

People-Centred Clean Energy Transition: The Role of Maritime Education and Training

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Abstract: Seafarers' knowledge and skills to handle new technologies in the environmental field are considered as important in the maritime industry. To prepare for future needs in green shipping, a new concept of "People-Centred Clean Energy Transitions (PCCET)" is relevant as it implies the role of education to support "people-centred and inclusive" clean energy transition within the maritime sector. This paper explores the role of MET to support the concept of PCCET from social sustainability perspectives. This study was inspired by the principles of "just transition" where education is recognized as a tool to create an enabling environment for people to drive the transition towards more sustainable and inclusive societies. The method of this study is to align the concept of PCCET to the existing framework of Global Maritime Professionals (GMPs), enabling the IAMU community to participate in PCCET through the promotion of GMP in MET. By adopting a concept mapping method, the paper identified key linkages between PCCET and GMP and the role of MET. The result would increase the applicability of GMP into an emerging maritime context where the potential of MET can also be expanded towards a sustainable maritime future.

Keywords: People-Centred Clean Energy Transition; maritime education and training (MET); Global Maritime Professional (GMP); just transition; maritime decarbonization

1. Introduction

A growing interest in shifting towards clean energy is a global and cross-sectoral issue to address climate change. This is also the case for the maritime industry where alternative and renewable energy as fuels to propel ships are recognized as a necessary transition in sustainable green shipping. Various technologies are being introduced, such as a variety of fuels made using renewable energy (e.g., methanol, hydrogen and ammonia), but also the introduction of renewable energy conversion devices onboard ships, such as wing sails and photovoltaic panels to harness the energy from wind and sun. Osterkamp et al. (2021) argues that clean energy transition in shipping is still in the emergence phase where at least 5% share of safe and scalable zero-emission fuels (SZEF) is required by 2030 to achieve a successful transition. While such transitions tend to focus on technologies to promote environmental and economic sustainability, social sustainability should also be underscored.

The International Energy Agency (IEA) coined a concept of "People-Centred Clean Energy Transitions (PCCET)", meaning that "all clean energy transitions should be truly people-centred and inclusive, and that this is essential to the success of energy system transformation at the pace and scale required to deliver global ambition for climate change mitigation" (IEA, 2022). This definition opens up a new research paradigm of how education can support "people-centred and inclusive" clean energy transition within the maritime sector. It is timely to discuss this concept in the context of maritime education and training (MET) as the impact and possibilities of emerging technologies, including clean energy related technologies, were addressed in the Principles of the Comprehensive Review of the STCW Convention and Code during the 9th session of Human

Element, Training, and Watchkeeping (HTW) Sub-Committee at the International Maritime Organization (IMO) (IMO 2023).

This paper explores the role of MET to support the concept of PCCET from social sustainability perspectives. This study was inspired by the principles of “just transition” which contribute to three elements of sustainability (i.e., environmental, economic, and social) (Just Transition Centre 2017) and education is recognized as a tool for “just transition”. Hence, the method of this study is to align the concept of PCCET to the existing framework of Global Maritime Professionals (GMP), enabling the IAMU community to participate in PCCET through the promotion of GMP in MET. GMP prescribed in the Body of Knowledge (BoK) (IAMU 2019) provides guidance to educate future maritime professionals. The paper begins with reviewing selected concepts of transitions in relation to human element in the maritime sector, followed by the method used and results and findings. Finally, discussion and conclusion are presented.

2. Transitions and human element

When values, perceptions, and ways of being and doing in the world are challenged for change, transitions require people to redefine the situations and self (Wilson 2019). Situation awareness is important in cognitive psychology as it refers to a function of the human mind to be conscious about complex, dynamic and potentially risky situations (Endsley 1995). Transitions are also used in behavioral theories to understand, negotiate, and resolve people’s life transitions (Ruthven 2021).

The maritime sector is facing contemporary challenges, such as digitalization, decarbonization, skill gaps, and occupational safety and health. Thus, the notion of human element by addressing these challenges is becoming wider and more complex. In this rapidly changing environment, human element or people-centred approaches are needed to consider how transitions can improve the lives of people and create a just maritime industry for all.

2.1 Just Transition

When considering green jobs to mitigate the impact of climate change, one important transition theory is called “just transition”. Just transition began its origins in the 1990s when trade unionists supported unemployed workers that were made redundant as the result of environmental protection policies, however the concept has been evolved to invest in environmentally and socially sustainable economies (Just Transition Centre 2017). Just transition recognizes education as a tool to create an enabling environment for people to drive the transition towards more sustainable and inclusive societies, for example, training and curricular adaptation is a way that educators can take part of the transition (ILO 2015). During the 26th meeting of the conference of the parties (COP 26) to the United Nations climate convention (UNFCCC) in Glasgow, the “Maritime Just Transition Task Force” was set up by the International Chamber of Shipping (ICS), the International Transport Workers’ Federation (ITF), the United Nations Global Compact (UNGC), the International Labour Organization (ILO) and IMO. It is an initiative that shipping’s response to the climate emergency puts seafarers and communities at the heart of the solution (Maritime Just Transition Task Force 2022).

In the context of MET, education of seafarers and other maritime professionals who are environmentally minded is a socially sustainable response to just transition. Future maritime sectors need people who can drive the process of maritime decarbonization, blue economy, green port, sustainable shipyard, sustainable supply chain, safe and healthy work environment, and other emerging agendas. PCCET is one of such agendas which has not been well conceptualized in the maritime sector and relates to just transition from human element perspectives.

2.2 People-Centred Clean Energy Transition

A concept of PCCET proposed by IEA (2022) reflects a growing interest in shifting towards clean energy as a global and cross-sectoral issue to address climate change. In the maritime industry, using alternative and/or renewable energy as fuels are the key for a necessary transition in sustainable green shipping. However, the current discourse is to drive a clean energy transition by policy makers and the industry with the emphasis on environmental and economic sustainability.

A “people-centred” approach underscores social sustainability, and thus human element is recognized as important for the successful clean energy transition. Baum-Talmor and Kitada (2022) argue that a technology-centred approach overlooks the human perspective of developing skills and advancing individuals’ careers as maritime professionals. Swe et al (2018) discuss the important role of education and training to implement the

energy efficiency measures in the Myanmar maritime industry. PCCET will create a space for MET to play a vital role in sourcing skilled professionals for greener shipping.

2.3 Global Maritime Professionals

In the rapidly changing maritime workplace, there was a need of establishing a guideline for future maritime professionals who can demonstrate modern professionalism in the future world of work. To respond to this need, the International Association of Maritime Universities (IAMU) undertook a formulation of a comprehensive guideline for the next generation of leaders, called the Global Maritime Professionals (GMPs). The GMP Body of Knowledge (BoK) was published in 2019, which specifies the 28 knowledge, skills and attitudes (KSA) required by GMPs by four sets of skill categories (I. Foundational knowledge and skills; II. Academic skills; III. Professional - Technical skills; and IV. Professional - Soft skills) and relevant Intended Learning Outcomes.

“Clean energy” related KSA was, however, not specified in GMP BoK and the closest KSA was found in the “environmental awareness, sustainability and stewardship” (KSA No. 25) under the category of “IV. Professional – Soft Skills”. To enable PCCET in the maritime sector, educating GMPs with KSA No. 25 as well as other KSAs will be an important contribution to social sustainability from MET perspectives. To maximize the potentials of GMPs for PCCET, key linkages between PCCET and GMP will be identified for further inquiries.

3. Methods

In order to explore the interlinkages between PCCET and MET, a concept mapping technique was used to identify the relationship at the concept level. Concept mapping is a technique to use graphical tools for organizing and representing knowledge (Novak & Cañas 2008). First, several key concepts relating to PCCET and MET were identified from the literature review, such as the triple bottom line (TBL) of sustainability performance (social, environmental, and economic sustainability), just transition, and GMP. Second, the interlinkages between various concepts were explored, which is detailed in Section 4, and conceptualized for visualization. Based on the identification of KSA No. 25 (environmental awareness, sustainability and stewardship) from the GMP BoK as the most relevant to PCCET, KSA No. 25 was further reviewed by four different tier levels (i.e., STCW and academic achievements) as well as three domains of learning (cognitive, affective, and psychomotor). The primary analysis and findings are presented in the following section.

4. Results and findings

Firstly, three dimensions of sustainability performance based on TBL were depicted by linking the concept of just transition. Just transition provides an example of how well managed, transitions to environmentally and socially sustainable economies can be a holistic approach to green and decent job creation, social justice and poverty eradication (Robins & Rydge 2019). The original version of the just transition diagram illustrates that both social sustainability (decent work) and environmental sustainability (climate change) would jointly support economic sustainability (green jobs). In the right half of Figure 1, social sustainability is linked to education which is also emphasized in the concept of just transition. Three relevant UN Sustainable Development Goals (SDGs) are noted: Goal 4 (quality education), Goal 13 (climate action), and Goal 8 (decent work). Figure 1 reflects that transitions are not primarily economic driven, however, economic sustainability (green jobs) is influenced by social sustainability (education) and environmental sustainability (climate action).

Secondly, in the left half of Figure 1, the intervention through education to support social sustainability can be achieved through the promotion of GMPs in the MET context. By reviewing the GMP BoK, the most relevant KSA was No. 25 “environmental awareness, sustainability and stewardship” under the category of “IV. Professional – Soft Skills”, which was highlighted in Figure 1. By mapping the concepts of just transition and GMP, the interlinkage between PCCET and MET is identified with three key SDGs.

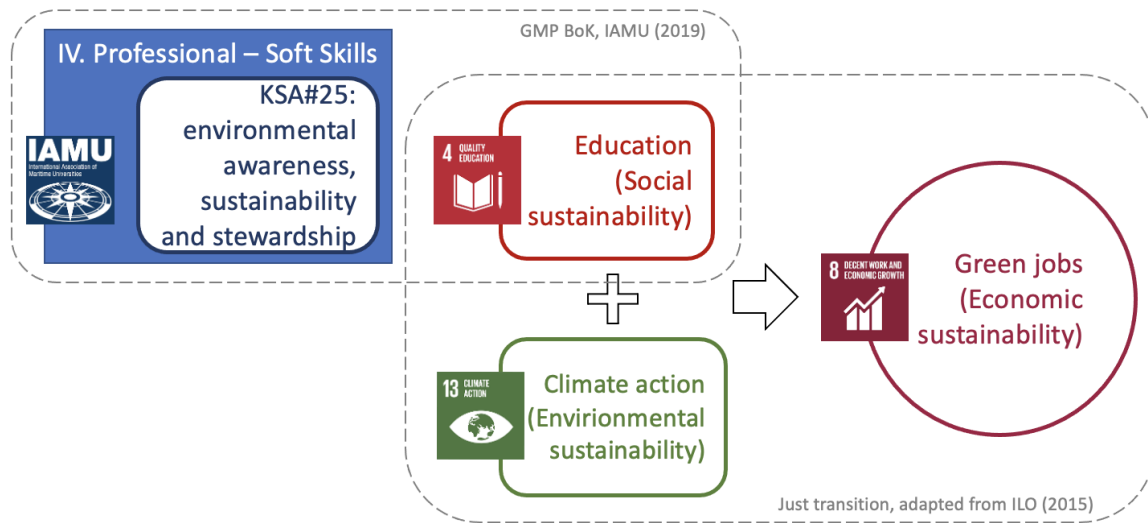


Figure 1. The linkage between GMP KSA#25 and Just Transition (Source: Authors).

Based on the results of concept mapping, the most relevant KSA No. 25 was reviewed according to the GMP BoK which specifies the STCW and academic learning outcomes of four tier levels (Table 1). The cognitive domain of KSA No. 25 relates to knowledge on environmental issues and relevant policies and technologies; the affective domain of KSA No. 25 emphasizes professional commitment to environmental management; and there are no levels of learning outcomes in the psychomotor domain for KSA No. 25 (IAMU 2019). The emphasis on cognitive and affective domains for KSA No. 25 reflects how future green shipping relies on intellectual and emotional knowledge and abilities of seafarers as GMPs. In KSA No. 25, all tier groups are expected to achieve the stated outcomes, because BoK presumes that the achievement of higher level tier outcomes presupposes the achievement of the lower level tier outcomes.

Some questions, however, remain whether: 1) higher cognitive learning outcomes are needed in Tier C and D; and 2) the current practical training for marine engineers are sufficient to green technologies in terms of the psychomotor domain of their skills. These questions are not the scope of this study, yet important to address when optimizing MET for PCCET.

Table 1. Levels of achievement in three domains for KSA#25, Adapted from IAMU (2019).

IV. Professional – Soft Skills KSA#25: environmental awareness, sustainability and stewardship IAMU	Cognitive	Affective	Psychomotor
	Tier A (Operational, BSc)	Lv. 1-3	Lv. 1-4
Tier B (Management, BSc)	Lv. 1-3	Lv. 1-5	n/a
Tier C (Management, MSc)	Lv. 1-3	Lv. 1-5	n/a
Tier D (Management, PhD)	Lv. 1-3	Lv. 1-5	n/a

5. Discussion and Conclusion

In this paper, PCCET was conceptualized in relation to MET from a social sustainability perspective by applying the theoretical concept of "just transition". The findings of this study provide insight into the linkages between just transition, sustainability performance based on TBL, and the promotion of GMPs in the MET context. A concept mapping technique was used to identify the role of MET as a social sustainability drive to promote PCCET with three relevant UN SDGs, namely, Goal 4 (quality education), Goal 13 (climate action), and Goal 8 (decent work). In PCCET, economic sustainability (green jobs) is influenced by social sustainability (education) and environmental sustainability (climate action). It highlights the importance of considering the social and environmental aspects of sustainability, in addition to economic factors, in promoting green job creation and decent work in the maritime industry.

By analyzing GMP BoK, KSA No. 25 (environmental awareness, sustainability and stewardship) was identified as the most relevant skill for the realization of PCCET. The emphasis on cognitive and affective

domains for KSA No. 25 reflects the dependence of future green shipping on intellectual and emotional knowledge and abilities of seafarers, according to GMP BoK. Nevertheless, the results show that there are potentially more spaces for MET to educate and train future maritime professionals by identifying higher-level cognitive learning outcomes in Tier C and D. There is also a need for reviewing the current practical training offered in MET institutions as newer green technologies emerge.

This study explored the application of PCCET to the maritime sector with the focus on MET at a conceptual level. A reference to relevant learning outcomes was derived from GMP BoK as the most reliable source of future MET guidelines. Future research can investigate what challenges are experienced by MET institutions and empirical data can be collected and analyzed. It may promote concrete case studies using insights from behavioral science to further design behavior change policies and uphold public awareness and communication in response to the Recommendations of the Global Commission on PCCET. It is also important to understand the meaning of “people-centred” and inclusivity in the process of maritime decarbonization. For example, this presents an opportunity to address gender and diversity issues in maritime workforce to support PCCET. In addition, potential barriers to promoting GMP in MET, such as the availability of resources and the ability of educational institutions to integrate new competencies into curricula, require further in-depth research.

Overall, the study provides further research and development opportunities for the IAMU community to collaborate and contribute to PCCET as an MET intervention. Promoting GMP in MET will help the PCCET process. Social sustainability is an important domain to achieve other sustainability issues and the role of MET clearly exists if not fully explored yet.

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