Sustainable Development in Maritime Education and Training (SDiMET) Towards Global Maritime Professionals (GMP) Development

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ABSTRACT

Sustainable Development **(SD)** in Maritime Education and Training **(SDiMET**) can be seen as an innovative approach towards global maritime professionals (GMP) development. This IAMU funded study primarily reveals the perspectives of maritime representatives (i.e., presidents, administrative officers, leaders, and teachers) and maritime students on various areas of sustainability**.** The study looked into the conception and attitude towards **SD**, the awareness and commitment to **SD,** institutional measures to address **SD,** research and innovation of the Institution related to **SD,** and prioritization of **SD** in the maritime higher education institutions (MHEIs). A mixed-method approach to research was carried out with data obtained from the 73 institutional representatives and 405 students (from 31 IAMU members from 17 countries) involved in the study. Results suggest **SD** implementation in maritime higher educational institutions (MHEIs) are less than ideal and therefore needs improvement. Nevertheless, **SD** is of significant importance and has a place of high priority for MHEIs. However, barriers to the optimal implementation of **SD** principles in maritime higher educational institutions need to be strategically and committedly addressed**.** Using the **S-D-I-M-E-T** acronym for easy recall, MHEIS are encouraged to: **S**- Supervise campus by institutionalizing SD**; D**- Develop a team culture of Men and Women for sustainability roles; **I**- Incentivize or provide incentives to people's SD initiatives; **M**- Mix or integrate SD principles into disciplines, policies, procedures, curriculum, and practices ; **E**- Execute and **E**valuate sustainable initiatives & projects; and **T**-Train people for sustainability. The paper ends with conclusions and other recommended actions in navigating the future of MET for sustainability and GMP development.

Keywords: Global Maritime Professional (GMP), Maritime education and training (MET), Maritime higher education institutes (MHEI), Sustainable Development, Sustainable Development Goals (SDGs)

INTRODUCTION

In general, sustainable development (SD) is defined as a development that provides for the needs of the present while considering the ability of future generations to meet their own. Today's buzzword as the United Nations promulgated its 17-point Sustainable Development Goals (SDGs) primarily for poverty eradication, environmental protection, and prosperity assurance for all. Sustainability is a learning process that encourages transformative learning, the capacity to challenge existing patterns and worldviews, construct new knowledge collectively, rethink current practice, and critique and examine sustainability issues (Sterling, 2001 as cited by Cebrian et al. (2013). It is supported by three (3) pillars: economic, environmental, and social. Economic sustainability promotes financial capacity and quality of life improvements thru activities such as job generation and enhancement of business enterprises. Environmental sustainability deals with the capability of an institution to exist within the means of natural resources. Social sustainability

is the ability of an organization to continually achieve excellent social well-being by ensuring the protection and promotion of human rights, gender equality, health, good governance, and others.

All sectors of society, including the educational sector, cannot thrive without keeping sustainable development in mind. **Education for Sustainable Development** has been an emerging research area, where much research has been conducted in integrating sustainable development in education (Barth & Rieckmann, 2016; Barth & Timm, 2010). However, in their analysis of higher education for sustainable development (HESD), Barth & Rieckmann (2016), concluded that HESD research is predominantly descriptive and only partly meets high-quality research standards. Moreover, integrating sustainability into higher education needs a re-orientation of teaching, learning and traditional approaches. Also, it is essential to advance innovative case studies to move higher education for sustainability forward to address the many changes in different disciplinary and cultural settings (Barth & Rieckmann, 2016). In a similar conclusion, Prylipko (2013) stated that the application of the sustainable development paradigm in the maritime sector seems to be problematic as there is no consensus among maritime experts on how it should be defined. She added that SD in maritime education and training (MET) needs re-orientation, resource allocation, and capacity building to implement **sustainable maritime development**.

Seafarers in the shipping industry are required to be in a continual state of education and training to ensure that they are up-to-date and well-versed in the current trends surrounding their duties and responsibilities aboard ships plying international waters. With this continual growth mind-set, **professional development** in the shipping industry is continually pursued. Seafarers are continuously required to hone their knowledge, skills and attitudes to have a positive outlook and perform their jobs more effectively and efficiently. Maritime higher education institutes (MHEIs), therefore, play a significant role in providing the shipping industry with the competitive and excellent maritime professionals that are to form the backbone of the maritime field**.** In this context, the International Association of Maritime Universities (IAMU) has recently (July, 2019) launched its leading initiative in maritime education and training, the **Global Maritime Professional - Body of Knowledge (GMP-BoK)**. The aim of the GMP-BoK is to provide MHEIs worldwide with an outcome-based approach to maritime higher education which, while meeting the needs of a rapidly advancing maritime industry, also recognizes the jurisdictional and social context of each individual university. The GMP-BoK ultimately aims to produce maritime graduates who remain current, vibrant, adaptable, professional and forward-looking so that they can continuously perform their roles successfully despite the rapid advancements in technology and the everyday disruptions in social and economic aspects. The following description is provided for a Global Maritime Professional (GMP).

> An individual who is a professional in the maritime industry and who is equipped with all the relevant technical competencies relevant to their specific operational role in the industry and as required by international requirements with high level academic skills including logical and critical thinking and who – in addition to their technical competency – exhibits a high level of <u>professionalism</u> and <u>ethical behaviour</u>, <u>human relations skills</u>,

emotional intelligence and multicultural/diversity awareness and sensitivity. Such an individual exhibits significant leadership skill and is able to optimally work with teams and also take personal initiative. They additionally exhibit a high sense of environmental consciousness and the need for **sustainable practices** and have an excellent grasp of contemporary issues affecting the maritime industry (IAMU, 2019).

From the above description, It can easily be noted that the concept of a GMP is strongly related to the notion of SD. Note the underlined words and phrases. Furthermore, the GMP-BoK outlines 28 focus areas that underline the knowledge, skills and attitudes (KSAs) required in a GMP. Focus area number 21 is titled *"Sustainable Development"* with a number of other focus areas closely pertaining to SD; e.g. Cultural/diversity awareness and sensitivity; Progressive mindset and lifelong learning; Environmental awareness, sustainability and stewardship; Professionalism and ethical responsibility… etc.

The same year the GMP-BoK was launched another closely related IAMU funded joint project was also concluded; the SDiMET joint research project which aimed to explore the landscape of sustainable development in maritime higher education. SDiMET involved four IAMU member universities; the World Maritime University **(WMU-Sweden**) as project leader, the Maritime Academy of Asia and the Pacific **(MAAP-Philippines),** the Arab Academy for Science, Technology and Maritime Transport (**AASTMT-Egypt)**, the University of Polytechnic Catalunya **(UPC-Spain)** with an independent researcher Ms. Alina Prylipko (WMU Report, 2019)**.**

The SDiMET research project primarily aimed to describe the perspectives of maritime representatives such as administrative officers, leaders, and teachers on various areas of sustainable development (SD). Also, the views of the students on similar concerns were sought. In addition, the study looked into the conception and attitude towards SD, the perceived commitment of the Institution to SD, measures or efforts taken by the Institution to address SD, awareness, and commitment of faculty/staff and students to SD, research, and innovation of the Institution related to SD, use of SD in learning, prioritization of SD in the maritime higher education institutions (MHEIs) and other feedback on SD.

The implications of the findings of the SDiMET project to GMP development are paramount. This study, therefore, provides maritime higher education institutions (MHEIs) with research-based information (extracted from the SDiMET project) relevant to making the wise decisions needed for the sustainable development of campuses and to further inform MHEIs in their quest to develop innovative plans, programs and curricula as required for the development of future GMPs.

METHODS

This research employs a mixed-method approach that involves quantitative and qualitative research techniques, methods, approaches, and concepts (Johnson and Onwuegbuzie, 2004). This method frees the research from extreme Durkheimian positivism restrictions, which tend to focus exclusively on objectified quantitative information, or Weberian *'Verstehen,"* which leans towards

focusing exclusively on subjective meaning (Manuel, 2011). Like qualitative research, this study focuses on gaining deep understandings of social phenomena. Quantitatively, the research obtained numerical data treated with descriptive statistical methods.

The research instruments were developed from a comprehensive literature review on sustainable development (SD) in general and integrating SD in maritime higher education institutions (MHEI). The researchers came up with themes and categories, which were then used for further exploration through surveys and interviews. First, a survey for IAMU institutional representatives was formulated about various SD-related topics and how their institutions are immersed in these topics. Then, a second survey was carried out for students of the same IAMU member universities. The student survey was similar in structure to the first survey but had more student-specific questions. Finally, for a more holistic picture of the situation in the sampled institutions, a semi-structured interview of institutional representatives was done on-site and online due to the COVID-19 pandemic.

The survey questionnaires were completed by the respondents online. The research involved 73 institutional representatives such as lecturers, professors, directors, rectors, managers, chief operating officers, deans, principals, and presidents. The 73 responses gave a 47% response rate from the 31 IAMU member universities involved in the study.

For the student survey, 405 respondents from 29 institutions in 17 countries were involved in the final analysis. The group consists of 83% males and 15% females. About 49% came from Europe and Africa, 39% from Asia, Pacific and Oceania, 6% from the Americas, and the other 6% were special members. For academic program level, 59% are Bachelor, 15% Diploma, 15% Master, and two percent (2%) Doctoral. Most 64% have no seagoing experience, while the other 36% have already worked onboard ships.

All statistical analyses were done using SPSS Version 26.For research ethics, the research participants were assured that all information is analysed and presented in aggregates, and their data were used strictly for research reports/publications.

RESULTS and DISCUSSION

The following are results extracted from the two SDiMET surveys involving institutional representatives and students, along with the results of the interview of the a number of institutional representatives.

Dimensions of Sustainable Development (SD)

As for the definition of SD, responds mostly coalesce around the definition used in the 1987 Brundtland Commission Report; i.e., "sustainable development meets the needs of current generations without compromising the ability of future generations to meet their own needs."

It is, interesting to note that when queried for their opinion on the importance of the three different dimensions of sustainable development; both the institutional representatives and the students

ranked "*environment*" first, "*social*" second, and "*economics*" third. While SD is a paradigm for thinking about a future with a balanced consideration of the environment, society, and economy to pursue advancement and improved quality of life, respondents have shown a bias towards the environment. While educational institutions may be primarily concerned with the social dimension given their nature and mandate, the environmental dimension gained primacy. Prylipko (2013) argued that SD, as a paradigm, is jeopardized by mistakenly considering its three pillars equally important instead of considering that the economy is a system within society, which depends on the environment.

On the other hand, Zeeger & Clark (2014) found that despite undergoing a pedagogical approach that challenged views through discussion, debate, and reflection and provided a balanced view of sustainability, many students still leaned towards environmentally focused perspective sustainability. However, Fisher & McAdams (2015) stated that though students, in general, emphasize the environmental aspects of sustainability, they also have an increasing grasp of the other dimensions of sustainability. Sustainable development, rightly understood, provides a better perspective on the any profession and its relation to society, environment and economy. Thus, ultimately paving the way for the concept of Global Professionals.

Implementation of SD

A majority of institutional representatives (64%) reported that their institutions were required to consider SD in their general operations. Almost 70% also claimed that they are required to somehow consider SD in their curriculum. The majority (83%) indicated that their institutions have vision and mission statements and accreditation/certification related to SD. However, only 42% have SD policies and only 53% with institutional social responsibility policies. Only 11% have signed an SD declaration.

As for students, more than 76% of respondents had a positive commitment to SD and 94% were of view that inclusion of SD issues in education was quite important. Nonetheless, only 37% were aware of the presence of any practices or initiatives related to SD on campus.

Sustainable Approaches to Institutional Governance and Facilities

On average, the institutions involved in the study lean towards having no concrete governance issues and facilities for sustainable development. For example, on a scale of 0-10 (0 being of "not present" and 10 being "fully present"), a formal sustainability office or position obtained a mean of 4.77 (with a standard deviation of 3.81) while a formal working group on sustainability had a mean of 4.67 and a standard deviation of 3.62. Likewise, incentives for staff and students to work on sustainability were at 4.66 and 4.52 respectively. are not fully present at the time of the research.

Institutional representatives, on average, tend to agree on various governance issues and facilities for sustainable development. They tend to believe that facilities on campus are designed and built based on SD principles. Using a 1-5 Likert Response Format (Strongly Disagree to Strongly Agree), the highest mean rating of 3.94 (with a standard deviation of 0.93) was provided on this

concern, followed by having clear rules for waste management in the Institution's facilities. On the other hand, the institutional representatives have neutral views concerning having incentives for faculty and staff to operate sustainably (mean = 3.24, standard deviation = 0.98), having incentives for students to work sustainably (mean = 3.28, standard deviation = 0.90), the Institution's operations leaving only a small carbon footprint (mean = 3.38, standard deviation = 0.99), and the waste being recycled in the Institution (mean = 3.38, standard deviation = 1.09)

The students' views on the Institution's commitment to SD through various governance issues and facilities tend to be positive. On the other hand, the institutional representatives' views on use of renewable energy sources at the respective institutions was limited; only 41% of the 73 respondents reported their institutions using renewable energy sources, while 29% stated that they are not yet using such energy sources, and 27% are unsure.

Institutional Measures to address SD in MHEI Operations

Possible institutional measures to address elements of operational sustainable development include efficient use of water, the greening of institutional campuses, reduction of water, reduction of carbon footprint, energy-efficient buildings, and effective waste recycling. These measures topped the list of institutional representatives. However, these actions are not as prevalent as may be desired.

On a scale of 0 to 10, institutional representatives are a bit neutral on their responses regarding the effectiveness of their institutional measures to address elements of operational SD. The top mean of 6.58 (with a standard deviation of 2.03) is on efficient use of water, followed by the greening of institutional campuses with a mean of 6.28 (with a standard deviation of 2.97). In contrast, institutions have none or almost no measures for vehicles powered from renewable sources, and mechanisms tracing the institutional carbon footprints.

Though results are rather similar, students have slightly higher regard towards the institutional measures to address elements of operational SD. The top mean of 6.72 (with a standard deviation of 2.96) is on effective waste recycling, followed by water reduction (mean=6.63, standard deviation=2.82). Like the institutional representatives, the students provided their lowest mean ratings on vehicles powered from renewable sources (mean=4.49, standard deviation=3.56) and mechanisms for tracking the institutional carbon footprints (mean=4.84, standard deviation=3.40).

For both groups, an extreme need for improvement can be vigorously pursued using vehicles powered by renewable sources and mechanisms for tracking the institutional carbon footprints. Moore (2005) promulgated infusing sustainability into all university decisions, promoting and practicing collaboration and transdisciplinarity, and focusing on personal and social sustainability. She also recommended integrating sustainability in university plans, decision-making structures, evaluative measures, research, services, and teaching components.

As for the presence of policies and institutional procedures on sustainable development, the top institutional measure, "conferences on SD", was confirmed by only 32% of respondents.

"Continuous professional development of human resources on SD" followed by 22% and only 16% confirmed having "guidance on integrating SD in their institutional operations".

Faculty, Staff, and Students' Awareness and Commitment to SD

Results suggest that faculty, staff, and students are not as aware of and committed to SD issues as may be considered ideal with less than optimal means. While awareness of faculty and staff seems slightly higher than that of students, direct inspection of mean ratings (5.67 compared to 5.61 as ranked by institutional representatives) suggests that overall awareness of both groups is quite comparable. The same may, also, be said about commitment to SD (5.50 compared to 5.46 as ranked by institutional representatives).

This result supports the finding of Barth and Timm (2011), wherein a high rate of commitment among the undergraduate students and a sophisticated understanding of the concept of sustainability towards an innovative approach to educational change was evident.

SD Research and Innovation

The institutional representatives consider research and innovation on SD at their institutions to be reasonable with mean ratings ranging from 3.47 to 4.04 on a 5-point Likert Response scale. However, results of surveys for both institutional representatives and students indicate less than ideal institutional support to research and, therefore, certainly need improvement, especially on researches that focus on social, economic, and environmental dimensions of sustainable development.

The most favored statement, "research at the institution is interdisciplinary", obtained a mean of 4.04 (with a standard deviation of 0.81). The lowest mean of 3.47 (with a standard deviation of 1.01), indicating a neutral rating, is on the Institution's support through funding research on sustainability.

On the other hand, students placed the highest regard on the importance of SD knowledge for their future professional performance (mean = 4.29, standard deviation = 0.78). In contrast, they gave the lowest mean rating of 3.37 (with a standard deviation of 1.15) on their personal involvement in sustainable community projects; a result that clearly indicates much room for institutions to improve on this area. Hence, the notion of integrating sustainability into higher education not only needs a re-orientation of teaching and learning and traditional approaches. It, also, is necessary to advance innovative case studies to move higher education for sustainability forward so that the many changes in different disciplinary and cultural settings can be addressed (Barth & Rieckmann, 2016).

Integration of SD in the Educational Curriculum.

When asked for their views on the integration of SD in the educational curriculum of their institutions, institutional representatives, 42% agreed that their institutions integrate SD elements, to some extent, in existing subjects. For example, certain principles of SD and environmental conservation may be reflected in existing subjects such as in Marine Pollution.

Only 13% of respondents indicated providing a stand-alone SD subject in their programs. Approximately 12% offer a Bachelor's program in SD, while only 10% offer a Master's program. Additionally, both institutional representatives and students had a moderate view on the degree of sustainability of the materials used for student learning activities with both rating sustainability of materials at approximately 6.26 (on a scale of 1 to 10).

It is evident that SD is not yet pervasively integrated into the curriculum of the institutions involved in the study. This result coincides with the findings of Amador et al. (2015) that there is an increasing number of higher education institutions engaged in integrating SD into their curricula; however, this has not yet been infused into all disciplines. Also, Fisher & McAdams (2015) recommended that sustainability programs incorporate a course or series of courses that expose students to a wide variety of scholarly approaches to sustainability early in the curriculum. Greater attention should be paid to fully integrated programs emphasizing typical descriptors of effective sustainability education.

Prioritization of SD in Operations, Curriculum, and Learning Outcomes.

Compared to other aspects of SD, prioritization in terms of operations, curriculum, and student learning outcomes are quite highly favored; with a mean rating of 8.11 given by institutional representatives and a mean rating of 7.73 by students. This finding supports Prylipko's (2013) study, which promotes education as the most powerful tool to consider to meet the United Nation's vision of meeting the needs of the present without compromising the ability of future generations to meet their own. She added that SD in MET needs re-orientation, resource allocation, and capacity building to implement sustainable maritime development.

With this in mind, it is interesting to note that only a handful of the institutions involved in the study have already signed a declaration as part of a network related to SD. About 58% reported being unsure if their institutions are willing to do it, while 37% expressed a positive response to this SD involvement.

Sustainability development in education should be advanced with the involvement of every member of the Institution, especially the senior officers. Students may be eager to engage in SD activities, but it is also crucially important that leading administrators provide top-down support. Communication is key. It is also essential that the Institution's accountability is linked with campus sustainability, e.g., greening the campus as part of corporate social responsibility or societal development involvement (Müller-Christ et al., 2014).

Overall Implications to GMP Development

The GMP-BoK includes, inter alia, sustainable development, cultural/diversity awareness and sensitivity, progressive mindset and lifelong learning, environmental awareness, sustainability, and stewardship, as soft professional elements that maritime students should develop to be successful global maritime professionals (IAMU, 2019).

Results of the SDiMET project prove that the inclusion of sustainable development, along with the above-mentioned SD-related elements, as necessary focus areas to the development of Global Maritime Professionals (GMPs) is far from arbitrary. Sustainable development, as the results show, is perceived by both institutional representatives and students to be of high importance. Yet, SD implementation in maritime higher educational institutions (MHEIs) is less than ideal and needs improvement. The SDiMET project helps shed the light on the intricacies of SD in MHEIs; therefore, proving quite important to the GMP initiative.

For one, MHEI students are not only willing, but are eager to learn about and practice SD. They understand the importance of SD to their future whether it be on a personal scale or professionally. For most focus areas of the GMP-BoK, working on the affective domain may not be a simple task. However, results of the SDiMET study show that when it comes to SD students are already "*affectively*" on track. Oddly, it is the cognitive domain that requires more attention when it comes to students embracement of SD principles. Students already embrace the importance of SD. They just need to learn more about it. This by no means implies that the affective domain may be neglected. In order to reach higher levels of achievement within the affective domain, students need also to engage in sustainable practices and activities both on campus and outside.

Secondly, students' perception of SD mainly revolves around the "environment". However, they seem to lack a good understanding of the remaining two pillars, "society" and "economy". Therefore, as MHEIs seek to create GMPs, some attention may need to be devoted to these two areas of SD; especially taking into account the very economic and social nature of the maritime industry.

Thirdly, the GMP-BoK aims to integrate SD principles in the curricula of MHEIs. With "internationalism" as one of its two guiding principles, the GMP-BoK does not specify how this should be achieved. MHEIs are free to introduce SD principles into their existing curricula or otherwise create a whole new course dedicated to SD. Though, the first approach may seem more simple and effective, the latter approach may be more comprehensive. By creating a dedicated SD course, students of MHEIs will surely get a universal sense of what SD means. They will be able to take a glimpse into the seventeen Sustainable Development Goals, thus, broadening their understanding of SD. The course should of course, during its later stages, focus on the unique nature of the maritime industry thus working towards the idea of GMPs.

Finally, in order to produce GMPs who embrace sustainability, students not only need to be educated on SD; they need to observe, feel and breathe SD. They need to see sustainability being practiced in every corner of their educational institution; in the curricula; in the conduct of staff and faculty; and in the institution's facilities including energy-efficient buildings, the greening of campuses, efficient use of water, reduction of carbon footprint, effective waste recycling, etc. Without a whole-institution approach to SD, truly realizing GMPs may become a challenge.

CONCLUSIONS AND RECOMMENDATIONS

Results suggest that sustainable development is perceived to be of high importance, with environmental dimension as the most essential, followed by societal and economic aspects, in that order. Furthermore, the respondents have a fairly high level of understanding of the concept of sustainability. It can be surmised from the results that sustainability does not simply require an "add on" to existing structures and curricula, rather, it implies a change of belief in the respondents (faculty, staff and students) culture, thinking and practices.

Generally, SD implementation in maritime higher educational institutions (MHEIs) is less than ideal and needs improvement. However, institutional awareness and commitment can be harnessed to prioritize SD for research, innovation, operations, and curricula.

In navigating the future of MET for sustainability, this study recommends the following **action plans for implementation of MHEIS** using the **S-D-i-M-E-T** acronym for easy recall.
- **S**upervise campus by institutionalizing SD in short and long-term plans, including technology, renewable energy, and other green sustainability practices.
- **D**evelop a team culture of professionals (GMPs) for sustainability roles.
- **I**nvolve and **i**ncentivize faculty, staff and students (future GMPs) whose activities contribute to sustainability.
- **M**ix or integrate SD principles into disciplines, VMGOs, policies, strategies, university plans, decision-making structures, evaluative measures, research, services, and teaching components including courses, programs and curricula.
- **E**xecute and evaluate initiatives & projects for sustainability and workforce development.
- **T**rain faculty, staff and students (future GMPs) for sustainability.

It is, also, worth noting the IAMU Tokyo Statement, which requires member universities to "*engage in sustainable university operations and to educate a future generation aware of and working toward sustainable development in a socially peaceful context, emphasizing the attainment of global goals such as the current 2030 UN Sustainable Development Goals and optimal stewardship of the pla*net." In the light of these realities, the research recommends that IAMU proactively promote the integration of SD principles among member institutions and that member university programs and curricula reflect this commitment; an IAMU sponsored SD declaration perhaps.

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