press, 1998. 330 p.
14. IMO. Standard Marine Communication Phrases (SMCP). MSC/Circ.794. London : International Maritime Organization, 2001. 116 p.
15. Стандарт вищої освіти України за спеціальністю 271 «Річковий та морський транспорт». Київ : Міністерство освіти і науки України, 2021. 24 с.
16. Crichton M. T. From cockpit to operating theatre to drilling rig floor: five principles for improving safety using simulator-based exercises to enhance team cognition. *Cognition, Technology & Work*. 2017. Vol. 19, No. 1. P. 73–84. <https://doi.org/10.1007/s10111-016-0396-9>.
17. Edmondson A. C. Psychological Safety and Learning Behavior in Work Teams. *Administrative Science Quarterly*. 1999. Vol. 44, No. 2. P. 350–383. <https://doi.org/10.2307/2666999>.
18. IMO. Model Course 6.09: Training Course for Instructors. London : International Maritime Organization, 2017. 98 p.
19. Dekker S. *The Field Guide to Understanding 'Human Error'*. 3rd ed. Boca Raton : CRC Press, 2014. 236 p.
20. Bairamova O. Maritime Safety Psychology: Political and Ethical Dimensions of Safety Culture in Maritime Organisations. *Psychology Travelogs*. 2025. Issue 3. P. 108–130. <https://doi.org/10.31891/PT-2025-3-11>.
21. Hetherington C., Flin R., Mearns K. Safety in shipping: The human element. *Journal of Safety Research*. 2006. Vol. 37, No. 4. P. 401–411. <https://doi.org/10.1016/j.jsr.2006.04.007>.

#### References

1. EMSA (2024). *Annual Overview of Marine Casualties and Incidents 2024*. Lisbon: European Maritime Safety Agency.
2. IMO (2017). *STCW Convention and STCW Code, 2017 Consolidated Edition*. London: International Maritime Organization.
3. Flin, R., O'Connor, P., & Crichton, M. (2008). *Safety at the Sharp End: A Guide to Non-Technical Skills*. Aldershot: Ashgate.
4. Reason, J. (1990). *Human Error*. Cambridge: Cambridge University Press.
5. Hollnagel, E. (2014). *Safety-I and Safety-II: The Past and Future of Safety Management*. Farnham: Ashgate.
6. Chauvin, C., Lardjane, S., Morel, G., Clostermann, J.-P., & Langard, B. (2013). Human and organisational factors in maritime accidents: Analysis of collisions at sea using the HFACS. *Accident Analysis & Prevention*, 59, 26–37. <https://doi.org/10.1016/j.aap.2013.05.006>
7. Ventikos, N. P., Louzis, K., & Koimtzoglou, A. (2023). The human element as a risk factor in the maritime domain: A review. *Maritime Policy & Management*, 50(5), 539–566. <https://doi.org/10.1080/03088839.2022.2044792>
8. Urum, N. S., Chufarlicheva, A. L., Shtrybets, V. V., & Lisovskyi, S. V. (2025). Communication as an important element of Bridge Resource Management on sea transport. *Vcheni zapysky TNU imeni V.I. Vernadskoho. Seriya: Tekhnichni nauky*, 36(75), 1, 375–381.
9. Plita, M. M., Shevchenko, A. P., Urum, N. S., & Lisovskyi, S. V. (2024). Orhanizatsiia khodovoi navihatsiinoi vakhty na morskomu transporti [Organisation of navigational watch on maritime transport]. *Vodnyi transport*, 2(40), 109–116.

10. Shevchenko, A. P., Yakusevych, Yu. H., Dorofieieva, Z. Ya., & Tryshyn, V. V. (2025). Deiaki problemy pidhotovky moriakiv na tli vprovadzhennia suchasnykh informatsiinykh tekhnolohii na morskomu transporti [Some problems of seafarers training in the context of modern IT]. *Vcheni zapysky TNU imeni V.I. Vernadskoho. Seriia: Tekhnichni nauky*, 36(75), 1, 382–388.
11. Bairamova, O. (2025). The dialect of hard and soft skills: A philosophical reflection on 21st century educational paradigms. *Perspektyvy. Sotsialno-politychnyi zhurnal*, 1, 138–144. <https://doi.org/10.24195/spj1561-1264.2025.1.18>
12. Endsley, M. R. (1995). Toward a Theory of Situation Awareness in Dynamic Systems. *Human Factors*, 37(1), 32–64. <https://doi.org/10.1518/001872095779049543>
13. Klein, G. (1998). *Sources of Power: How People Make Decisions*. Cambridge, MA: MIT Press.
14. IMO (2001). *Standard Marine Communication Phrases (SMCP). MSC/Circ.794*. London: International Maritime Organization.
15. *Standard vyshchoi osvity Ukrainy za spetsialnistiu 271 «Richkovyi ta morskyi transport»* [Higher Education Standard of Ukraine for Specialty 271] (2021). Kyiv: Ministry of Education and Science of Ukraine.
16. Crichton, M. T. (2017). From cockpit to operating theatre to drilling rig floor: five principles for improving safety using simulator-based exercises. *Cognition, Technology & Work*, 19(1), 73–84. <https://doi.org/10.1007/s10111-016-0396-9>
17. Edmondson, A. C. (1999). Psychological Safety and Learning Behavior in Work Teams. *Administrative Science Quarterly*, 44(2), 350–383. <https://doi.org/10.2307/2666999>
18. IMO (2017). *Model Course 6.09: Training Course for Instructors*. London: International Maritime Organization.
19. Dekker, S. (2014). *The Field Guide to Understanding 'Human Error'* (3rd ed.). Boca Raton: CRC Press.
20. Bairamova, O. (2025). Maritime Safety Psychology: Political and Ethical Dimensions of Safety Culture in Maritime Organisations. *Psychology Travelogs*, 3, 108–130. <https://doi.org/10.31891/PT-2025-3-11>
21. Hetherington, C., Flin, R., & Mearns, K. (2006). Safety in shipping: The human element. *Journal of Safety Research*, 37(4), 401–411. <https://doi.org/10.1016/j.jsr.2006.04.007>

Дата першого надходження статті до видання: 13.02.2026

Дата прийняття статті до друку після рецензування: 19.03.2026

Дата публікації (оприлюднення) статті: 07.05.2026