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IAMU 2019 Research Project
(No. 20190303)

A critical analysis of the integration of sustainable development principles and practices in maritime higher education institutions (SDiMET)

By

World Maritime University (WMU)

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Structured abstract

[Background] The International Maritime Organization (IMO), in the last couple of decades and in tandem with other United Nations bodies has shown an increasing commitment to the notion of Sustainable Development (SD). This focus by the IMO is reflected in a number of policy statements and actions not least the Organization's strategic plan for the years 2018 to 2023 At the same time, the discourse on SD has become quite well established in the literature and in academic practical discourse. Regrettably, the concept does not appear to have been topical for transnational inter-university collaboration and specifically, its implications for maritime education and training does not appear to have been sufficiently addressed. In the specific case of the International Association of Maritime Universities (IAMU), an examination of the key statements of the Association indicate that although the global focus on SD may be said to have gained traction in the early 1980s, it is only the Association's most recent Statement of 2019 (the Tokyo Statement) that specifically mentions SD and encourages member universities to engage comprehensively with it.

[Objectives] In light of this, the research effort being reported on - A Critical Analysis of the Integration of Sustainable Development Principles and Practices in Maritime Higher Education Institutions (SDiMET) - sought to explore the landscape of SD in maritime higher education with specific reference to the IAMU. Its specific objectives included the analysis of the concept of SD and its applicability to Maritime Higher Education Institutions (MHEI); an exploration of the status quo regarding MHEI integration of sustainability principles in their management, operations and curricula activities; the identify of barriers to such integration; the analysis of the contemporary approaches for SD in MHEI and the suggesting of ways of improving the SD performance of MHEI with particular reference to the membership of the IAMU.

[*Methodological approach*] The research utilized a mixed-methods approach, combining two comprehensive surveys with in-depth semi-structured interviews. The surveys were targeted at IAMU member universities for, first institutional responses and second for student responses. The interviews were with representatives of the member universities

[*Results*] Responses were received from 919 students (of which 405 were used in the research to prevent data skewing) and 73 responses from institutional representatives (administrative and/or faculty members of member universities).

[*Limitations*] Answers to survey questionnaires and in interviews always carry a subjective element based on the particular perspectives of the respondents and sometimes social desirability. In this way the research is limited in reflecting the objective reality about SD in IAMU member universities. Furthermore, a census approach may have been more informative. The resources committed to this research allowed only for a sampling approach to be taken. Although the institutional response rate was a relatively high 47%, a census approach would have increased objectivity. Future research may be directed at more objective empirical studies and at a census approach that collects data at the institutional level from all the 66 member universities of the IAMU. Additionally, the COVID-19 pandemic precluded the possibility of carrying out face-to-face interviews with the possibility of site visits and in-depth document analysis.

[*Conclusions and implications of key findings*].

It was concluded that there was room for improvement in how SD principles are integrated in MHEI. The role of IAMU was acknowledged to be important, even critical, to helping to make progress on such integration. Recommendations include the Association taken explicit steps to facilitate the development and integration of SD principles in the operations and curriculum of its member universities, in particular, in light of its Tokyo Statement of 2019.

Keywords: *Sustainable development, sustainability, education for sustainable development, higher education, maritime higher education, maritime industry, shipping, MET, IAMU.*

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1. Introduction

Sustainable Development (SD) has become a critical issue for humanity with its economic, social and environmental dimensions. There are currently substantial global efforts to understand and improve SD. This focus is reflected in the UN 2030 Sustainable Development Goals (SDGs). In the context of the International Maritime Organization (IMO) a number of policy statements and high-level meeting outcomes also reflect this focus. They include the outcome of the 72nd session of the Organization's Maritime Environmental Protection Committee (MEPC), the strategic plan for the years 2018-2023 [1] and the policy document released in conjunction with the celebration of the World Maritime Day 2013 on a concept of a sustainable maritime transportation system [2]. Higher education institutions in many jurisdictions and academic contexts have signed declarations, charters and initiatives (such as the Talloires Declaration with 513 signatory institutions as at June 2020) to integrate SD in their operations and academics. There appears, however, to be limited efforts among maritime higher education institutions (MHEI) as a collective in this respect. The research being reported on - A Critical Analysis of the Integration of Sustainable Development Principles and Practices in Maritime Higher Education Institutions (SDiMET) - therefore, had the following objectives:

a. to analyse the evolution of the concept of SD and its applicability to MHEI;
b. to explore the status quo regarding MHEI integration of sustainability principles in their management, operations and curricula activities;
c. to identify the barriers to such integration;
d. to critically analyse the contemporary approaches for SD in MHEI;
e. to suggest ways of improving the SD performance of MHEI.

The research draws from the work of Manuel and Prylipko [3] on the integration of SD principles in higher education. As part of an encyclopaedic work on SD that work noted the following:

- To a large extent, the concepts of SD and education for sustainable development (ESD) are contested notions with different stakeholders having differing views about what it means and how it can be implemented in higher education;
- Despite the lack of consensus, the existence of the concept serves a very important purpose in that it brings multiple stakeholders together, engaged in a critical discourse that is extremely important for humanity's survival;
- There are significant barriers to the integration of SD in higher education.

2. Methodological approach

2.1 Specific methods

The research was carried out using a methodological approach drawn from the philosophy of triangulation. This philosophy has been used to confirm findings from other methods and/or to find divergent findings from different methods, thus affording an appreciation of the perspectives of different stakeholders. As concluded by Farquhar and Michels [4], triangulation can lead to "three potential outcomes … convergence, complementarity or divergence."

Further, noting its origins in navigational and surveying contexts, Hastings [5], for example, observes that:

> …triangulation aligns multiple perspectives and leads to a more comprehensive understanding of the phenomenon of interest. Researchers differ in the emphasis placed on

the purposes of triangulation; some investigators view it as critical to establishing corroborating evidence, and others focus on its potential to provide multiple lines of sight and multiple contexts to enrich the understanding of a research question.

Despite the clarity of the above, the term "triangulation" has generated some confusion in the literature to the extent that the editors of the Journal of Mixed-Methods have encouraged authors not to use it in the journal [6, 7]. Noting this, the concept of triangulation is used advisedly in this research to mean the use of both a qualitative and quantitative methodological approach to explore as many perspectives of SD as is possible, anticipating that the outcomes of both qualitative and quantitative data collection efforts will reveal insights from different stakeholders – in this case students and institutional respondents – to give an expanded appreciation of how SD is perceived to be integrated in Maritime Higher Education Institutions. A mixed-methods approach was therefore used because this "combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" [8] and frees the research from the restrictions of extreme Durkheimian positivism tending to focus exclusively on objectified quantitative information or Weberian 'Versterhen" tending to focus exclusively on subjective meaning [9]. Accordingly, 2 surveys (quantitative) and 1 set of interviews (qualitative) were used in this research to give an appreciation of a more holistic picture of the phenomenon of interest.

2.2 Development of the survey and interview questions

As suggested by Bryman [10], a scoping literature review was completed prior to the commencement of empirical data collection. The aim of this review was to analyse the existing literature in order to establish what is already known in the field of education for sustainable development and sustainable development in the maritime industry and also to develop themes and categories regarding the integration of sustainable development in maritime higher education institutions (MHEI). These themes and categories were then used in further exploration through surveys and interviews.

The objectives of the review were to, within the context of the literature:

- analyse the contemporary understanding and debate surrounding definitions of sustainable development and education for sustainable development;
- appreciate the role of the higher education in achieving sustainable development;
- explore application of sustainable development within the maritime industry;
- interrogate practical aspects of implementing sustainable development in higher educational institutions (HEI) in general and MHEI specifically.

Regarding the practical dimensions of implementing sustainable development in HEI, this literature review further explored the following aspects: the usage of strategic tools (policies, declarations, accreditations); barriers HEI encounter in transitioning towards sustainable practices; facilities and operations; research and innovation; curriculum and teaching practices; students and teachers; social responsibility.

While the majority of sustainable development issues as they relate to HEI in general are well discussed in the literature, there is limited information on practices within MHEI specifically. Publications related to sustainable development of the maritime industry were found to focus mainly on technological implications and only marginally addressed "developing environmentally friendly maritime expertise" and "development of human and technological capabilities" [11].

From the broad literature review, key themes and categories were mapped and grouped for incorporation in the surveys (see Figure 1 and Figure 2).

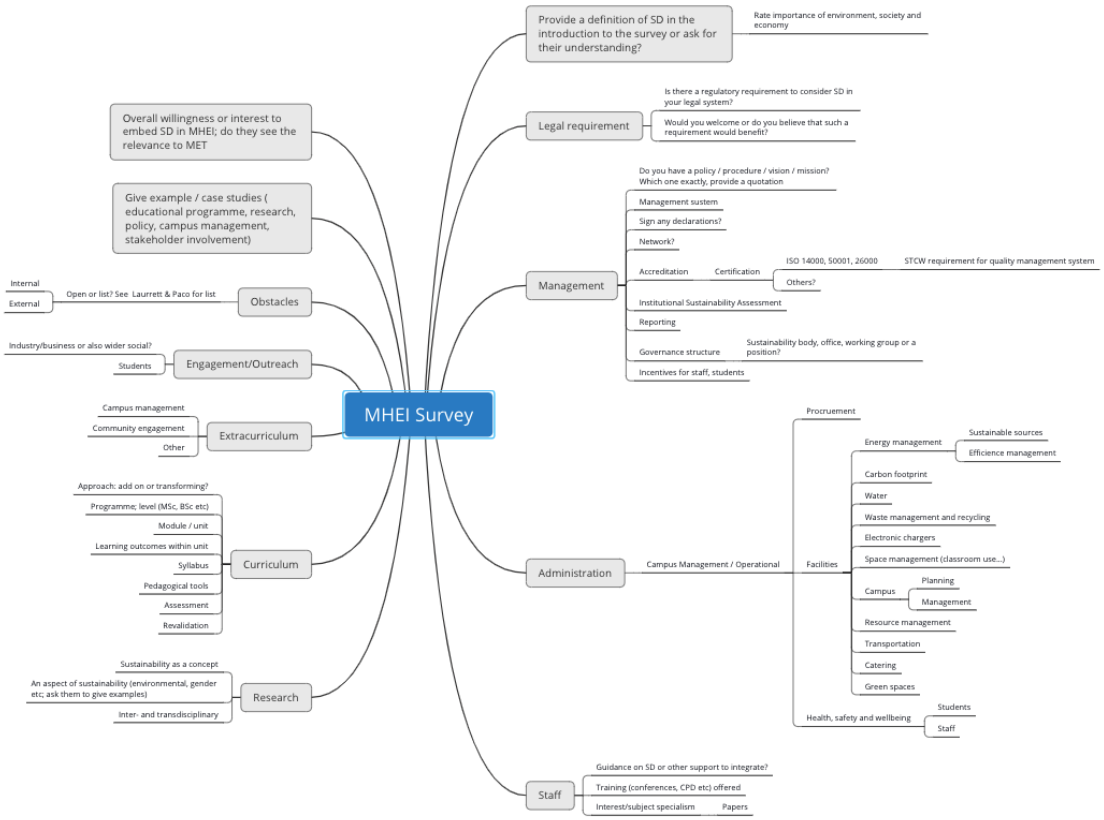

Figure 1: Themes derived from literature for MHEI survey

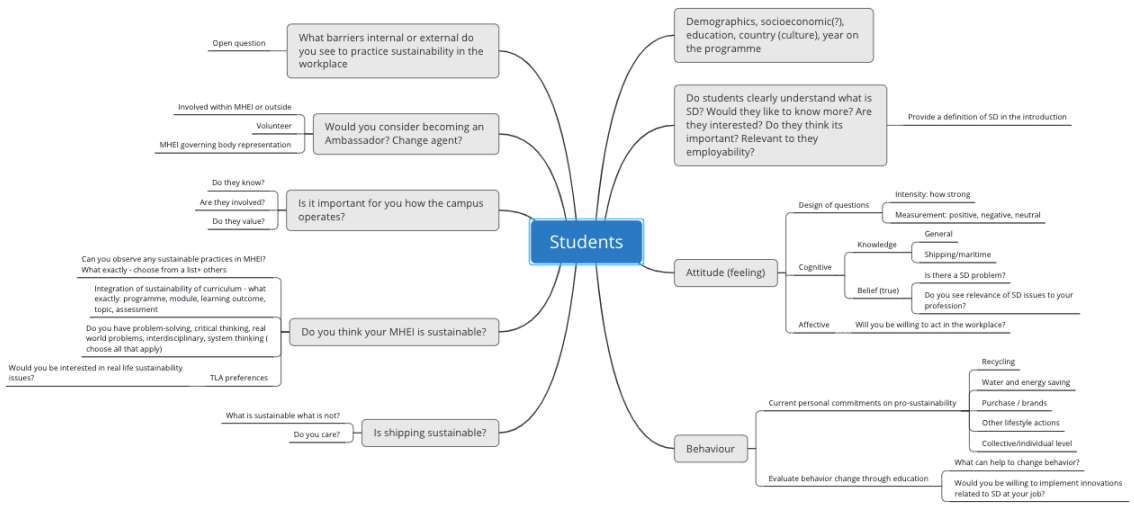

Figure 2: Themes derived from literature for students' survey

The identified themes and categories were used to inform the development of survey questions for both MHEI institutional respondents and students as well as for another set of semi-structured interview questions. These data collection instruments were reviewed by all members of the research team and piloted prior to dissemination.

A first survey (the institutional survey) was targeted at IAMU institutional representatives. It was comprised of 36 questions covering a range of SD-related topics and how their institutions were positioned with respect to these topics. This survey was augmented by a semi-structured interview of institutional representatives. The semi-structured interview had 24 questions. Using this approach helped to reach a more holistic picture of the situation in the sampled institutions as it pertains to the integration of sustainable development principles and practices in maritime education and training.
While many of the interviews were conducted on-site, the COVID-19 pandemic and its effect of shutting national borders and limiting travel led to the carrying out of the majority of the interviews online precluding the possibility of data augmentation through site visits and document analysis in that context.

A second survey was carried out targeted at students of IAMU member universities. This survey was similar in structure to the first survey but had more student specific questions. In all there were 28 questions, some of which were the same as for the first survey, not only to give more information, but also to allow for the carrying out of institutional consistency.

2.3 Research ethics

The rigorous research ethics processes of the World Maritime University were followed, which included the submission of documents assuring confidentiality/anonymity to and the informed consent of all research participants prior to undertaking the research. Research approve was given for 1) the approach and use of the institutional survey 2) the approach and use of the students' survey and 3) the approach and use of the semi-structured interview guide. Also submitted in compliance with the ethics procedures was documentation relating to the original research proposal and the background of all researchers involved in the project.
Research participants were assured in all cases that "all information will be analysed and presented in aggregated with personal data being stored in a secure database and used strictly for the purposes of research reports/publications associated with the survey/interviews". On the basis of this, research approval was given by the relevant body of the World Maritime University.

3. Findings

3.1 Results from the institutional survey

In total there were 73 valid responses to the institutional survey. Respondents included Lecturers, Professors, Directors, Rectors, Managers, Chief Operating Officers, Deans, Principals and Presidents. The 73 responses came from 31 IAMU member-universities. This gives a high 47% response rate from the IAMU member universities.

A list of responding institutions for the institutional survey is attached to this report in Appendix I (see Table 32).

All statistical analyses were done using SPSS Version 26.

The following are descriptive statistical findings from the institutional survey. They reflect the views of respondents on the different questions posed by the institutional survey.

Table 1 shows the results for the institutional respondents' ranking of economic, environmental and social dimensions of SD for their importance to a definition of SD.

Table 1: Ranking of importance of economics, environmental and social dimensions in a definition of SD

SD dimension	Minimum	Maximum	Mean	Standard Deviation	N
Economic	1	10	8.03	2.236	71
Environmental	3	10	9.11	1.489	71
Social	5	10	8.92	1.452	71

Note: The ranking is on a scale of 0-10 (0 being of no importance and 10 being of most importance)

Table 2 indicates the results of responses to a number of survey questions that explored the implementation of SD from a strategic/organizational perspective.

Table 2: Results for SD from a strategic/organizational perspective

Questions and Answers	Responses	Percentage	N
Is there a requirement for your institution to consider SD in the institution's general operations?			
No	4	5.4	72 (of 73)
Not sure	21	28.7	
Yes	47	64.3	
Is there a requirement for your institution to consider SD in the institution's curriculum?			
No	7	9.5	72 (of 73)
Not sure	14	19.1	
Yes	51	69.8	
Does your institution have a vision statement?			
No	3	4.1	71 (of 73)
Not sure	8	10.9	
Yes	60	82.1	

Questions and Answers	Responses	Percentage	N
Does your institution have a mission statement?			
No	1	1.3	72 (of 73)
Not sure	10	13.6	
Yes	61	83.5	
Does your institution have a sustainable development policy?			
No	17	23.2	73 (of 73)
Not sure	25	34.2	
Yes	31	42.4	
Does your institution have an accreditation/certification related to sustainable development (e.g. ISO 14000, 50001,26000)?			
No	1	1.3	72 (of 73)
Not sure	10	13.6	
Yes	61	83.5	
Does your institution have an institutional (university) social responsibility policy			
No	14	19.1	72 (of 73)
Not sure	19	26.0	
Yes	39	53.4	
Is your institution a signatory to any declaration (such as the Talloires Declaration) on sustainable development?			
No	28	38.3	72 (of 73)
Not sure	36	49.3	
Yes	8	10.9	
Is your institution a part of any network focused on sustainable development?			
No	10	13.6	71 (of 73)
Not sure	32	43.8	
Yes	29	39.7	
Does your institution carry out institutional sustainability assessments?			
No	12	16.4	71 (of 73)
Not sure	35	47.9	
Yes	24	32.8	
Does your institution report to any entity (internal and/or external) about sustainable development?			
No	16	21.9	71 (of 73)
Not sure	27	36.9	
Yes	28	38.3	

Tables 3 and 4 indicate the results of responses to a number of survey questions that explored the sustainable approaches to institutional governance and facilities.

Table 3: Ranking with reference to presence of various governance issues and facilities for SD

Presence of …	Min	Max	Mean	Standard Deviation	N
A formal sustainability office or position	0	10	4.77	3.808	70
A formal working group on sustainability	0	10	4.67	3.622	70
Incentives for staff to work on sustainability	0	10	4.66	2.945	68
Incentives for students to work on sustainability	0	10	4.52	3.052	67

Note: The ranking is on a scale of 0-10 (0 being of "not present" and 10 being "fully present")

Table 4: Level of agreement with statements related to various governance issues and facilities for SD

Statement	Min	Max	Mean	Standard Deviation	N
Procurement practices are undertaken with a significant consciousness of their sustainability implications	1	5	3.77	0.918	70
Facilities are designed and built based on sustainable development principles	1	5	3.94	0.931	71
The institution uses energy from sustainable sources	2	5	3.53	1.046	71
Energy management in the institution is efficient	2	5	3.72	.873	70
The energy requirements of the institution are very high	1	5	3.59	.996	69
The institution's operations leave only a small carbon footprint	1	5	3.37	.976	69
There are clear policies and procedures to ensure that the institution's operations are sustainable	1	5	3.51	.990	68
The institution's faculty and staff are aware of sustainable development issues	1	5	3.51	1.024	70
The institution's student community is aware of sustainable development issues	1	5	3.62	.881	69
There are clear rules for waste management in the institution's facilities	1	5	3.88	.985	69
Waste is recycled in the institution	1	5	3.38	1.086	70
Waste is segregated in the institution	1	5	3.68	1.057	69
There are incentives for faculty and staff to operate sustainably	1	5	3.24	.979	69
There are incentives for students to work sustainably	1	5	3.28	.895	69
The institution collaborates with industry for sustainability work	2	5	3.74	.902	70
The institution collaborates with social partners (community) for sustainability work	2	5	3.78	.878	69

Note: Responses were on a 1-5 Likert Response Format (Strongly Agree to Strongly Disagree).

Table 5 indicates the respondent results regarding the use of renewable energy sources at the respective institutions.

Table 5: Use of renewable sources of energy

Questions and Answers	Responses	Percentage	N
Does your institution use any renewable sources of energy?			
No	21	28.7	72 (of 73)
Not sure	20	27.3	
Yes	31	42.4	

Table 6 shows respondents ranking of the effectiveness of various measures that institutions may take to implement SD practices.

Table 6: Ranking with reference to institutional measures to address elements of operational SD

Institutional measure for …	Min	Max	Mean	Standard Deviation	N
Reduction of carbon footprint	0	10	5.32	2.898	70
Efficient use of water	1	10	6.58	2.032	70
Reduction of waster	0	10	5.69	2.457	68
Effective waste recycling	0	10	5.07	2.907	70
Use of recycled material	0	10	4.96	2.990	69
Energy efficient buildings	0	10	5.29	2.712	70
Automatic electricity switching off systems	0	10	4.68	3.655	67
Greening of institutional campus(es)	0	10	6.28	2.972	69
Automatic switch mechanisms for water sources	0	10	4.01	3.492	69
Vehicles powered from renewable sources	0	10	2.33	2.963	67
Mechanisms for tracking the institutional carbon footprint	0	10	2.87	3.030	68

Note: The ranking is on a scale of 0-10 (0 being of "no measures" and 10 being "excellent and effective measures")

Table 7 shows the presence of a number of policies and institutional procedures as reported by respondents.

Table 7: Presence of various institutional measures

Measures	Responses	Percentage	N
Which of the following are present in your institution?			
Guidance on integrating sustainable development in institutional operations	22	15.9	138 (for all responses that apply)
Continuous professional development of human resource on sustainable development	30	21.7	
Conferences on sustainable development	44	31.8	
Performance measures for sustainable development	18	13.0	
Rewards/incentives for faculty/staff for Sustainable Development practices	9	6.5	
Rewards/incentives for students for Sustainable Development practices	15	10.8	

Table 8 shows respondent ratings of their institution's faculty, staff and students' overall awareness of and commitment to sustainable development issues.

Table 8: Rating of faculty/staff and students SD awareness and commitment

Item	Min	Max	Mean	Standard Deviation	N
Faculty and staff overall awareness of SD issues	1	10	5.67	2.165	71
Student overall awareness of SD issues	0	10	5.61	2.189	71
Faculty and staff overall commitment to SD	0	10	5.50	2.315	69
Student overall commitment to SD	0	10	5.46	2.147	69

Note: The ranking is on a scale of 0-10 (0 being of "no awareness/commitment" and 10 being "full awareness/commitment")

Table 9 indicates respondents' agreement with a number of items related to SD research and innovation at their institutions.

Table 9: Level of agreement with statements regarding institutional SD-related research and innovation

Statement	Min	Max	Mean	Standard Deviation	N
The institution is a vibrant context for research discourse on SD	1	5	3.50	0.922	69
Research at the institution is interdisciplinary	2	5	4.04	0,806	71
The institution supports research in sustainability with funding	1	5	3.47	1.014	69
Research specifically in SD is encouraged at the university	1	5	3.68	1.029	69
Research in the institution on SD focuses on the economics of SD	1	5	3.50	0.763	69
Research in the institution on SD focuses on the social implications of SD	1	5	3.49	0.922	69
Research in the institution on SD focuses on the environmental aspects of SD	2	5	3.85	0.851	69

Note: Responses were on a 1-5 Likert Response Format (Strongly Agree to Strongly Disagree).

Table 10 shows respondents' views regarding the integration of SD in the educational curriculum of their institutions.

Table 10: Integration of SD in educational curriculum

Item	Responses	Percentage	N
With respect to the integration of sustainable development in the educational curriculum, which of the following are most applicable to your institution?			
We do not integrate sustainable development in our educational curriculum	9	7.5	120 (for all responses that apply)
We add sustainable development knowledge elements to existing subjects	50	41.6	
We have stand-alone sustainable development subject in our programmes	16	13.3	
We offer a Bachelor's programme in sustainable development	14	11.6	
We offer a Master's programme in sustainable development	12	10.0	
We do something else to integrate sustainable development in our academic programmes	19	15.8	

Table 11 indicates respondents' ratings on the degree to which materials used for student learning activities in their institutions are sustainable.

Table 11: Rating of sustainability of materials used for student learning activities

Item	Min	Max	Mean	Standard Deviation	N
Sustainability of materials used for student learning activities	1	9	6.25	1.900	68

Note: The ranking is on a scale of 0-10 (0 being of "not sustainable" and 10 being "fully sustainable")

Table 12 shows respondents' agreement with various organizational cultural elements related to SD.

Table 12: Level of agreement with statements regarding some organizational cultural elements of SD

Statement	Min	Max	Mean	Standard Deviation	N
There is a lack of understanding of SD, including appreciation of different dimensions of SD and their interrelation	1	5	3.16	1.093	70
There is a lack of appreciating complexity and the importance of holistic approach	1	5	3.25	0.983	69
There is a lack of leadership and support from top management	1	5	2.84	1.133	70
There are clear strategic goals, good planning with achievable and meaningful targets	1	5	3.28	1.056	70
There is evidence of true commitment to SD throughout the institution	1	5	3.26	1.017	69
There is an absence of staff specialized in SD in university decision-making bodies	1	5	3.13	1.056	70
SD processes are characterized by no/weak communication and poor monitoring	2	5	3.12	0.856	69
There is a lack of incentives for potential institutional stakeholders to be engaged in SD	2	5	3.31	0.874	69
There are limited resources in terms of staffing	2	5	3.41	0.950	69
There are limited resources in terms of staff training	2	5	3.43	0.997	69
There are limited resources in terms of time	2	5	3.46	0.984	69
There are limited resources in terms of finance	2	5	3.49	1.000	69
There is a lack of empowerment	1	5	3.12	1.000	69
There is a lack of staff engagement	1	5	3.07	1.005	68
There is evidence of strong resistance to change	1	5	2.94	1.057	68
There is a fear of the extra work that a full engagement with SD will bring	1	5	3.17	0.954	67
SD is viewed as an area of scientific interest for only a few faculty members	1	5	2.91	1.061	69
The institution is not structured to carry out activities for SD	1	5	2.81	0.996	69
Adding SD issues to the curriculum will overload the curricula at the institution	1	5	2.63	1.091	69
There is a lack of mature reporting and accountability mechanisms	1	5	3.15	0.981	69

Note: Responses were on a 1-5 Likert Response Format (Strongly Agree to Strongly Disagree).

Table 13 shows how much of a priority respondents think MHEI should give to SD in respect of their operations, curriculum and student learning outcomes

Table 13: Prioritization of SD in operations, curriculum and learning outcomes

How much of a priority should be given by MHEI for …	Min	Max	Mean	Standard Deviation	N
Sustainable development in respect of operations	4	10	8.10	1.631	69
Sustainable development in respect of curriculum and student learning outcomes	3	10	8.12	1.701	68

Note: The ranking is on a scale of 0-10 (0 being of "no priority" and 10 being "the highest priority above everything else").

Table 14 indicates respondents views as to their institutional interest in signing a declaration as part of a network related to SD.

Table 14: Institutional interest in signing an SD declaration

	Responses	Percentage	N
Would your institution be interested in signing a declaration as part of a network related to SD?			
No	0	0.0	73 (of 73)
Not sure	42	57.5	
The institution has already signed such a declaration	4	5.4	
Yes	27	36.9	

3.2 Results from the students survey

Students from 29 institutions in 17 countries responded to the student survey. Only three of these institutions (with a total of 7 responses) were not IAMU members. These responses did not skew the results in any way, but were retained as a reference to practices by non-members.

There was initially a total of 919 responses. However, 587 responses were from one specific institution and significantly skewed the outcome. To get a fairer representation of the data across the membership of the IAMU, a response set from this university close to that of the second highest number of responses from the other institutions (and based on first respondents) was used. This response set was based on the time of responding. The first respondents to the survey were used. In other words, using the time stamp data from the software used for the survey, later responses were excluded. This brought the total number of responses used in the analysis to 405. The 587 responses from the one institution will be analysed at a later stage for the benefit of that institution.

A list of responding institutions for the student survey is attached to this report in Appendix I (see Table 33).

The respondents to the student survey had an average age of 22.9 years (minimum 17 and maximum 64 – a doctoral student).

All statistical analyses were done using SPSS Version 26.

Table 15 shows the demographics of the student respondents to the student survey.

Table 15: Demographics of student respondents

Demographic	Responses	Percentage	N
Gender			
Male	336	83.0	405 (of 405)
Female	61	15.1	
Prefer not to say	8	2.0	
IAMU region of responding institution			
Europe and Africa	196	48.9	401 (of 405)
Asia, Pacific and Oceania	157	39.2	
The Americas	23	5.7	
Special member	25	6.2	

Demographic	Responses	Percentage	N
Respondent's academic programme level			
Diploma	62	15.3	405 (of 405)
Bachelor	237	58.5	
Master	59	14.6	
Doctoral	7	1.7	
Other	40	9.9	
Seagoing experience			
No	261	64.4	405 (of 405)
Yes	144	35.6	

Table 16 shows the results for the student respondents' ranking the economic, environmental and social dimensions of SD for their importance to a definition of sustainability.

Table 16: Ranking of importance of economic, environmental and social dimensions in a definition of SD

SD dimension	Minimum	Maximum	Mean	Standard Deviation	N
Economic	1	10	7.92	1.904	380
Environmental	1	10	8.88	1.732	378
Social	1	10	8.54	1.787	380

Note: The ranking is on a scale of 0-10 (0 being of no importance and 10 being of most importance)

Table 17 indicates the results of responses to a number of survey questions that explored the student respondents' views on SD.

Table 17: Student respondents' views on own SD perspectives

Questions and Answers	Responses	Percentage	N
Are you aware of the existence of any practices or initiatives related to sustainable development in the institution in which you are studying?			
No	44	11.6	378 (of 405)
Not sure	194	51.3	
Yes	140	37.0	
On a personal level, how would you describe your own commitment to sustainable development?			
Very negative	5	1.3	378 (of 405)
Negative	8	2.1	
Neutral	77	20.4	
Positive	243	64.3	
Very positive	45	11.9	
Do you think that your own knowledge and actions about sustainable development are related to your employability?			
No	49	13.0	376 (of 405)
Not sure	191	50.8	
Yes	136	36.2	
In your view, how important is it to include sustainable development issues in education?			
Very important	211	56.9	371 (of 405)
Important	137	36.9	
Neutral	17	4.6	
Not important	3	0.8	
Completely unnecessary	3	0.8	

Table 18 indicates student respondents' views on their institution's practices related to SD governance.

Table 18: Level of agreement with statements related to various governance issues and facilities for SD

In my opinion, the institution is committed to sustainable development through …	Min	Max	Mean	Standard Deviation	N
The institution's vision and mission statements	1	5	3.92	0.880	346
The existence of a sustainable development policy	1	5	3.87	0.893	346
Sustainable operations	1	5	3.88	0.857	339
The presence of sustainable development topics in the curriculum	1	5	3.84	1.023	340
Research on sustainable development	1	5	3.90	0.996	343
The use of facilities and equipment (e.g. renewable energy use)	1	5	3.73	1.127	344
Faculty and staff engagement in sustainable development practices	1	5	3.87	0.923	343
Student engagement in sustainable development practices	1	5	3.79	1.017	343

Note: Responses were on a 1-5 Likert Response Format (Strongly Agree to Strongly Disagree).

Table 19 indicates the respondents' views on whether their institution's commitment to SD played any role in their decision to study there.

Table 19: Role played by institutional SD commitment in student's choice to study there

Questions and Answers	Responses	Percentage	N
Did your perception of the institution's commitment to sustainable development play any role in your decision to study at this particular institution?			
No	259	74.0	350 (of 405)
Yes	91	26.0	

Table 20 shows student respondents' ranking of the effectiveness of various measures that institutions may take to implement SD practices.

Table 20: Ranking with reference to institutional measures to address elements of operational SD

Institutional measure for …	Min	Max	Mean	Standard Deviation	N
Reduction of carbon footprint	0	10	5.64	3.135	339
Efficient use of water	0	10	6.62	2.681	342
Reduction of waster	0	10	6.63	2.821	343
Effective waste recycling	0	10	6.72	2.960	341
Use of recycled material	0	10	6.03	3.128	337
Energy efficient buildings	0	10	6.29	3.053	339
Automatic electricity switching off systems	0	10	6.07	3.288	334
Greening of institutional campus(es)	0	10	6.50	2.905	335
Automatic switch mechanisms for water sources	0	10	5.99	3.203	334
Vehicles powered from renewable sources	0	10	4.49	3.556	336
Mechanisms for tracking the institutional carbon footprint	0	10	4.84	3.404	329

Note: The ranking is on a scale of 0-10 (0 being of "no measures" and 10 being "excellent and effective measures")

Table 21 shows respondent ratings of their institution's faculty, staff and students' overall awareness of and commitment to SD issues.

Table 21: Rating of faculty/staff and students SD awareness and commitment

Item	Min	Max	Mean	Standard Deviation	N
Faculty and staff overall awareness of SD issues	0	10	6.82	2.445	351
Student overall awareness of SD issues	0	10	6.13	2.564	351
Faculty and staff overall commitment to SD	0	10	6.64	2.548	348
Student overall commitment to SD	0	10	6.07	2.603	351

Note: The ranking is on a scale of 0-10 (0 being of "no awareness/commitment" and 10 being "full awareness/commitment")

Table 22 indicates student respondents' agreement with a number of items related to SD at their institutions and their own involvement and views.

Table 22: Level of agreement with statements regarding institutional SD-related research and innovation

Statement	Min	Max	Mean	Standard Deviation	N
I am personally involved in sustainable community projects	1	5	3.37	1.149	347
I believe a knowledge of sustainable development is important for my future professional performance	1	5	4.29	0.776	346
I believe the maritime industry operates in a sustainable way	1	5	3.68	1.082	346
Sustainable development issues should form a greater part of the curriculum in the programme I am studying	1	5	3.95	0.886	345
I would like to be a change agent for sustainable development in my institution	1	5	3.73	1.020	345
Students are invited to be a part of developing sustainable development strategies in the institution	1	5	3.71	0.961	344

Note: Responses were on a 1-5 Likert Response Format (Strongly Agree to Strongly Disagree).

Table 23 indicates student respondents' ratings on the degree to which materials used for student learning activities in their institutions are sustainable.

Table 23: Rating of sustainability of materials used for student learning activities

Item	Min	Max	Mean	Standard Deviation	N
Sustainability of materials used for student learning activities	0	10	6.274	2.293	344

Note: The ranking is on a scale of 0-10 (0 being of "not sustainable" and 10 being "fully sustainable")

Table 24 shows the view of student respondents on whether Maritime Higher Education Institutions (MHEI) should effectively promote sustainable development in respect of their operations and curriculum.

Table 24: Institutional promotion of SD in operations and curriculum

Question and Answer	Responses	Percentage	N
In your view should maritime higher education institutions effectively promote SD principles in their operations and curricula?			
No	12	3.5	341 (of 405)
Not sure	159	46.6	
Yes	170	49.9	

Note: The ranking is on a scale of 0-10 (0 being of "no priority" and 10 being "the highest priority above everything else").

Table 25 shows how much of a priority student respondents think Maritime Higher Education Institutions (MHEI) should give to SD in respect of their operations, curriculum and student learning outcomes

Table 25: Prioritization of SD in operations, curriculum and learning outcomes

How much of a priority should be given by MHEI for …	Min	Max	Mean	Standard Deviation	N
Sustainable development in respect of operations	0	10	7.70	2.019	341
Sustainable development in respect of curriculum and student learning outcomes	0	10	7.75	1.947	338

Note: The ranking is on a scale of 0-10 (0 being of "no priority" and 10 being "the highest priority above everything else").

3.3 Inferential statistics and comparison of student and institutional respondent surveys

As intended by the methodological approach, there were a number of questions asked that allowed for a comparison of the perspectives of students and of institutional respondents. This was done to explicate areas where these perceptions converged or diverged with a view to gaining a more holistic understanding of the perspectives of these key stakeholders. The results from these comparisons are indicated below.

All statistical analyses were done using SPSS Version 26.

3.3.1 Dimensions of SD

Institutional respondents ranked the environmental dimension the highest with respect to its importance to a definition of SD, followed in order by the social dimension and the economic dimension.

The results from the students converged with this view with the same order of ranking.

3.3.2 Comparison of respondent perceptions of institutional measures to address elements of SD in operations

To get a sense of the perspectives of students and institutional respondents on how their institutions integrate sustainability in their operations, research participants were asked to rank 11 items (on a scale of 0 to 10), the total score of which were then used to indicate the participant's perception of how well their institution was doing with respect to some key operational elements of SD (in particular in the

environmental dimension). The items related to the reduction of carbon emission, the efficient use of water, the reduction of waste, the use of recycled material, the presence of energy-efficient buildings, the use of automatic switch-off mechanisms for electricity and water and of vehicles powered from renewable sources, greening of campuses and mechanisms for tracking the institutional carbon footprint. After tests for normality of the variable (total score for SD operations ranging from a score of 0 to 110[1]) were conducted using Q-Q plots, an independent samples *t*-test was used to compare the combined scores of the perceptions of students and institutional respondents. The mean scores were lower at 51.69 (standard deviation = 22.87) for institutional respondents (N = 62) than for students (N = 303) at 65.96 (standard deviation = 26.62). The 95% confidence intervals for the means were 45.89 to 57.5 for institutional respondents and 65.96 to 69.19 for students. The difference between the scores were statistically significant: t (104.21) = -4.27, $p < 0.01$.

To explore if these differences in perception between students and institutional respondents persist across the IAMU regions, a two-way between groups analysis of variance (2-way ANOVA) was attempted. The IAMU regions[2] were coded as 1 for Europe and Africa, 2 for Asia, Pacific and Oceania, 3 for Americas and 4 for Special Members. Levene's Tests of Equality of Error Variances were significant indicating that a two-way analysis of variance was not possible since the assumption of homogeneity of variances (homoscedasticity) for this test had not been met. Given that the sample sizes (due to different response rates from the regions) were unequal it was not possible to proceed with this test.

3.3.3 Comparison of respondent perceptions of awareness and commitment of faculty, staff and students to SD issues[3]

Similar to section 3.3.2, independent samples *t*-tests were conducted to see if there were any differences between how institutional respondents and students perceived the 1) overall awareness and 2) overall commitment of faculty and staff as well as students to SD issues. Again, tests of normality confirmed the relevant variables followed a reasonable normal distribution.

- Faculty and staff overall awareness of SD issues

On the scale of 0 to 10, the mean scores for institutional respondents (N =70) for faculty and staff overall awareness was 5.67 (standard deviation = 2.17) lower than the score for students (N = 351) with a mean of 6.82 (standard deviation = 2.45). The 95% confidence interval for institutional respondents' mean was 5.11 to 6.18 and for students it was 6.55 to 7.07.

The difference was statistically significant: t (419) = -3.66, p = .000.

- Student overall awareness of SD issues

On the scale of 0 to 10, the mean scores for institutional respondents (N = 70) for student overall awareness was 5.61 (standard deviation = 2.19) lower than the score for students (N = 351) with a mean of 6.13 (standard deviation = 2.56). The 95% confidence interval for institutional respondents' mean was 5.06 to 6.13 and for students it was 5.85 to 6.39.

The difference was not statistically significant: t (419) = -1.59, p = .12.

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[1] Sum of items with a ranking scale of 0 to 10 (0 being "no measures taken" in respect of the items and 10 being "excellent and efficient measures"). For 11 items the total score range was 0 to 110.

[2] See https://iamu-edu.org/about-iamu/members/

[3] The scale used was from 0 to 10, where 0 implied "no awareness/commitment" and 10 referred to "full awareness/commitment".

- Faculty and staff overall commitment to SD issues

On the scale of 0 to 10, the mean scores for institutional respondents (N = 68) for faculty and staff overall commitment to SD issues was 5.50 (standard deviation = 2.32) lower than the score for students (N = 348) with a mean of 6.64 (standard deviation = 2.55). The 95% confidence interval for institutional respondents' mean was 4.92 to 6.06 and for students it was 6.37 to 6.91.
The difference was statistically significant: t (414) = -3.42, p = .001.

- Student overall commitment to SD issues

On the scale of 0 to 10, the mean scores for institutional respondents (N = 68) for faculty and staff awareness was 5.46 (standard deviation = 2.15) lower than the score from the students (N = 351) with a mean of 6.07 (standard deviation = 2.60). The 95% confidence interval for institutional respondents' mean was 4.90 to 5.94 and for students it was 5.79 to 6.34. The difference was not statistically significant at t (417) = -3.42, p = .068.

3.3.4 Views on prioritization of SD in operations, curriculum and learning outcomes[4]

Again, independent samples t-test were conducted to see if there were any differences between how institutional respondents and students perceived the degree to which SD should be prioritized by MHEI in respect of 1) their operations and 2) their curriculum and student learning outcomes. Tests of normality confirmed the relevant variables were reasonably normally distributed.

- Prioritization of SD in MHEI operations

On the scale of 0 to 10, the mean scores for institutional respondents (N = 68) for priority of SD in MHEI operations was 8.10 (standard deviation = 1.63) higher than the score from the students (N = 341) with a mean of 7.70 (standard deviation = 2.02). The 95% confidence interval for institutional respondents' mean was 7.68 to 8.47 and for students it was 7.48 to 7.91. The difference was not statistically significant at t (112.11) = 1.78, p = .078.

- Prioritization of SD in curriculum and student learning outcomes

On the scale of 0 to 10, the mean scores for institutional respondents (N = 67) for faculty and staff awareness was 8.12 (standard deviation = 1.70) higher than the score from the students (N = 338) with a mean of 7.75 (standard deviation = 1.95). The 95% confidence interval for institutional respondents' mean was 7.70 to 8.53 and for students it was 7.54 to 7.96. The difference was not statistically significant at t (403) = 1.44, p = .150.

3.3.5 Consistency of results between institutional respondents and students from specific institutions

A series of tests were conducted to check the consistency of results from institutional respondents and students (where the same question was asked of both). For these tests, institutions with responses of 5 or more institutional respondents and at least 10 student respondents were used. The results from Mann-Whitney U tests for differences from 4 institutions[5] are indicated in Tables 26, 27, 28 and 29.

[4] The scale used was from 0 to 10, where 0 implied "no priority/relevance" and 10 referred to "highest priority above everything else".

[5] Per the ethics clearance given, these institutions are anonymized as Institutions 1, 2, 3 and 4.

Table 26: Institution 1 differences in scores between institutional respondents and students using Mann-Whitney U test.

		Perspectives on …						
		SD integration in operations (0 to 110)	SD priority in curriculum (0 to 10)	SD priority in operations (0 to 10)	Faculty and staff overall awareness of SD issues (0 to 10)	Students overall awareness of SD issues (0 to 10)	Faculty and staff overall commitment to SD issues (0 to 10)	Students overall commitment of SD issues (0 to 10)
Institutional respondents	N	3	5	5	5	5	5	5
	Median	66.0	9.0	9.0	7.0	6.0	8.0	6.0
Students	N	19	22	22	23	23	22	23
	Median	77.0	8.0	8.5	8.0	5.0	7.0	5.0
Mann-Whitney U		13.00	42.50	48.00	38.50	51.00	51.50	48.50
Z		-1.485	-.799	-.451	-1.158	-.395	-.222	-.544
p		.137	.424	.652	.247	.693	.824	.587
Conclusion: There is no statistically significant differences in the results regarding the above variables between institutional respondents and students in Institution 1								

Table 27: Institution 2 differences in scores between institutional respondents and students using Mann-Whitney U test.

		Perspectives on …						
		SD integration in operations (0 to 110)	SD integration in operations (0 to 110)	SD integration in operations (0 to 110)	SD integration in operations (0 to 110)	SD integration in operations (0 to 110)	SD integration in operations (0 to 110)	Students overall commitment of SD issues (0 to 10)
Institutional respondents	N	5	6	6	6	6	6	5
	Median	66.0	7.5	7.0	6.0	5.5	5.5	5.5
Students	N	17	18	18	19	19	19	19
	Median	77.0	8.0	8.5	8.0	5.0	7.0	5.0
Mann-Whitney U		7.00	33.00	38.50	27.00	31.50	25.50	32.50
Z		-2.851	-1.474	-1.088	-1.982	-1.669	-2.078	-1.600
p		.004	.141	.277	.047	.095	.038	.110

Conclusion: There are statistically significant differences in the results regarding integration of SD in general operations, overall awareness of SD issues of faculty and staff and overall commitment to SD issues of faculty and staff. In all of these cases, the median for students were higher than for institutional respondents.

For the other measures there are no statistically significant differences.

Table 28: Institution 3 differences in scores between institutional respondents and students using Mann-Whitney U test.

		Perspectives on …						
		SD integration in operations (0 to 110)	SD priority in curriculum (0 to 10)	SD priority in operations (0 to 10)	Faculty and staff overall awareness of SD issues (0 to 10)	Students overall awareness of SD issues (0 to 10)	Faculty and staff overall commitment to SD issues (0 to 10)	Students overall commitment of SD issues (0 to 10)
Institutional respondents	N	11	10	10	11	11	10	11
	Median	53.0	8.5	10.0	6.0	5.0	5.5	6.0
Students	N	55	54	54	57	57	57	57
	Median	99.0	9.0	10.0	9.0	9.0	9.0	9.0
Mann-Whitney U		67.00	227.50	268.00	42.50	50.50	40.00	62.00
Z		-4.063	-.834	-.041	-4.606	-4.475	-4.429	-4.278
p		.000	.404	.968	.000	.000	.000	.000

Conclusion: There are statistically significant differences in the results regarding integration of SD in general operations, overall awareness of SD issues of both faculty/staff and students and overall commitment to SD issues of both faculty/staff and students. In all of these cases, the median for students was higher than for institutional respondents.

For the other two measures, there are no statistically significant differences.

Table 29: Institution 4 differences in scores between institutional respondents and students using Mann-Whitney U test.

		Perspectives on …						
		SD integration in operations (0 to 110)	SD priority in curriculum (0 to 10)	SD priority in operations (0 to 10)	Faculty and staff overall awareness of SD issues (0 to 10)	Students overall awareness of SD issues (0 to 10)	Faculty and staff overall commitment to SD issues (0 to 10)	Students overall commitment of SD issues (0 to 10)
Institutional respondents	N	5	6	6	6	6	6	6
	Median	11.0	9.5	9.0	4.0	3.0	4.0	3.0
Students	N	12	12	12	12	12	12	12
	Median	8.0	9.0	8.5	1.5	1.0	1.5	1.0
Mann-Whitney U		20.00	30.00	28.00	22.00	14.00	20.50	14.00
Z		-1.057	-.591	-.774	-1.356	-2.106	-1.504	-2.106
p		.291	.555	.439	.175	.035	.133	.035

Conclusion: There are statistically significant differences in the results regarding overall awareness of SD issues of students and overall commitment to SD issues of students. In both of these cases, the median for students was lower than for institutional respondents.

For the other measures, there are no statistically significant differences.

3.3.6 Effect of student age on responses

Using Spearman's Rank Order Correlation, student age (which did not follow a normal distribution) was found to have no correlation with perceptions of prioritization of SD in MHEI operations and curriculum, overall faculty/staff and student awareness of and commitment to SD issues, ranking of importance of the dimensions of SD and other measures interrogated by the survey.

3.3.7 Effect of student academic level on responses regarding prioritization of SD principles in MHEI operations and curriculum

Using only data from the student survey, the scores for prioritization of SD in MHEI operations and curriculum were not normally distributed. Accordingly, the Kruskal-Wallis test was used to explore the differences in the degree to which MHEI should prioritize SD issues in 1) their operations and 2) their curriculum and learning outcomes based on responses of students with different academic levels.

The Kruskal-Wallis test revealed non-statistically significant differences between the academic levels of responding students when it comes to the perception of the degree to which SD issues should be prioritised by MHEI in respect of their operations.
Group 1 (n = 51) - Studying for Diploma. Group 2 (n = 197) - Studying for Bachelor's degree. Group 3 (n = 51) - Studying for Master's degree. Group 4 (n = 7) - Studying for a Doctoral degree. Group 5 (n = 35) Other.
H (4, n = 341) = 7.77, p = .100.
The median scores (on a scale of 0 to 10) was 8.00 for all groups.

For differences between the academic levels of responding students when it comes to the perception of the degree to which SD issues should be prioritised by MHEI in respect of curriculum and learning outcomes, the test showed non-statistically significant differences.
Group 1 (n = 50) - Studying for Diploma. Group 2 (n = 196) - Studying for Bachelor's degree. Group 3 (n = 50) - Studying for Master's degree. Group 4 (n = 7) - Studying for a Doctoral degree. Group 5 (n = 35) Other.
H (4, n = 338) = 9.12, p = .058.
The median scores (on a scale of 0 to 10) was 8.00 for all groups apart from the Diploma group which had a median score of 7.00.

3.3.8 Gender influence on perceptions of MHEI of prioritization SD in operations and curriculum

Using only data from the student survey, the scores for prioritization of SD in MHEI operations and curriculum were not normally distributed. Accordingly, the Kruskal-Wallis test was used to explore the differences in the degree to which MHEI should prioritize SD issues in 1) their operations and 2) their curriculum and learning outcomes based on responses by gender. The gender variable was grouped as "male", "female" and "prefer not to say".
The Kruskal-Wallis test showed that scores for all three groups regarding MHEI prioritizing SD issues in operations were not different to a statistically significant level.
Group 1 (n = 277) – Male. Group 2 (n = 57) – Female. Group 3 (n = 7): Prefer not to say.
H (2, n = 341) = 3.57, p = .167.
The median scores (on a scale of 0 to 10) was 8.00 for all groups apart from the "Prefer not to say" group which had a median score of 7.00.

The test also showed that scores for all three groups regarding MHEI prioritizing SD issues in curriculum and learning outcomes were not different to a statistically significant level.
Group 1 (n = 276) – Male. Group 2 (n = 55) – Female. Group 3 (n = 7): Prefer not to say.
H (2, n = 338) = 1.76, p = .416.
The median scores (on a scale of 0 to 10) was 8.00 for all groups apart from the "Prefer not to say" group which had a median score of 7.00.

3.3.9 Sea experience influence on perceptions of MHEI of prioritization SD in operations and curriculum

Using only data from the student survey, the scores for prioritization of SD in MHEI operations and curriculum were not normally distributed. The Mann-Whitney U test was used to explore the differences in the degree to which MHEI should prioritize SD issues in 1) their operations and 2) their curriculum and learning outcomes based on responses by seagoing experience. The seagoing experience variable was grouped as "No", and "Yes".
The test showed that scores for both groups regarding MHEI prioritizing SD issues in operations were not different to a statistically significant level.
Group 1 (n = 221) – No seagoing experience. Group 2 (n = 120) – Have seagoing experience.
Mann-Whitney U = 12343, Z = -1.072, p = .284.
The median scores (on a scale of 0 to 10) was 8.00 for both groups.

The test also showed that scores for both groups regarding MHEI prioritizing SD issues in curriculum and learning outcomes were different to a statistically significant level.
Group 1 (n = 119) – No seagoing experience. Group 2 (n = 120) – Have seagoing experience.
Mann-Whitney U = 11251, Z = -2.110, p = .035.
The median scores (on a scale of 0 to 10) was 8.00 for both groups.

3.3.10 Correlations between perceptions of institutional integration of SD in operations and faculty/staff and staff overall awareness and commitment to SD issues

The results from institutional respondents and students together (using Pearson's correlation[6]) suggest high (statistically significant) correlations between the respondents view of the institutional integration of SD in operations and the overall awareness of and commitment to SD issues of both faculty/staff and students (see Table 30).

3.3.11 Correlations between perceptions of institutional integration of SD in operations and view of importance of prioritization of SD in operations and in curriculum

The results from institutional respondents and students together (using Spearman's correlation[7]) suggest high (statistically significant) correlations between the respondents view of the institutional integration of SD in operations and the overall awareness of and commitment to SD issues of both faculty/staff and students (see Table 31).

[6] All the variables under consideration satisfied the assumptions for this parametric test.

[7] Two variables under consideration (importance of prioritization of SD operations and importance of prioritization of SD in curriculum) did not satisfy the assumptions for a parametric test. The non-parametric Spearman's rho was therefore used.

Table 30: Correlations between perceptions of institutional integration of SD and faculty/staff and student awareness of and commitment to SD issues

		Correlations				
		Institutional integration of SD	Faculty/staff overall awareness of SD issues	Students overall awareness of SD issues	Faculty/staff overall commitment to SD issues	Students overall commitment to SD issues
Institutional integration of SD	Pearson Correlation	1	.719**	.680**	.686**	.677**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	365	365	364	362	364
Faculty/staff overall awareness of SD issues	Pearson Correlation	.719**	1	.728**	.820**	.669**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	365	421	420	416	418
Students overall awareness of SD issues	Pearson Correlation	.680**	.728**	1	.672**	.835**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	364	420	421	416	419
Faculty/staff overall commitment to SD issues	Pearson Correlation	.686**	.820**	.672**	1	.731**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	362	416	416	416	415
Students overall commitment to SD issues	Pearson Correlation	.677**	.669**	.835**	.731**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	364	418	419	415	419

**Correlation is significant at the 0.001 level (2-tailed)

Table 31: Correlations between perceptions of institutional integration of SD and views on the importance of prioritizing SD issues in operations and curriculum

			Correlations		
			Institutional integration of SD	Prioritization of SD in MHEI operations	Prioritization of SD in MHEI operations
Spearman's rho	Institutional integration of SD	Correlation Coefficient	1.000	.326**	.276**
		Sig. (2-tailed)		.000	.000
		N	365	354	353
	Prioritization of SD in MHEI operations	Correlation Coefficient	.326**	1	.741**
		Sig. (2-tailed)	.000		.000
		N	354	409	405
	Prioritization of SD in MHEI curriculum and student learning outcomes	Correlation Coefficient	.276**	.741**	1.000
		Sig. (2-tailed)	.000	.000	
		N	353	405	405
**Correlation is significant at the 0.001 level (2-tailed)					

3.4 Results from the institutional interviews

In-depth semi-structured interviews were carried out with 14 institutions in 13 countries. A list of the institution represented can be seen in Table 34. The findings (using quotations from respondents) from the interview sessions are indicated below according to the specific themes used. The qualitative data analysis was done using ATLAS.ti Version 8.4.4.

3.4.1 Definition of SD

Interviewees' definition of SD largely centred on the management and safeguarding of present and future resources to meet humanity's current, evolving and future needs. Words/terms used in connection with this concept included: stable development, harmonious development, evidenced in all sectors of development. Many cited or aligned their own definitions with that from the Brundtland Commission Report of 1987 i.e. "sustainable development meets the needs of current generations without compromising the ability of future generations to meet their own needs" [12]. Some responses are indicated below.

> *Sustainable development improves the quality of human life, within the limits of the functioning of life support systems on the planet;*

> *Sustainable development is more of a process of change than an end in itself; it can introduce new visions of our cities and villages, but it must start from the interests of the local community. Simply … "Provide for today. Make sure that we have something for tomorrow." And that's what sustainability is all about.*

> *Sustainable development does not simply require an "add on" to existing structures and curricula. Rather, it implies a change of belief in our culture, choices, thinking, practice strategies & actions in integrating the concepts of sustainability principles in work and curricula that lead to optimum sustainable development outcomes.*

> *Sustainable Development in MET simply connotes the relevant activities of maritime higher educational institutions that are environmentally friendly, socially just and economically viable, and that they will continue to do and be so for future generations. A truly sustainable MHEIs functions as a sustainable community, practicing responsible use of water, food, energy and supports the sustainable development of their locality and region. The sustainable concepts are also emphasized in their curriculum and research, preparing their students to contribute as working citizens to an environmentally healthy and equitable society for a viable economy.*
> *SD is a model of development in which the three dimensions of SD are considered such as Social/People, Economic/Profit, and Environment/Planet are developed in equal balance.*

Many respondents recognized the wide scope of SD and its inherent complexity.

> *… I am very much in favour of the opinion of the EU, what they say there and I fully agree that SD is not a subject per se. It is actually a part of all other subjects*

> *Actually, SD is much more. In my opinion, it is a way of thinking rather than subject per se. SD should be a part of each and every curriculum and each and every presentation subject. It should be a way of living or a value system. Bloom's taxonomy saying that we have cognitive domain*

and affective domain. If I want to decide, environmental protection and sustainable development belong to the affective domain. It is a part of the mindset …

Some respondents suggested the need to keep expanding the widely recognized definition.

There are many definitions. … What I would say is that [there should] be integrity of the classical three pillars of environmental or ecological, then social and economic concepts or issues in the development of any system. … I think that this concept should be better explained and developed more because maybe we are missing an exact model of this concept. I've been reading a lot of papers regarding sustainability, so I think that we should go further … maybe especially in the area of maritime industry or sector …maybe we should improve this definition.

It's a complex issue. [There] needs [to be] some kind of broad definition that is, at the same time, ethical and operational or whatever you call it. It's like defining health. It's very difficult to find a common and unique definition of health. And I think that defining sustainably in the case of development is the same. So, it's the discussion about what it is exactly. It's not that relevant when you start trying to implement it because we all understand the general concept behind [it].

Despite the distinct differences between SD and ESD as discussed in the literature, at least one respondent viewed SD as being synonymous with ESD.

For us in [institute], being an educational institution, SD is Education for Sustainable Development (EDS).

The respondent clarified what they meant by ESD

ESD is education that fosters the leadership needed to build a sustainable society. Implementing ESD requires the following two perspectives. Development of personal character, self-reliance, judgement, and responsibility are the kinds of humanity to be fostered, as are individuals who value relationships and connectedness through an awareness of their relationships with other people, with society, and with the natural environment.

3.4.2 Strategic/organizational

3.4.2.1 Regulatory or accreditation requirements

With respect to whether there were regulatory or accreditation requirements for the institutions to consider SD in the relevant national legal system, there was no unanimity. While some indicated such requirements in depth, the majority were emphatic that there were no such requirements. Still others were of the view that while SD elements were not required by regulatory bodies in an explicit way, they nevertheless could be deemed to be present in other operational terminology and requirements.

No, but we are consciously encouraged to adapt SD in all our endeavours.

Reading through standards, principles of sustainable development are reflected, however, the term SD is not used. For instance, I have the quality management policy of our university in front of me right now. The main principles of our work are actually SD. However, the term is not used. It could be also asked later on, but the quality management system stipulates accountability, transparency, ethical behaviour, which are all SD. Also, compliance with the international standards, rule of law, human rights. Every state might have their terms.

There are ISO standards on sustainable development, you mentioned those in the questionnaire. We use ISO 9000, but specifically sustainability standards we do not use. We do not have mandatory standards. Every 5 years we go through accreditation by the Ministry of Education and by the Ministry of Transport and we do not have mandatory sustainability standards. But looking at our internal policies and managerial documents, all of these principles are established.

... It is a yes for external accreditation like DNV-GL wherein sustainable development is one of the expected outcomes of the educational organization.

The [institution] is the first institution in the [country] and in the region to be accredited by DNV-GL for ISO 21001:2018 for the Management Systems for Educational Organizations. This standard contributes to Sustainable Development Goals Number 4, 10 and 11: https://www.iso.org/standard/66266.html

The [institution] is also a member of the United Nations Academic Impact (UNAI) with only ten member institutions from the [country]. The [institution] voluntarily submits annual reports on sustainable development initiatives as shown on the UNAI website as one of its members

The [institution] follows the National Universities Academic Law and Regulations and also the [country] Sustainable Development Plan 2018-2030. Moreover, our institution carried out Quality Management System (QMS) in getting our ISO certificate in which Sustainable Development in considered or incorporated. The aims of the [institution] reflects the consideration of SD at national level as well as the objectives of international Maritime Organization (IMO).

... So, there is no hard law requiring something, but there are a number of soft laws guiding everyone here to follow as much as possible sustainable development. So, if you ask me, strictly speaking, are there any requirements, the answer would be no. But if the question is are there policy documents, yes. Practically all policy documents from the university level coming down to the institution are [related to] sustainable development. So, it's a paradigm. I will give you an example. We had to change the heating system last year. It was not the requirement, but yes, when we considered one fuelled by the oil and the one fuelled by the gas, even though gas is a little bit more expensive, not a big deal, it was basic criteria and the reason why we selected the gas system, was much lower levels of particle matters and those things. So, behind that decision was sustainable development principles. But there is no strict requirement ...

Yes, there is. I mean, when we go through the re-accreditation process, we have to prove that we have economic and social balance, but not environmental ones. So only this part of ... it's only this social and economic component are included in the requirements, national requirements that we have to fulfil.

... But wait, what we are doing? Actually, we are integrating this part of the environmental pillar into our curriculum. So most of our many courses are actually connected to this issue. Actually, we don't have a system here in [the country] yet regarding this issue [for] our institutions but we are doing it via our partnership with companies ...

At the level of education, this was treated through the competences in the curricula. So, when any degree has to be accredited, you have to list the competences that you will deliver to the students. And there was at that time it was, I think 10 competences … and the freedom to choose what kind of competences were there and [the institution] declared that competence of sustainability and social commitment would be one of the compulsory ones for any degree. …

What I see now the implementation of the SDG or Agenda 2030 that covers this, is kind of coming again, seeing a lot of pressure that will probably become mandatory to ensure that any university is [considering] these agenda 2030 in its policy in the education, but also in other areas, for example, in the climate change policy, the government is asking all universities to declare a commitment of what they are doing for it and obviously [the institution]], and I'm sure other universities, show that we have this competence on sustainability. And we have this, so [while] I don't think there it is strong today … it's really coming in the SD Agenda 2030.

In general, it can be said that, with a few exceptions, for the most part the institutions do not have explicit SD standards defined against specific accreditation or regulatory requirements whether nationally or internationally.

3.4.2.2 SD organizational arrangements

Respondents also gave insights about their institution's organizational arrangements regarding SD.

We have conservative approach towards usage of water resources. Proper garbage disposal management. We utilize solar energy and wind energy to meet our energy requirement wherever possible. We are conscious about maintaining the greenery of our campus. We do energy and green audit as a requirement of our accreditation authorities

We have a quality management department. But I think this is a complex task and every specific position has specific aspects of sustainability. For instance, Students Directorate is looking after developing a responsible citizen, wellbeing promotion. Estates are looking after usage of electricity, water, heating. They have a separate document, a Map of Energy Efficiency, that I have in front of me now, which explains how to save resources. On each level, all specific employees have something in their roles related to sustainability

The integrated policy applied by [the institution] in the field of quality and the environment is based on the commitment of its management to provide satisfactory services customer requirements in terms of efficiency and effectiveness, without significantly affecting the environment and to ensure health and safety at work, in accordance with the defined and assumed policy driving.

The general objectives of our University in the field of quality and environment are oriented in the following directions … providing important ideas only

- *Increasing the competitiveness of services provided through the qualification and experience of employees, as well as by developing the university infrastructure.*
- *Ensuring the necessary human, material, informational and infrastructure resources and continuous improvement of system efficiency, thus improving the working environment in order to achieve compliance with the determined requirements.*

- *Process management in accordance with the requirements of the reference standards for achieving and continuously improving performance in the field of quality, environment and the effectiveness of the integrated management system.*
- *Fulfilling the organization's specific compliance obligations, applicable to the activities University in the field of quality and environment.*
- *Pollution prevention.*
- *Performance management of waste resulting from the University's activities.*

[The institution] incorporated SD in [the institution's] New Educational Quality Policy to wit "We at [the institution] commit to manage a maritime education and training environment that satisfies its learners', stakeholders' social responsibility and intellectual property requirements and achieves greater efficiency by continual educational quality standard system, scientific , technical and sustainable development and improvement" under Section 5 of [the institution's] Educational Quality Standard System Manual .

Every academic and management department of our institution has to implement their respective departmental QMS (Quality Management System) *and must follow the QMS. The internal and external audits are carried out among interdepartmental organizations.*
[The institution] organizational arrangements for sustainable development includes making medium and long-term development plan including education, scientific research, etc.; constructing campus culture; promoting the concept of sustainable development ; promoting innovation and managing effectively for sustainable future.

The philosophy of [the institution] is to implement basic and applied education and research related to marine studies and science technologies to facilitate sustainable development of human society.

In order to conduct well the functions, tasks and to develop sustainably, the organizational structure of [the institution] is divided into 4 main sections: Administration Section, Education and Training Section, Research Institutes & Centres and Companies ... In addition to the University Board which directs the university's regular activities, [the institution] has a University Council to manage, monitor, and periodically evaluate the university's activities, as well as the University Board, which provides adjustment (if necessary) for the university to operate effectively and to develop sustainably.

In the coming years, according to the current situation of social–economic development, the need for national security and defence, the strategy for the sustainable development of [the country's] sea-ward economy until 2030, with a vision until 2045, the University sets its strategic target of "Being the centre of highly qualified human resources education & training, scientific research and technical transfer of the country and the region for implementing successfully the national sea-ward economic development strategy".

Again, a lot of the responses did not show evidence of an explicit focus on SD for its own sake. Many institutional systems and arrangements are rather framed in the wider context of quality, efficiency and effectiveness is standard practices of all higher education institutions such as quality management systems for service delivery. Almost all the institutions have some level of organizational arrangements

that purportedly and implicitly can be put forward as addressing SD principles. However, few had explicitly linked these to SD.

3.4.2.3 Signing of declaration(s)

Interviewees were also asked whether their institution was signatory to any declaration(s). Only three of the institutions represented in our interview sample are signatory to the Talloires Declaration (both of which became signatories as recently as in May 2020). The Talloires Declaration of the Association of University Leaders for a Sustainable Future (ULSF) is a leading declaration on SD and has been subscribed to extensively by higher education institutions outside the context of the IAMU.

> *We signed this many years ago and many other declarations. So [the institution] has its own declaration on sustainability. I think it was 2008. We sign in 2004 the Barcelona declaration on engineering education in sustainable development, that was at the end of the conference that we hosted here.*
>
> *Yes, [we are signatories to the Talloires Declaration (document was attached)].*
>
> *Yes, [the institution] joined ULSF as signatory to Talloires declaration to wit "As an institution of higher education concerned about the state of the world environment and the advancement of sustainable development, we shall strive to promote actions that will achieve a sustainable future ..."*

Most of the other institutions are not signatories to explicit SD declarations in a formal way such as the ULSF and its Talloires Declaration. As with previous finding, they are rather signatories to more generalized agreements and networks some with a high relevance to SD.

> *We are a national centre of Baltic Universities Programme. They have been working with sustainable development for 30 years.*
>
> *We are members of many initiatives, we also have an internal network.*
>
> *No. we are not signatory to any SD declarations but we support sustainability and supports the [country's] Sustainable Development Plan 2018-2030*

The institutional respondents were unanimous in their willingness to sign a declaration in the context of the IAMU.

> *Yes , our institution will welcome the signing of SD declaration.*
>
> *... We would like to sign any SD declaration in the future, especially SD declaration of IAMU (if possible).*

However, there were some concerns expressed by a respondent about the level at which SD can be interrogated where the signing of a declaration is concerned. The willingness to sign such a declaration would be dependent on the terminology used, with the respondent preferring the unidimensional concept of "environmental protection" to the multidimensional one of "sustainable development".

> *If the question is if there will be any value, then the answer for us is yes. In our language the understanding of the word "sustainable development " is usually considered as more political*

level. All faculties here belong to one of the 5 areas, it can be medicine, natural sciences, engineering and technology, social sciences and humanities. This is more or less the division we have here. Maritime studies belong to the faculty of engineering and technology. As such we are much more prone to use the word "environmental protection". It is a narrower term than SD… In [the country] SD is always used at a policy level. At a practical level it would be "environmental protection" in our case. It is understood as technically more specific… I do not know the right wording.

If you offer a declaration on sustainable development, nobody will understand that as an obligation to do something. But if you have environmental protection policy or something like that then it will be yes, we agree with that and we are ready to do something based on our willingness to improve the environment.

3.4.2.4 Networks dedicated to SD

Similar to the case for the signing of formal declarations, many of the institutions participating in the interviews did not have explicit networks dedicated to SD.

No, we are not yet a part of an SD network but we would like to be a part of SD network.

Our university has not joined the network relevant to SD … And, our university [has not] considered joining such a network.

No, as far as I know, we are not. But I am not sure on the University level. The University is part of one European network, but I am not sure which one right now. I think there must be something on sustainable development there because it is a part of university strategy.

A number of responding institutions did indicate belonging to such networks.

There is … [country] Green Energy Cross-Border Cluster – Dobrich: To ensure sustainable favourable conditions in the cross-border region for both catalysing mastered growth of the regional clean energy industry and maximizing the clean energy potential of local industries, federating expertise, knowledge and resources from Bulgaria and Romania through the establishment and deployment of a Cross-border Green Energy Cluster "Dobrudja".

[The institution] is part of the Association of University Leaders for a Sustainable Future and joined ULSF as signatory of Talloires Declaration along with other university leaders from a geographically and culturally diverse network of over 500 colleges and universities in 59 countries moving forward in a united international effort to further sustainability globally.

[The institution] … has contributed to the Bataan Sustainable Development Strategy Publications [whose 103-page book is available online].

Yes, [the institution] has been kept connection with networks where we used to be very active. Maybe we are less active today or as far as I know. … And so, they are networks like CRUE (Rector's Conference of Spanish Universities) has its committees on sustainable development. … But also, my feeling is that we have had a decade of very active international work between 2000

and 2010 and now we are less in the international side and now we work more on the local & regional side.

[The institution] is a part of network of partner institutions participating in projects related to sustainable development under the Erasmus+ program of the European Union (EU), such as WANASEA (Water and Natural resources in South-East Asia) project, MARE (Marine Coastal and Delta Sustainability for Southeast Asia) project.

However, many did view many of the networks they belong to as incorporating elements and principles of SD.

No … But in 2019 we have been chairing Baltic Universities Programme and within work with the youth and interdisciplinary section we had a part dedicated to ESD. 15 universities actively participated in the project. When we went on an expedition, we also had lectures on climate change, ecosystems and energy efficiency and processes that impact SD. We had separate modules and they reported in general on the project.

[The institution] is also a member of various network organization which do not contain sustainable development in the name, but if the objective of the partnership will be analysed and interpreted, the joint partnership aims for a sustainable future.

Currently our institution is a part of MTCC-Asia (Maritime Technical Cooperation Center - Asia Region) network under implementation by IMO. The mission of MTCC-Asia includes controlling, monitoring and technical guidance to respective human resource in the reduction of GHGs emission to the atmosphere and ocean.

Interestingly, some respondents viewed the IAMU as such a network.

Yes , these are the International Association of Maritime Universities (IAMU) and the Black Sea Association of Maritime Institutions (BSAMI …).

3.4.2.5 Sustainability assessments

With respect to the carrying out of sustainability assessments, the following are illustrative of the range of responses received. Some do not carry our any such assessment, while others suggest various assessments as representing sustainability assessments. Most of these are internal with only a few external assessment and reporting requirements.

Yes, we do energy and green audit as a requirement of our National Accreditation Council.

We have a dialogue with the President of the university. Our second name is "[the institution] - for a sustainable future". We do not think about it anymore, it is how we do things.

Yes, through Internal-Integrated Quality-Environment Management System-manual for institutional sustainability assessments

Yes, Externally, through getting feedbacks from various stakeholders, shipping sponsors and partner organizations of [the institution] through feedback form mechanism. However, the

assessment does not specifically indicate for sustainability, although it involves and affects people, environment and economy (cost/budget).

Our institution does not carry out institutional sustainability assessment directly, but maybe carrying out SD assessment indirectly through the accomplishment of our institutional objectives

No, [the institution] does not carry any sustainability assessments

No, SD is basically a policy term. Nobody considers that there are any actions following SD.

I understand this is about educational level, fundamentally. Well, there is one side, all the assessment that is linked to the accreditation and the verification or whatever. So, follow up of SD competence. And so, here, schools and faculties of the university have some kind of pressure to follow up on how this is being [achieved]. In addition to that, I must inform about two things. One is a work, a research work from the Institute of Sustainability that was developed last year with interviewing of many teachers and academics of the university in charge of sustainability and maybe even more interesting, interviewing or through a questionnaire to students asking how sustainable level was treated in the education, in the learning. ... I haven't seen [the results yet] because, still the work is not finished. But the feeling I got is that there is a lot to improve. So, one thing is what is written the competences and declarations, at the end, what is really crucial, what the student perceives as how institution works. There's another follow up that we [have done] since 2018. We report for the impact ranking of universities related to his contribution to SD goals. So, the agenda 2030. So, it's a ranking developed by the same group that developed Higher Education ranking, so are quite relevant ... specifically focused on the Agenda 2030. And this ranking has measures on the contributions to the 17th goal SDG and forces up to make some kind of internal audit or assessment of what we do in innovation, research, especially management, operational management. So, there is here some kind of assessment.

We regularly assess the economical and effective use of electricity and water,
the restricted use of plastic waste, nylon waste and battery, etc.

3.4.2.6 Sustainability reporting

With respect to sustainability reporting the responses included:

Yes, we need to produce and to report about specific questions related to SD with reference to environment and education.

Yes, externally and internally - ISO 9000+ISO 14001:

No reporting directly on Sustainable Development. Comes in different terminologies but outcomes are for sustainability.

Our institution does not have any reporting requirements in respect of SD directly. However, our annual submission of accomplishment reports internally or externally may also contribute to sustainable development as reflected in [the institution's] objectives which we support and form part of our action plans.

I personally have not heard of anything in this regard. Perhaps it is discussed in meetings, but rather like a voluntary and perspective area of development.

Yes. [the institution] submits reports as required internally and externally that contributed to sustainable development.

We have ISO certification, but for just for quality. Sure, it's not for the environmental or social responsibility. We have this by Bureau Veritas and [country] Register of Shipping.

We are doing things but not systematically, meaning that this is kind of new in [country] so under the organization level, mean sustainable development. So, it takes time because there are many layers from the ministries … so we do that regularly, but under institutional level. Let's say it's not developed yet in creation.

3.4.2.7 Improving implementation of SD in HEI

The institutional respondents/interviewees were asked what, in their opinion, could improve the implementation of SD in Higher Education Institutions. Among many insightful responses were the following:

Awareness about the necessity of SD in higher education would improve the implementation of SD in MHEIs.

Review progressive experience of green universities or universities that are advanced in ESD. Also, lectures and seminars and to start with raising awareness to bring this to the attention of all. Many people know about it, but not fully. At times, confused with the terminology and what to do in this direction.

Make it a part of educational programmes …

Through workshops, discussions, topics related to culture. This has to be done on demand of the country and be based on the level of their social development.

Transparency , documentation and reporting of institutional SD efforts would improve implementation of SD in HEIs. Incentives or awards for sustainability efforts would also help improve SD implementation.

… An SD maritime policy and strong linkages and partnership for SD with various maritime and non-maritime institutions for academic, research, extension and professional development both local and international would improve SD in Higher Education Institutions that is cost effective, relevant and efficient.

Implementation of SD in Higher Education Institutions could be improved by ensuring that the action plans are accomplished based on the institutional , national and global goals and all concerned are informed and reminded.

In my opinion, implementation of sustainable development in Higher Education Institutions may be improved by establishing Higher Education Institutions (HEI) cooperation network on sustainable development (SD); adding SD related courses into the curriculum; setting rewards/incentives for faculty and staff to operate sustainably and for students to be involved in SD practices and collaborating with the industry and social partners for sustainability work.

It is thought that [SD may be developed] through the leadership of the President and provision of budget.

I will give you the idea that I have. This is not official, there is nothing in the papers. I think the problem that we have, at least in my country and the people I talk to, is that we never considered in the past something called energy management. The major part of SD is actually energy management. When I say "energy management", I mean at the level of the state, company, society, all the way to the individual. This is the most important part. And funny to say this, energy management in the past was never considered as a subject. Energy was always unlimited and you can use it as much as you can, as much as technically viable. What should be the most important part of sustainable development in the future is to change it to a subject called Energy Management but not in a technical sense of managing fuel on board, but how we spend our resources.

It is good when you have an initiative and when you just joined the initiative and it's much easier than to be the one who will lead.

It's better when we are all in some kind of strong network. Then we have the strength to change or to exchange because here we can do something, but it's a pioneering, you know, it's really hard to get the results. So, for instance, we have a cooperation with [named university] which is very much dedicated to sustainable development. Actually, their vision is for the sustainable future. So maybe to share this knowledge, but on the institutional level ….

Well, I think that we need a lot of the institutional pressure, because it's something that otherwise will not come into the agenda. But, also, we need some pressure from students. After all these years, I think that the only real change will come when students will really demand this change to enrol or not into our degrees. So as far as students don't really care or just care a bit, but it's not a strong thing, I don't think university will be enough capable to change, and I am not sure, if it's in a sufficient condition, because maybe students would create a lot of pressure, but we will not have the capacity to deliver services to them.

Education, research, policy formation, and information exchange on environment and development to move toward global sustainability.
Develop the capability of faculty members to renovate curriculum based on sustainability science and teach knowledge of sustainability science to all undergraduate students and graduates.
Awareness of importance and necessity of issues relating to SD from staff, lecturing bodies and students through academic and scientific researching activities should be a top priority.
Study and apply more new and effective measures to approach and cope with issues related to sustainable development.

Consider any opinions and advice of many researchers and scientists in the field of SD in the world.

Conduct scientific researchers in terms of SD.

3.4.2.8 Role of IAMU

A very important question asked related to whether the interviewees thought that the IAMU was in a position to help, why or why not this was the case and in what ways such help could materialize. The following responses illustrate the scope of respondents' views.

IAMU can help. IAMU is already into creating awareness by calling for projects and convening meetings about sustainable development. IAMU, being in a consultative status with IMO, they are indebted to follow and promote the SDGs of IMO

Support specific projects related to implementation of SD in our university, sharing experience through lectures or exchange of lecturers specialised in the area.

SD must be a part of the course and make it relevant. Perhaps IAMU could give examples of how SD could be relevant to specific STCW competencies.

Yes, definitely, IAMU is in position to help with this. Scientific research and cooperation play a key role in internationalization policy. [Our university] is an active member of two major international networks with great potential for the development of student and teacher mobility, as well as research projects: the International Association of Maritime Universities (IAMU) and [named association].

Yes, certainly. The funding of this SDiMET project is considered a start because all decisions and actions of IAMU must be based on research as an objective reference on what can possibly be done to support the IAMU MET institutions perspective on SDiMET for possible assistance by IAMU as part of the development projects that can be funded by IAMU for desired outputs or outcomes.

IAMU could create or establish an SDIMET Network wherein all its institutional members can share annually their respective best practices for sustainable development. This could serve as the annual venue of sharing and reporting in respect to SD, that could be documented through presentations and publications.

IAMU to include SD in maritime as part of its Research Agenda and Developmental projects.
IAMU can launch search for best practices on SD to be participated in by IAMU member institutions with incentives to encourage submission of entries for presentations and publications
IAMU institutional member institutions can also sign an SDiMET declaration and come up with [an] Action Plan to serve as terms of reference to jointly contribute to a sustainable future

Yes , IAMU can help by encouraging its member institutions to sign an SD declaration applicable for maritime universities.

Hard to answer without consideration. Firstly, leadership needs to give instructions in regard to general strategy and when we will be looking for ways to implement it, we might need statistics, instruments to implement SD in specific subjects.

Yes, IAMU can help. IAMU is one global network of leading maritime universities around the world. IAMU has the ability to promote the implementation of SD in Maritime Higher Education Institutions (MHEI) through signing of a declaration on SD by IAMU member universities

Yes , IAMU is important and is in the position to help and the contribution especially by the network of member universities is expected

If you say sustainable development or energy management, whatever words you're going to use, nobody will react because this is the way people are doing things. But I would like you to suggest a strategy we have in another project in [a named country]. If you want to change the way that the maritime training and education system is working you have to do something with them every 3, 4 or 5 months for three or four years. First time it could be a conference, second time it could be a site visit third time it could be a workshop. You have to be there to change their mindset. What you are talking about right now about how I understand things is that we are trying to change the mindset of the people. When we are trying to do so the first step would be a very simple policy document which everyone very easily accepts. And then the second one would be a train-the-trainer programme or something - I don't know. It has to be not one round [but] a sequence of steps which will be delivered every 5-6 months and after sufficient amount of time you will get a result. Otherwise, everyone will sign whatever you want and forget about it.

Well, I would go with workshops, but in any way, I will start with a policy document. Because whatever I think about policy documents, they are the step zero. First you have to have a formal agreement, no matter how [simple] it is. But if it is only formal agreement, nothing will happen. You will have to have a number of steps. I would never go with training materials. I know that for a number of years IAMU supported development of training materials, but at the end of the day, they were never used by other institutions. It is a basic principle: if I am going to deliver a lesson, I cannot use your PowerPoint presentation because it's not mine. No matter how good your presentations are, I have to touch them, to familiarise myself with those slides and make slides my own way. But some kind of supporting materials which will make it easier to prepare my presentation. So not to prepare training materials, but some kind of supporting materials, some kind of repository of important documents. Those kinds of materials can make my life easier. I am the one delivering marine environmental protection. This is my subject, environmental protection and safety at sea. So, I would be very grateful if someone could give me materials to prepare my own training materials. That would be nice. But I would never follow your training materials. This kind of materials could help. Also, right now, IAMU has a very generic proposal for development and research projects. Those calls should be much more specific. And one way to promote a change of mindset among people is if there is no call for shipping business, there is a call for sustainable development or environmental protection or management, use wording that you like. Don't make very wide scope as it does not make sense. You can have specialised calls directly hitting energy management or MARPOL Annex 6, not just MARPOL, but Annex 6 exactly or one particular technology, something like this.

Yes, a good initiative of IAMU is the Body of Knowledge like for development, some soft skills for the master students. How to help [so that] they can be able to adjust to the challenges in the real world and all these changes that are happening.

I think that the problem with the education at the global level is obvious. So, … all around the globe [we are] wondering what is going to be education tomorrow, since nowadays, you know, the labour market is changing dramatically. How we can we adjust to these changes. … Maybe IAMU could do something about the area …. I cite Jacques Cousteau, who said actually we are all in the same ship, so we should do something about it.
Absolutely. I think it's what I was saying, the institutional pressure. If an institution like [IAMU] really creates a demand or pressure at same time and help the universities saying, this has to be first on the agenda. This is fundamental, it's strategic.

Yes , IAMU could help especially through [creating a platform for] sharing of experiences of sustainable development among member institutions of IAMU, particularly those members from developed countries, getting financial support to conduct and implement IAMU funded scientific researches relating to SD, such as energy saving, waste recycling etc.

The section above on IAMU's help and how this can be operationalised is an extremely important and valuable part of this research, being targeted as it is at IAMU and its role in the achievement of SD in the context of maritime higher education. Accordingly, almost all the relevant responses have been reproduced.

3.4.3 Facilities and operations

Many of the responding institutions take some form of action to reflect sustainability in the design and use of facilities. With respect to sustainable sources of energy, there does not appear to be wholesale use of renewable sources. Of the six sources of renewable energy (biomass, geothermal, solar, hydroelectric, ocean and wind) a number of institutions reported the use of hydroelectric, solar and wind power, the latter two generally in the range of 1 to 10 percent. One institution, for example, reported the use of approximately 10% solar energy and approximately 2% wind energy. While many other institutions did not report any use of renewable energy or specific SD measures, others indicated the presence of such actions and specific steps regarding infrastructure and superstructure design.

We need further to implement technology and use renewable resources. The question is in the lack of infrastructure and we might need to review the whole infrastructure. We are planning to use solar panels on the main building, we use heat reflective screens, we have replaced and installed energy saving windows, sensitive lights. Students are instructed to act in a way that allows saving energy, such as not open windows while heating is on. … installation of 20 heat reflective screens, which is very effective. We changed the lamp bulbs as well.

We are working on how to further reduce the cost of heating and CO_2, sensors (on/off), solar cells, and we have an internal pool of electric cars to be booked instead. We have a very strong environmental policy.

Infrastructures … and associated quality facilities include modern classrooms, library and student accommodations with sustainable facilities - natural lighting or fluorescent lamps,

systems with renewable energies (photovoltaic panels, wind turbines ...), connection high speed internet, multi-functional labs with new sustainable technologies and equipment and sports facilities.

The main sources of energy used by our institution is 100% fluorescent lamps and [in one location] 20% of this is with renewable energies. The [named project] supports intelligent specialization in the field of energy , through the holistic analysis of the impact of energy sources on climate change, achieving the evolution, the progress of knowledge, for a sustainable development of [named country].

[The institution] uses 10% Solar Energy. The rest is electrical energy using LED lights and also re-chargeable batteries and gasoline

The design of our buildings ... adopts the idea of sustainable approach. The main source of energy comes from hydroelectric power. We also use a thermal power plant (gas) or diesel power plant, during the low season of the river dam . As to the percentages, I have no idea.

We use electricity with caution, we try to save. But we do not use renewable sources, unfortunately.

There are many possible options here, reuse water, we use a lot of energy resources we could be saving better. Campus is located outside the city and there are opportunities to generate and use renewables.

Facilities of [the institution] are designed and built based on SD principles. The main sources of energy we used include solar energy, fossil fuels and wind. However, I am not sure about the percentages.

We have various policies and statements at [the institution] which is believed contributes to sustainable development . Some of these are "Statement of Energy Saving" by [the institution], the implementation plan for reduction of emittance of greenhouse gas, the environmental report, the policy to promote procurement of eco-friendly goods, The achieved procurements of eco-friendly goods. [These are based on various national laws and initiatives].

The main energy source of our university is electricity. And 91% is electricity.

We have a new building now, and it's built with some kind of energy efficiency [shown in its] certificates, but we still use the fuel for heating. So, we don't have any renewable energy resources that we use, and lights in the building in the rooms and offices, it's on regular switch on switch off, but in the corridors and in lobbies, there are sensors. Water is just a regular one. You have to close [the tap]. If you don't close, it will still drain and go on. So, there is definitely space for improvement.

It's interesting because I've appreciated a very strong change in the last couple of years. So, there is now, so it's easier to introduce in the operation all this sustainable ability change, than [only] introducing in the curriculum or in the research. Why? Well, because it is easier to manage because it depends on us. In the end it is a question of willingness and resources. So today we

have some strong commitments and developing the implementation plans on renewable energy at the campuses, avoiding single use plastic materials, different services on circular economy. ... So, these kind of things that were really difficult some years ago, now are adopted because in the general population these topics are becoming normal and they were not in societal discussion ten years ago.

I think in the new buildings of our university it's mandatory they use renewable energies.

It is not because we as university really push on that. That is because the local municipal regulations force us to do that. ... There were no really resources to go beyond the regulations and the mandatory norms. But the management that goes after that and all the management is doing in any building today, I think it's starting to understand. And we are working very hard with all the maintenance and operational technicians.

The energy we buy, all the energy we buy at [the institution] and together with all the universities in [the region] is from renewable energy, certified. So, it means that if any institution wanted this kind of certification, all the energy in the grid, should be renewal.

Can we say that 100% off our consumption of energy is renewal energy? It's electrical energy, because we still have gas boilers. So here we have a natural gas for heating, but mainly we're moving to electricity. When we renew and we are, we can certify 100% of the electricity's from renewable sources.

We construct buildings with many skylights, windows and glass so that we can take advantage of daylight to save electric energy. [The institution] has policies to reduce plastic and nylon usage. Instead of using disposable plastic bottles, we store the water in glass bottles and clean them for the next use.

Sometimes the redesign of buildings to make them more efficient is limited by the fact that these buildings have historical value (particularly for the older universities) and tend to be less energy efficient. Substantial changes would then require significant outlays of capital, threatening institutional financial sustainability.

We have a very good proverb - there are no limits in perfection. Many buildings of our university have high historical value and we are trying to improve energy efficiency and there are national and regional programmes to improve efficiency. We are part of this initiative and till 2022 we are implementing this programme aimed at reducing the usage of electricity, water and heating.

With respect to campus management the following are indicative of the responses we received.

... I will also stress the problem of the [institution] because my students have done a little research regarding social activities in the campus. So, it's obvious that they're very satisfied with the level off studying and everything. But the problem is with the social activities, for instance, here we miss sports facilities. ... This really lack off it. So maybe the social….this could be maybe also great problem and transportation.

... But on the level of the city transport traffic. Yeah, yeah, it's really, it's really rare, and you can't rely on the public transportation.

... And also, economic situation is maybe challenging. Maybe that the problem with this economic issue, maybe that could be also the problem. How to allocate resources.

Clean and green campus is our motto. Laying tree sapling, seed balls, beach and lake cleaning, garbage management, conserving our water bodies are some of the regular activities. These are all believed to contribute to an effective campus management.

Campus management in terms of facilities and operations are being carried out by estate department of [the institution] responsible for the water and sanitation, engineering and cleaning. Also, it is led by the top management level in monitoring , evaluating and ensuring that all concern follow approved procedures and processes for effective campus management

…We separate garbage. We have a campus "Crew": they are planting, looking after the environment around the campus.

There are many possible options here, reuse water, we use a lot of energy resources we could be saving better. Campus is located outside the city and there are opportunities to generate and use renewables.

As regards effective campus management, [the institution] makes plans and rules and promotes efficient use of water, reduction of waste, effective waste recycling, and textbooks reuse. There is also a shared bicycles program.

This campus is not too big. You can you can go from one part to the other in five minutes. So, there are several buildings here, but I saw a few days ago that there are e-bikes out outside the library and so they put these e-bikes, the public ones, but general problem of the town … is the transportation. [The country] is centralized and in … the capital, public transportation functions well. But here we are on the south. So, everything is, you know, a little bit disorganized.

[The city] is one of the three the biggest passenger port on the Mediterranean, … and we have enormous number of tourists … during the summer time, not only summer in the peak of the season, but in July and June. And so, it's the problem because maybe 20 minutes is from campus to reach the centre of the city where the students [live]and so we said [we need] stronger collaboration with city authorities and also [the national level].

I'm understanding about sustainable management … is [that] we need a strategy. So, currently we have [an] energy strategy until the end of this year and we're developing a carbon neutral strategy that will we hope be approved in May. We have implemented also a circular economy strategy. So, once you have these strategies, then after you have these operational level and maybe responsibilities distributed into different services. But what is maybe more specific and useful for us is we work a lot in collaboration and network between the different campuses and schools and faculties. That helps in fact to improve the knowledge management. And the good practices [is shared] how we try to ensure that these distribution of campus of [the institution] in the region. We have eight campuses spread out in the province. It is not a problem but a benefit because we can coordinate and change good practices and pilot projects and at the same time have some kind of regional influence. We are, for example, implementing in Campus Nord, the solar campus that is starting up a photovoltaic plant in the classroom that was done in another campus two or three years ago …

Interviewees were asked whether they believe that sustainability policies regarding campus management have the potential to impact the perception of staff and students on the importance of SD issues. In general, the answer to this was a resounding "yes", but with one qualifying statement as illustrated below.

> *Very difficult question. It really depends on the person. We do provide educational and awareness raising activities to students, but all depends on individualities.*

> *Yes, because the presence of a SD policy [regarding campus management] would provide a signal to staff and students on the importance of SD issues*

> *Yes. Sustainability policies would certainly impact the perception of the [institution's] community on the relevance of SD .*

> *Yes, this is what we call B curriculum or this shadow curriculum that you learn by living at the campus is not only just in the classroom with your professor. The trend on sustainable education is that what really remains is about the education leads to values - values and attitudes, and it's not only contents and knowledge. It's also skills as fundamental values. You hardly learn on values without experience. It has to have an emotional and a real experience, not just some PowerPoint or repository of information or even a classroom, and the campus management allows this kind of involvement of students. So, in my opinion and understanding that this sustainability competence can be rooted in academic activities but also on campus management activities. It is fundamental because it opens other options to fulfil a goal without putting all the responsibility on a crowded curriculum … I'm thinking also that having this kind of experience via a cooperation for development project … should be also be integrated in this kind of experiences that help to understand this competence on SD.*

> *Effective campus management help saves space, save energy and ensure a long-lasting and sustainable development. From my perspective, sustainability policies regarding campus management play a very important role in affecting the perception of staff and students on the importance of SD issues because campus is where they work and study. Working and learning regularly in a sustainable [context] have good effects on them and raise their awareness of sustainable development.*

Regarding barriers specific to implementing SD principles in campus management, the interviewees shared the following views. Interestingly, while a couple of institutions indicated they have no barriers, the vast majority indicated the existence of many barriers, not least a lack of time, financial resources and awareness/commitment. It was also noted that a lack of appreciation of the trans/inter disciplinary nature of SD resulting in individuals working in siloed specialized areas also constitutes a barrier.

> *Limitations are with the individuals among society. When the society is slow to change towards sustainable development, the individual cannot realise it as a pressing commitment.*

> *Financial and change of consciousness. We can see that people are more responsible towards the environment nowadays. Even in the city, all of the latest developments are eco-friendly. We had a number of European projects aimed at energy efficiency and raising awareness.*

> *How to further reduce costs, these are hard to do.*

No. All members of the academic community together with the administrative staff contribute to the implementation of the institutional sustainable development policies.

No barriers, as long as implementing rules will be provided, all [institution] personnel strictly adhere and execute the policies directed by the Office of the President.

Interpersonal and interdepartmental cooperation, utility water, campus life, transportation, safe working environment during inside and outside of office hour, may be barriers for the implementation of SD principles

The overall awareness of SD issues is not enough.

It is budget. Budget from government decreases every year.

I would not call them barriers, but I would call them natural limits. The point is that you have a campus or you don't have. In most cases management is not in a position to change their own reality. We do not have a [big] campus and we are located at the centre of the city. My management would really like to have a [big] campus, but it is way beyond our capabilities. It does not matter what policy document you prepare or how willing you are, there are limitations with no way to remove those limitations. I see the word "barrier" as it could be removed with certain reasonable efforts. But in most cases, limits are much stronger and could not be removed by the management of an institution. That's my understanding.

We can also stress in this moment that [the university] is developing a strategy of development of the [city] in this very moment. It takes time. This is the first - time. … The lack of money … financial resources is really a big problem

Many [barriers]. Well … obviously the lack of resources … the lack of competence and attitude in the academic and administrative staff, the decision makers. It's obvious that we come from a culture where sustainability was not the centre. The new generation should have these in the centre because they will suffer the consequences … Another barrier here is the fragmentation of knowledge …. So, everyone is very committed and involved in his own area of knowledge and sustainability really needs … is a general area or inter-transdisciplinary narrative. The lack of competence to work in transdisciplinary of universities is the fundamental epistemological problem. The lack of resources also, I think that this one is more serious, because I think the [financial] pressure on academia is more and more… a problem.

Implementing SD principles in campus management takes more time and cost for our university.

3.4.4 Social outreach and responsibility

The research also sought to gain insights into how institutions regards their own social policies. This was to further explore the social dimension of SD as represented by the institutions' social outreach and responsibilities. Similar to SD policies, many institutions indicated that while the terminology of corporate social responsibility (CSR) is not used, they did feel that many of their extant policies addressed issues that are inherent in CSR. The following are some of the responses received.

Not [stated] as a CSR but expectation or results of CSR are met in our Vision and Mission statement.

One of the main principles of our activities is accountability to the society and environment. We have very strict fines for any ecological violations. Another principle is transparency - in decision making and activities that impact society and environment. The next principles are ethical behaviour, taking into account interests of all stakeholders, rule of law, compliance with international law and human rights.

Social aspects are part of [the institution's] DNA. We have high ranking research projects, liaise with local energy companies… and power plants. We generate our own energy and if we have surplus we give it to the public. We have strong links with the industry as well, working on topics related to scrubbers, equipment, testing fuels. We also do underwater testing. We are a technical university so we are naturally involved with the industry.

The [institution] has taken an active role in the international maritime community, concluding a series of bilateral protocols with specialized universities, both to ensure the exchange of students and teachers, and to facilitate the exchange of experience in the maritime field. There are currently 23 such partnerships

Yes, and they are incorporated in the newly revised [institution] Educational Quality Policy.

Similarly, [the institution] plays important roles in SDGs accomplishment through its extension services programs. [The institution] is a non-stock non-profit organization engaged in conducting professional development activities/projects to enhance competencies of its members in implementing community development-oriented programs and to develop the target community for societal and environmental well-being.

Yes, we do in the form of welfare benefits. Also, provision of quality education, good health, advanced science and technology, research and academic-industry integrated project, clean drinking and utility water, … green environment, priority use of clean energy, clean campus and green environment to cite a few.

Yes. One of [the institution's] corporate social responsibility is providing support for the industry and serving the national strategies …

Our university has "Vision 2027" which is a corporate social responsibility policy.

I don't know. Environmental impact is the root cause of whatever is going on. Social response is actually response. People will always follow the same patterns how they always act, react, behave. So, the social arena is only responsive to what is going on the technical side. All those aspects are consequences of the first one, they are not coming in parallel. The first one is coming … , then there is technical capability and then everything else. Look now at the situation that we have with CO_2. You cannot remove CO_2, so there are technical possibilities, but they are extremely expensive. So, they are so expensive that we do not want to remove them , also for political reasons. So, it is always what we have to do and then do we have a technical possibility and after that we

have social and economic aspects. To give you one crazy example that we have now. We are building an LNG terminal because the government because of dedication to decrease emissions, which ecologically for the time being is a better solution. Who is fighting against this terminal - environmental protection groups. Why? Because they are protecting local interests no matter the whole society. First you have to have technical solutions and only after that you can have social and economics. I cannot see these problems as parallel. I see them as a sequence.

We have incorporated in our Strategic Policy. We have some implicit in the statutes, where there is the policy, the general policy, approved in 2011. And we are working to have one this year, a renewed one because since last March, we have a new vice rector for equality and social responsibility. So here, we have some kind of leadership and this helps to have a strategy or some kind of umbrella strategy. Although we have already strategies in SD, or equality, or inclusion and we're working on it, broader umbrella strategy on Social Responsibility.

Yes, [the institution] issues policies to encourage officials, lecturers and students to participate in community and volunteer activities, such as helping the poor, the disadvantaged and the residents who live in remote areas, awarding scholarships to students who have good performance, organizing festivals and clubs for students, volunteer activities for protecting environment (collecting garbage on beach, etc.).

CSR activities were indicated to include the following, some of which are debatable as CSR activities:

Making the students learn about CSR and conducting lectures and seminars about it.

Let me cite some activities which may be considered CSR . These are:

- *bilateral protocols with specialized universities*
- *external mobilities for researchers, teachers, students …*
- *partnerships with professional associations with the role of global connection and support for professional development*

Various extension services programs are participated in by [the institution's] community (faculty, staff and students) either voluntarily or as requested by external agencies. These include health, environmental care and protection, and education and training extension programmes …[The institution's] students assist in feeding programs, medical/dental missions and gift giving to indigent residents in [the community]. Biannually, [the institution] midshipmen/personnel donate blood to the National Red Cross and Veterans Memorial Hospital and Medical Center thereby helping save people's lives… Also, [the institution] annually collaborates [some industry partners] for Christmas cheers to less fortunate children of … selected areas in [the community] by organizing fun games and giving meals and school supplies.
On Environmental care and protection program, [the institution's] cadets conduct tree planting, coastal clean-up and waste management activities. [The institution], with all its cadets, annually supports the International Coastal Clean-up Day celebration every September in coordination with the local government of [the community]. [The institution's] cadets also take part in [an annual event] in neighbouring public schools by helping in cleaning and refurbishing their facilities.

In addition to free educational and capability trainings (Simulators, GIS etc) provided by [the institution] to [the country's] Navy, Coast Guard and other professional mariners , there are so many values added activities that [the institution] has supported, beneficial for both within and outside [the institution].

Corporate social responsibility provided by [the institution] may include welfare programmes for the faculty and staff includes: Casual leave, Maternity leave, Medical leave, and National holidays.

We clean … after picnics. We do Saturdays cleaning hills. Our cadets and people living in [city] are quite conscious. In regard to cooperation with industry, very often a part of procurement has a point in regard to the environment aspects of a product or service.

Some of [the institution's] activities that can be considered as corporate social responsibility is the hosting and holding of Conferences such as World Maritime Conference, Global Forum on Green Shipping, etc., to provide platforms for the industry to discuss hot topics related to maritime energy management, intelligent ships, green shipping
[The institution] has also established think tanks … focusing on the better development of the shipping industry
[The institution] also organizes students to participate in social environment protection activities such as cleaning the beach …

Education:
[The institution] develops a curriculum that ensures high quality education that meets international standards and will create original, world-leading educational programs in marine science and technology. In addition, we will collaborate with marine-related institutions in [the country] and overseas while providing the world's highest standard of education in order to produce numerous leaders in industry, government, and academia.

Research:
[The institution] takes a central role in giving shape to the vision for marine science and technology of the future, while conducting top-class research in the fields of marine science and maritime technology and fisheries science with research focused on practical learning in close partnership with industry.

Internationalization:
[The institution] creates a cosmopolitan campus suited to the global age, based on the tradition of the maritime technology and fisheries science sector as a pioneer of internationalism during the process of [the country's] modernization.

Social and Community Partnership:
[The institution] strengthens its collaboration with local communities and marine-related industries in [the country] and around the world, to contribute to solving problems, as well as to contribute to industrial development, based on the results of our education and research.

... We have a good cooperation with the non-government organizations, environmental ones but also with the centre for homeless people. So, our students both give them a dinner so the university provides them with food and the students go there to share with the homeless people dinner.

Sometimes we had a problem with our ex-student who unfortunately he has been lost in maritime. So, then our faculty helped his wife and children economically. And another thing which would be maybe for the social issue is that our staff is part of the university games. ... And another thing is that we have, like possibility of medical care. Every year we have some kind of medical testing free. And another thing is, from time to time for the holidays, we get some extra bonus for, like, extra money we can spend on in shops ... But it comes from the Union, from the syndicates Labour Union.

Well, I think that [the institution] has been plenty of a lot of initiatives, like I mentioned this cooperation for development initiatives or all the SD & Social Responsibility integration in the curriculum or all the links with the stakeholders or schools. But there was not a systematic approach to that. We hope to create a kind of system to put in relation all those elements. But yes, I would say that in theory there are plenty of very socially responsible staff (academic and administrative) that spent a lot of energy also to connect with society to go beyond with fundamental scientific or academic work.

[The institution] puts students first and respect their thought and their rights. We always encourage staff, lecturers and students to participate in community and volunteer activities, such as helping the poor, the disadvantaged and the residents who live in remote areas, awarding scholarships to students who have good performance, organizing festivals and clubs for students, etc.

Almost all the responding institutions indicate having extensive sustainability-related collaboration with other external entities, the emphasis being on academic institutions. There are many industrial collaborations, nevertheless. There was however a noteworthy comment, which we have reproduced below.

This is one off the lacking points in this assessment for the impact ranking... We now we are working on the negative point or the areas of improvement. We have a lot of relationship with stakeholders ... from local communities, to neighbourhoods to companies. But we do it in a very informal or [uncoordinated] way. Well, you know, we don't have any strategy on that. So, one of the main focus for this strategy will be, well, there are four points, one is listening for societal needs, not just to come from companies or the policymakers, also citizen groups, so that is one. Another will be a recognition of the work. So, all these words that I just mentioned ... is being done but ... in very isolated or invisible to recognise.

3.4.5 Human resources (faculty and staff)

Most of the respondents indicated that SD is supported/promoted among faculty and staff through opportunities for further studies and social activities and through awareness creating efforts.

[We discuss] the academic, administrative, infra-structure, hostel matters and other issues at the meetings of Directors, Deans and HODs at Department Levels

Our Vice-Chancellor convenes regular meetings of the Directors, Deans and HODs to discuss all the academic and non-academic issues before taking decisions.
Our Board of Management, Planning and Monitoring Board and Academic Council have their respective representatives from different departments to ensure effective planning and implementation of academic and non-academic programmes.
Our Departmental budgets are given due consideration by the Finance Committee and funds are allocated.

[The institution] promotes SD principles through information dissemination or awareness creation by seminars, conference, contests and etc.

Through participating in projects, conferences, various join activities with international partners, such as publication of articles.

[The institution] supports and promotes SD principles through various welfare programmes and services beneficial to [the institution's] community (faculty, staff and students). [A long list of facilities, clubs and social activities given]

The most effective tool would be an instruction from the top management to integrate this concept into teaching, life and work of cadets. I am sure that faculty and teachers are aware of the importance of this concept but due to their busy schedules and the amount of teaching they need to do, they simply have no time to look into it or implement it.

All ... we do are ultimately to promote human development. On the one hand, we continuously strengthen the team construction of the faculty and staff to improve the ability of sustainable development of [the institution]. On the other hand, we also put emphasis on the humanistic care for teachers to maintain and improve the team cohesion.

Both yes, everyone for SD as long as they don't have to pay for this

What would be the most important is our curricula. So, because more or less, we are much focused on this part of job, everyday job. Since the administration activities has risen dramatically for the last couple of years. And so maybe this is our core business. So, this is the way how we distribute. And also, we have our regular faculty meetings. We have these issues always. We do always discuss about this problem.
(We have ... a project related to the blue economy and innovation and entrepreneurship and we try to develop these skills in [two countries]. ... We are responsible[in the project] for the training and education of teachers and students in the blue economy and innovations and entrepreneurship.
And another thing, ... for the European Maritime Day, which will be held ... we are going to host children and parents and people from the community to come to our university and have like a workshop at our facilities Another event which is connected with this one is research night, which would be on 25th of August. So that would be also part of the similar activities. So we are intervening with the [country] Chamber of Commerce and the children and parents. And so, we will share like the idea that could change the world.

Yeah, and there is also a festival of science every year. It is organized in April at the level of the university. We call it a festival of science and also this researcher nights or night of the researcher it is organized by the university at the level of [the country. But I think more international it is a part of the Horizon 2020.
The basic topics is actually this blue world. So how to the ideas that could change the blue world in connection with the public general public, scientists, children and their parents and students. So, all of these united interested parties are going to intervene at the university level We have the support of Chamber of commerce.

There is an opportunity that is using agenda 2030 as a general framework for all and easy at least, is what we are going to try. We have done some courses for staff, academic and administrative on sustainability and different aspects. But now what we are going to do is general courses for how to implement SDG. And, those courses will be done at each campus during September-October. So, and what we do is we are open those courses. It's not a course only for the staff, or for the academics, or the administrative or students. We do it together because we think it's really an issue that connects and links the community. Then there are a couple of other activities will be done that might also help. One is to index all the academic production to index, all the new and, if possible, the past activities. All the activity according to the SDG. So, ... maybe one ... economic paper is linked to three or four. So, it's not just to classify simplistically, it's to connect them. But at least to show the contribution of the University, from the perspective of these Agenda 2030. This will affect academic work on this scientific level but also all the final degree projects at bachelor and master level. So, this should be a way that everyone gets some kind of attention to this global agenda.

We develop human resource on SD. Besides, we are aware of the importance of sustainable development for faculty and staff. In addition, we have some rewards/ incentives for staff involved on SD activities...

3.4.6 Research and innovation

Regarding institutional arrangements, outcomes and expectations for research related to SD, respondents noted the following:

We are open to undertake research projects and collaborate unlimitedly with partners having keen interest to sustainable development

The university emphasizes the following ethical principles as top priority in all its academic and other research activities, namely: maintaining highest honesty; objectivity; integrity; carefulness; openness; respect for intellectual property; confidentiality; responsible publication; responsible mentoring; respect for colleagues; social responsibility; non-discrimination; competence; legality; animal care and human subjects protection.

The above principles served as guidance to all the personal involved in research and is believed to contribute to sustainable development

We just have finished a big project on ESD together with [named university. We had a big Erasmus project in regard to improving energy efficiency in developing countries. We had a

project on ecological development of fishing education. We are also involved in the project related to implementing the strategy of a green port, implementing electric chargers in port.
We would like to have more practical research to allow us to implement specific technologies on campus.

As an institution of higher learning, [the university] is mandated to conduct relevant MET research programs for its institutional development including research activities to enhance the maritime education and training curricula. Researches has also been conducted in collaboration with other agencies or organizations in the maritime and education sector. [The institution] motivates its faculty and staff to conduct research as well its students to develop their critical thinking and problem-solving skills. The institution provides incentives including an opportunity to present research papers in national and international conferences and has also hosted various national and international conferences ….
Some of the research outcomes presented and published are directly or indirectly related to SD. The research titles may not contain the word "sustainable" but the research results contribute to sustainable development.

The vast majority of dissertations are technical, but they still consider various aspects of environmental protection as not paying attention to this trend is impossible, as you are aware, with changes to MARPOL, Annex VI, Ballast Water Management Convention. These changes changed various aspects of engineering and for this reason the majority of thesis in mechanical engineering and ETO are discussing this. I am currently writing a doctor's thesis and I simply cannot ignore it.

[The institution] has clear policies , procedures and guidance on integrating SD in institutional operations [and several] recent research outputs of [the institution's] faculty are related to sustainable development [list provided].

Our university has a School of Marine Resources and Environment in the Undergraduate Course, and has a Master's Course in Marine Resources and Environment and a Doctoral Course in Applied Marine Environmental Studies. Through these courses, the investigation, research, and education about SD are performed actively. Moreover, Office of Liaison and Cooperative Research and Gender Equality Promotion Office are promoting these activities relevant to SD.

It is important to share that the [institution's] research group has been chosen by [named programme], supported by a collaboration between the [a couple of national agencies] is currently working on a funded research project in partnership with [a named country] for 5 years (2019-2023) …
[The institution's] faculty and staff are active research partners of the Science and Technology Research Partnership for Sustainability are very active in conducting research for sustainability.

A lot. Probably more than 60% of all research activities have something in common with, in most cases, environmental protection or taking into account SD.

Well, you know how research, how free research decisions are done. So, I think that here the only things really that the university can help here, is not to disturb research. But when, for example,

the grants and the money from Europe comes and is focusing on these issues of sustainability missions and others, well, really, I think this is being done, so many research groups at the institution, are really orienting into sustainability because Europe is putting this on the research agenda. What we also wanted to connect the different activities and promote this kind of inter disciplinarity and without knowing what the others do, is difficult. So that's why indexing and classifying or at least do this kind of map of who's doing what in the different of these goals in the 2030 Agenda to put it in relevance and connecting research groups around general topics. For example, now this has to do with the Office of Cooperation Projects. We're trying to identify where we have set three priorities and for example. Here we will open some kind of calls for which groups are working on climate change and with vulnerable communities or big data for social priorities, etc. And I think this is a way also to focusing, we don't have from university enough resources to direct the research, but at least to connect researchers that are working in similar or complementary things isolated and they don't know each other.

Educating, researching and exchanging information on environment and development to move toward global sustainability.
Sharing experience of SD from partners in the developed countries.
Seeking financial support to implement the scientific researches relating to sustainability science.
Listening opinions and advices of researchers and scientists from other countries.
Find out methods to improve and to foster education and training.

The scientific research activities have been recognized as one of the most important strategic tasks for enhancing the prestige and brand name of the university to the socio-economic environment and national industry, promoting the position of the university in the trend of integration and globalization.

Recently, [the institution] actively enhances the exchange of materials, researchers and faculty members, joint-research with overseas universities and academies, focusing on the fields of maritime automation control, shipbuilding technology, offshore construction, marine environment protection, sea-port engineering and management, logistics and supply chain, etc., which are vital matters of [the country's] industries.
[List of research outcomes and awards given]

3.4.7 Curriculum, teaching and learning

Many of the institutions have subjects that incorporate elements of SD. There is however relatively few subjects/courses that focus exclusively on SD.

There are no exclusive courses on sustainability in the maritime course offerings but there are some academic approaches to sustainable development through various Enhancement and Development Programs for students…

Our institution does not review the curriculum in light of SD principle directly. However , as a maritime university, we are largely concerned with the environment, economic and human resource training.

In the curriculum of most of marine subjects [reflect] SD with learning outcomes, activities, assessments, materials etc. However, the curriculum and activities at [the institution] is still dependent on the instructors' ideas and actions in incorporating the SD principles in their subjects and teaching and learning activities. Topics related to SD are integrated into the main modules, also in modules related to environmental protection, engineering. ...Every 5 years we renew the programme to take into account legislation changes to keep seafarers up to date. We are currently considering subjects of energy conservation and various aspects of saving and rational use of fuel on board, we look into ballast water treatment systems, scrubbing technologies, air pollutions, efficient use of fuel. We are keeping up to date with garbage separation regulations and looking into recycling, but all seafarers already know about this and they do not need an additional explanation.

We probably need to start with consequences as not everyone can model consequences of their actions. They live today, throw plastic into the sea or on the ground. We could have offered an interesting lecture, presentation or course to demonstrate the consequences of uncareful use of resources in 5, 10 and 15 years. Every person that cannot imagine it can see clearly what consequences might be of a thrown plastic water bottle, not switching off water or not carefully using other resources and how it will impact their children and grandchildren. And it has to start at school as in HE we have students at such an age of their lives when they are not very interested in all of these.

[The institution] is adding SD related topics to curriculum. Our academics are in the best position to further describe the learning outcomes, activities and assessments.

In the light of integrating SD principles in curriculum, teaching and learning ... we use the following approach :
We create educational programs that capitalize on [the institution's] facilities, including training and research vessels and the Field Science Centre.
We collaborate with marine-related institutions in [the country] and overseas and promote collaboration with organizations, research institutions, universities, corporations, and other bodies with a clear objective for collaboration. We produce numerous leaders of industry, government and academia by implementing educational methods that foster the leadership required for leaders of industry, government, and academia. We increase activities that pave the way to fostering leadership, such as the experience of leadership through teaching assistant and research assistant positions.
We develop educational programs aimed at producing leaders in government administration in particular.

We have even on the study programme level outcomes, learning outcomes, and in the specific course outcomes.
(There are two subjects at the master's level and they are fully dedicated to sustainable development. One is the blue and green technology and the other is integrated coastal zone management. In addition, the subject links with these sustainability issues specific to the blue communities I mean blue economy and in some other subjects, different parts of the sustainability are integrated. For example, we have ecology of the sea. We have marine environment and sea protection. We have also some economic subjects and we also have some social organization

subject like organization and the crew management on board and this subject includes the issues off ethics, different cultures and so on.
We force our students to make presentations. For instance, we had recently presentation at the Chamber of Commerce regarding a circular economy, blue economy. So, student has made investigation ... we have been there at the presentation not only the faculty presentation, but also some companies from the area ... So, we've been talking about this problem of plastic in the marine environment.
We are trying as much as we can to get the students [engaged in] entrepreneurship internship ... And also, one more thing that in our courses we have case study, for instance, in the area of recreational boating and nautical tourism which is for [the country] a very important industry. So, we are investigating and also making contacts with industry experts regarding how to solve problems ...

I think that was a very good decision including SD competence in the curricula and it was strategic. It was [ahead] compared to many other universities. I don't think we have, generally speaking, worked enough the implementation. Although I see in some schools that the work has been extremely positive, I am thinking about especially and one for example, computer science faculty where they really were working on that and thanks to that competence, they developed a programme that was really so very, very interested. ... I think it's necessarily, but it's not enough and the enough I think we need more pressure from legal, from institutions will also from the students, too.
So, we need the pedagogical approaches that are easy to implement, and that help the staff, from just giving contents to working on a really transforming education. This is one and the other also is when you have new staff entering. ... We have a very bad policy or situation on staff admission. But then it's difficult to ask for excellence in academics staff when you are paying low or you are not able to choose. That's the real problem.

[The university] is a leading centre for educating and training maritime experts, scientists providing for the national sea-ward economy of [the country].

We develop the capability of faculty members to [renew] curriculum toward global sustainability and teach environmental knowledge to all undergraduate students and graduates. In addition, we would like to contribute to the sustainable development of Vietnam as well as the world.

Respondents were asked whether in their view SD and ESD are related to STCW training and education or and how SD could be integrated into STCW curricula.
Responses included:

I think SD and ESD are related to STCW training and education. The approach can be problem based and project driven from which the students can learn the abilities of problem solving and critical thinking.

On the [question of] how SD could be integrated into the STCW Curricula, there is a need for the MET Higher educational institutions to endeavour to fulfil the following indicators and key points for excellence in STCW training and education.
1. Curriculum design must be aligned with the institutional goals and objectives.

2. Curriculum design and sustainable development must be done through a well-defined process.
3. Curricula developed/ adopted must have relevance to the local/ national / regional/ global sustainable developmental needs.
4. Employability & entrepreneurship, pursuit of higher knowledge, overall sustainable development of students must be major considerations in the design and sustainable development of the curriculum.
5. Global competencies must be developed and sustained
6. There must be consultation with academic experts, industry/employment sector/alumni/other stakeholders within and outside the institution for developing the curricula.
7. The curriculum must be flexible and offer choices for students
8. Courses must provide adequate opportunities for additional/supplementary/enrichment courses along with their regular curricula.
9. The course delivery system and examinations processes must be transparent
10. The curriculum must be flexible for enrichment
11. Structured feedback from stakeholders and peers must be evolved and sustained

SD is related to the whole world and the whole civilisation, of course it is related to seafarers as well. Seafarers must be ready for automation, which is a technology of sustainable development as they will be utilising sustainable technologies.

A single seafarer can destroy the ocean, their actions can have severe consequences. For this reason, SD related topics have to be highlighted. But in [country] it is not very difficult as they all got it from high school already.

Yes. SD could be integrated into STCW curricula like courses for environmental protection procedures and techniques, ecological maritime transport systems and sustainable development, onboard waste water treatment plants, biofouling, aquaculture, etc.

Yes, I think the SD and ESD are related to STCW MET (containing KSA and KUP) because ESD … is one that allows every human being to acquire the knowledge, skills, attitudes and values (competencies) necessary to shape a sustainable future.

Even in various programmes and course contents, SD is not specifically stated, but what is important are the measurable outcomes that result to sustainability. For example, the following STCW programme outcomes are linked to sustainability
PO1: Demonstrate the ability to perform the competence, at the operational level under Section A-II/1 of the STCW Code or Section A-III/1 of the STCW Code
PO2: Apply knowledge in mathematics, science and technology in solving problems related to the profession and the work place;
PO3: Work in a multi-cultural and/or multi-disciplinary team;
PO4: Understand professional and ethical responsibilities;
PO5: Communicate effectively in oral and written English;
PO6: Understand the impact and implications of various contemporary issues in the global and social impact of the profession;
PO7: Engage in lifelong learning and keep abreast with developments in the field of specialization and/or profession;

PO8: Use appropriate techniques, skills and modern tools in the practice of profession in order to remain globally competitive;
PO9: Conduct research using appropriate research methodologies; and
P10: Demonstrate all the required technical, behavioural, attitudinal competences as required by the [university]

SD need not be mentioned in every discussion of STCW. The course content in the STCW curriculum may mean the term SD is never explicitly mentioned, like in MARPOL subject for example, but issues of pollution and proper waste disposal, for example, are.

The maritime professionals in their subject areas (STCW curriculum) are the most effective SD champions that MHEI learning provider can have.

Armed with some knowledge about what SD and ESD is about and using a simple approach, a lot can be achieved. Every course is different and therefore there is no "one size fits all" approach. The best people to integrate SD in the curricula are those who teach. One way is by identifying the environmental, ethical and social considerations that can be raised or integrated in the STCW curriculum as part of the course because they are part of the sustainability dimensions.

SD and ESD are related not only to STCW training and education but also to programmes oriented towards shore-based professions.
STCW curricula itself already contains or applies SD principles.
SD could be further integrated to STCW curricula through the topics onboard marine energy management, ship energy efficiency, emission control technique, utilization marine energy conversion, and so on.

My personal opinion is that this topic should be included in every educational programme, not only those for seafarers. All other models of development have a dead end. Speaking about seafarers, honestly, seafarers are professionals that will comply with current requirements and do not breach those. But this concept should play [a greater] role in MET. As you noticed we discussed at the very beginning that this is a part of personal development, disregarding specialisation. Studying in an HE institution is a great opportunity to introduce to the consciousness of a person this topic or to develop it. Green path or even not just green, but sustainable, is the only right one.

It is a question how you understand the wording SD. For seafarers, they have nothing to do with policy level. They are professionals. Does SD have something with seafarers? Yes, a lot. ... But I do not think that seafarers will decide which kind of fuel ships will have to burn, or slow steaming. Those decisions which are affecting SD are not made by people on board, they are made ashore by companies, IMO, administrations. This is my understanding of SD.

Yeah, it is possible. It is possible because STCW convention is just the minimum requirements. So, it can be expanded a little bit. So, that way [there is] improved knowledge, especially in the field, the sustainable development. You also have I saw there here a question about SD. SD is integrated in the national level on the part of the re accreditation process for the higher education institutions in [the country]. So, .. to a great extent they are incorporated in the requirements that

ministry and the agency for high education want to be complied with. So, at the national level we have to comply, but also at the international level through all IMO conventions, but I can agree with you that by broadening of these requirements of STCW, we can [improve] students and future professionals' awareness.

Maybe it should be done quickly ... because it's very important to [increase] awareness .... We are a very, very maritime country .... As I said, we have a great problem at this moment in economic and with environment. Since [maritime] activities have risen dramatically in the last five years, we are facing really big issues, and students are the ones who should definitely change the world because the knowledge is in their hands. So maybe we could do something about it, especially I think that also this framework of Erasmus, especially universities which are in the Erasmus Active and IAMU.... I've seen also a book, but I don't have, I cannot remember the name of the author, but it's World Maritime University is the publisher, and it's about social responsibility in maritime industry. And maybe some kind of brochure or whatever something that could be implemented quickly in curricula and in business processes as well could be maybe help.

Well, I don't really know the topic and the convention so that any help come from the obligations on the competences and the skills, you know, will be welcome. The focus sometimes is that you have a list of competences so long that at the end, you lose the focus.

We think that the SD is very important for all industries, not only the STCW training and education, but also all programmes oriented towards shore-based professions.

The STCW Convention can integrate some other requirements related to SD ....

3.4.8 Student engagement and enrichment

Respondents gave insights into how their institutions support or promoted SD among students.

Our problem is that we prepare a seafarer and have to teach him twice the number of hours in philosophy compared to maths. These are requirements of national HE regulations. If we want to deliver an HE programme, we have to give 120 guided learning hours of philosophy, 120 hours of business while they do not even use it at work with the exception of a couple of dozens of [country] vessels. There are many examples like this when we have to deliver a certain number of mandated subjects and cannot substitute that for anything else, including with subject related to SD.

There is an institutional Research and Extension Services Circle composed of the top 10% of each class, to assist and promote research and extension services amongst the students.

Through participative governance

[The institution] promotes the participatory Governance University for Sustainable development by incorporating the valuable suggestions of the teaching and nonteaching staff, cadets/students, alumni, parents, industry people in its decision-making process. [It also] forms and makes functional the different student committees/ bodies like Students' council, Mess Committee, Sports

Council, Cultural Committee, Leo Club, Eco Club, Peace Club etc., through which cadets/ students give their suggestions/ grievances which are considered while taking decisions

Well, we try to celebrate and support any initiative from students that has to do with sustainability, or a proposal, idea, critique or whatever … The last year there was this climate emergency declaration [by the institution] thanks to the pressure of students, and this has created a lot of work in consequence, that we will present during this year. But what also is becoming a strategy is to open this kind of activities called challenge-based education or challenge-based learning like solar decathlon competition or zero emissions car competition. This kind of activities help the students to be really committed and want to be part of change to … these students want more & more because they want to spend their career on this topic.

3.4.9 Barriers to integrating SD

Another very important question related to what the interviewees perceived to be current or future barriers to implementing SD in MHEI.
The following are representative of the responses received.

In my opinion, the barriers could be:

- *Limited resources: We must seek funding from external sources (e.g. sustainability related grants and fellowships)*
- *Academics themselves: They must demonstrate the relevance of discipline-specific topics and issues to sustainability in classes*
- *Lack of innovation: We must seek ways to shift the focus of existing campus programmes toward sustainability topics and issues*
- *Unconnected communities: We must describe connections between sustainability and local groups, particularly as they affect future careers for graduates*
- *Lack of collaborations: We must undertake collaborative writing and research projects.*

Status quo or resistance to change in integrating concepts or elements of sustainable development in the existing curriculum, procedures, policy, planning and operations.
There may be no terms of reference or guidelines for the departments, divisions or offices for them to integrate principles of sustainable development to the existing curriculum or operational procedures or developmental programs and services.
There may be limited or no knowledge about SD and its principles among the faculty, staff and students.
No topics or issues on sustainable maritime development on the research agenda.
Existing curriculum does not reflect the sustainable development concepts.

There are no specific or direct policies on SD, no direct SD monitoring, assessment, evaluation and reporting . The institution is certainly contributing to sustainability and its three dimensions but no actual reporting is directly done.

We have very bureaucratic state processes from the governmental side. It is very hard for an individual to get permissions and for legal persons it is even harder. Some aspects which are initiatives from the top management, are very hard to achieve.

First one, as I mentioned, particularities of [country] system of education in which we have to comply with requirements of HE and also STCW. The barrier is bureaucracy and the need to comply with two sets of requirements. We have very weak autonomy of universities or even total lack. There is also a lack of political will. Until the international community … clearly adopts this as the main strategy, I think it will take a long time for MHEI to develop in this direction independently. We need a clear politics and clear direction. Not only small initiatives.

Implementation of SD in MHEI would be difficult if there is a lack of understanding of SD in MHEI and lack of incentives.

The country which considers only the profits of its own country.

SD is confronting personal policies. SD is expensive for individuals and the major barrier is that we are all very much for SD, but we are not ready to pay for it. Because we are not sure it's true. So, somebody else has to pay for SD. This is the major barrier that people are not aware of consequences of [the absence of sustainable development]… SD means that living will not be as easy as it was in the past. So, we need to explain to people what's going on. If they don't understand that, they will refuse to do whatever we invent. ... If you want students to do something in the future they need to know why we are doing this. If you have a seafarer who is already 30 years working on board, do not explain anything, he is too old. But students they must know as otherwise they will not be ready to bear expenses

Sometimes laziness of the personnel, mentality, mentality. Yeah, they see this like extra work. So, they just come here on, do their jobs at the minimum. Not all but a great deal, just one to get the payment without any additional effort or passion for something. Mentality can be a problem.

Economic issue is maybe the first one. So maybe opportunism but mentality. My opinion is that maybe it is not possible to change people's minds, mindset, especially people who are already mature, but we can influence younger generations and maybe students. My very, very good experience this semester. I was working with students from the [other universities in other countries] and connecting with [our] students. I've seen the great potential, and I really think that maybe how to influence students, that could be maybe something that we should work on, because adults are already like, you know, it's very, very hard to influence them that have, you know that this is nice, but, you know, I cannot do anything. Even I've been trying to push people to answer your research questionnaire.

Disciplinary divide is for me the fundamental problem. At [our institution] we don't have social sciences and others science related to humanities. This is another problem because we are very technical, but we lose off these ethical reflection or philosophical reflection. I think, also a problem here is competence of staff, bureaucracy, complicated organization and fragmented organization. It is so slow to make a change because it's so complicated a transition.

The shortage of experience and knowledge on SD and the lack of connections between institutions in terms of SD.

3.4.10 Prioritization of SD in MHEI operations

Most respondents, when asked how much of a priority MHEI should give to SD in their operation, gave a rating (on a scale of 1-10 where 0 means no priority/relevance and 10 means the highest priority above everything else) of between 5 and 10 with the answers skewed significantly towards 10 (highest priority). The complete set of responses are indicated below.

10; 10; 5; 7; 7; 7; 8; 10;

Other text-based answers were:

We need to know the outputs of this concept, no one knows.

Seek funding from external sources (e.g. sustainability related grants and fellowships) - 9
Academics - demonstrate relevance of discipline-specific topics and issues to sustainability in classes - 9
Innovation - seek ways to shift the focus of existing campus programmes toward sustainability topics and issues - 9
Community - describe connections between sustainability and local groups, particularly as they affect future careers for graduates - 10
Collaborations - undertake collaborative writing and research projects - 10.

10 - High priority considering that SDG is an international concern that all sectors must jointly implement to ensure success in the accomplishment of the 17 SDGs

For me, for what I am doing in my life, it's 10 as it's the core subject I am delivering. For people in my institution it is not so important. If you ask a colleague in the office next to me, it's 6. It depends on what you are doing …

I would give it the highest. Ten

Ten. See, actually is the source of life and the problems that we're facing on everyday level are getting higher and higher. I mean, this is our utmost priority. I mean, maybe even for the first weeks of each course should be done something with sustainability. It should be a priority.

3.4.11 Prioritization of SD in MHEI curriculum and learning outcomes

Similar to the response for prioritization in operations, when asked how much of a priority MHEI should give to SD in their curriculum and learning outcomes, interviewees gave a rating (on a scale of 1-10 where 0 means no priority/relevance and 10 means the highest priority above everything else) of between 5 and 10 with the answers skewed significantly towards 10 (highest priority). The complete set of responses are indicated below.

10; 9; 10; 5; 7; 10; 10; 10.

Other text-based answers were:

For seafarers, 5.

Relevance of discipline-specific topics and issues to sustainability in classes - 9
Describe connections between sustainability and local groups, particularly as they affect future careers for graduates – 10

10 - High priority because SDG4 or quality education is one of the 17 SDGs and the curriculum and learning outcomes is a major component in ensuring quality education is achieved for sustainable development.

4. Discussion

4.1 Defining SD

The findings reflect previous work done in the literature.
Figure 1 is a word cloud of interesting terms used by respondents (in the interviews) when they tried to define SD.

Figure 3: Word cloud of important terms from interviewees' definition of SD

For the most part, the triangulated approach indicated convergence as regards the definition of SD. In both the quantitative analysis of the surveys and the qualitative analysis of the interviews, the definition of SD from the respondents (and as seen in Figure 1) coalesce around the definition used in the Brundtland Commission Report [12] i.e. "sustainable development meets the needs of current generations without compromising the ability of future generations to meet their own needs".
Defining SD and "sustainability" itself has not been without controversy with a substantial lack of consensus in the literature [13] [14] [15] [16]. However, it has been noted that the lack of consensus itself may affords the global community an opportunity to engage a very large group of stakeholders representative of the three dimensions of SD to address this rather complex concept together [13, 17]
While there was no explicit recognition of the definitional controversies by research participants, it was interesting to see a notable understanding of the existence of the three dimensions of SD – the economic,

environmental and social dimensions. However, in the stated definitions, respondents showed a bias towards the environment and economic dimensions to the detriment of the social dimension (see Figure 1). On the contrary, in the survey to institutions, the mean of responses about the importance of the dimensions ranked "environment" first (mean of 9.11 on a scale of 0-10), "social" second (mean of 8.92 on a scale of 0-10) and "economics" third (mean of 8.03 on a scale of 0-10). There was convergence here with the results from the student survey in the ranking: "environment" first (mean of 8.88 on a scale of 0-10), "social" second (mean of 8.54 on a scale of 0-10) and "economics" third (mean of 7.92 on a scale of 0-10). This is surprising given that arguably, educational institutions should be primarily concerned with the social dimension as by their nature and mandate they exist to use the social dimension to influence human practices that affect both the environment and economics. This can be argued to be the essential nature of education.

4.2 Institutional measures to address SD in MHEI operations

Part of possible measures that MHEI can take to operationalise SD (particularly with respect to the environmental dimension) include efforts to reduce carbon emissions, the efficient use of water, the reduction and recycling of waste, the use of recycled material, presence of energy efficient buildings, automatic switch-off mechanisms for electricity and water, renewable-energy-based transport systems and campus greening efforts as well as carbon footprint tracking mechanisms. The findings suggest that such SD implementation mechanisms are not as pervasive as may be desirable and that there is much room for improvement, in some cases extreme need for improvement. Interestingly, on this particular measure, students had a more favourable view of their institutions' performance than the views expressed by institutional respondents. The difference was statistically significant. This is one case in which there were divergent results from the two stakeholders in the context of the quantitative study. This difference may suggest a lack of awareness of the true state of institutional SD performance on the part of either one of the parties or of both.

4.3 Faculty, staff and students' awareness of and commitment to SD issues

The overall outcome of the research suggests that, similar to other findings and broadly speaking, faculty, staff and students are not as aware of and committed to SD issues as may be considered ideal with less than optimal means (see Tables 8 and 21). Interestingly on the specific issues of both faculty/staff awareness and commitment, institutional respondents gave statistically significant lower scores than students did (see section 3.3.3). This was not the case for student awareness and commitment. It can be inferred that students assume that their faculty and staff will be more aware and committed to SD issues than they will be as students.

4.4 The level of prioritization required for SD issues in MHEI operations and curriculum

Almost uniformly, respondents ranked the degree to which SD must be prioritized in MHEI operations and curriculum (and learning outcomes) highly (see Tables 13 and 25). The differences between institutional respondents and students were not statistically significant (see section 3.3.4). It can be concluded that both stakeholders deem SD to be of high importance, necessitating of high prioritization by MHEI in the two areas addressed. The findings from the interviews confirm this.

4.5 Effects of age, gender, academic level and seagoing experience on perspectives of SD

The quantitative findings suggest that there was no correlation between student age, academic level and seagoing experience and how students perceived the need to prioritize SD in both MHEI operations and in curriculum and determination of learning outcomes (see sections 3.3.6-9). Given the high rankings

discussed in 4.4, it can be inferred that across board, therefore, this need is recognized. There was, however, a statistically significant difference for prioritization of SD in curriculum between students with seagoing experience and those without. This may be explored further in future research.

4.6 Correlations between perceptions of MHEI operational SD integration and faculty/staff/student awareness and commitment to SD issues

There was a strong correlation between respondents' perceptions of institutional performance on SD operational performance (as described in section 4.2) on the one hand, and the perception of awareness of, and commitment to, SD issues on the part of faculty/staff and students on the other hand (see Table 30). This is to be expected as it can be argued that institutions that have put a strong emphasis on the technical parts of SD (particularly in respect of the environmental dimension) will naturally and as part of the overall SD approach, have more informed and committed faculty, staff and students. It also suggests strong reliability of the data collected.

4.7 Correlations between perceptions of MHEI operational SD integration and perceptions of prioritization of SD in operations and curriculum

Contrary to what pertained in section 4.6, there was no high correlation between respondents' perceptions of institutional performance on SD operational performance (as described in section 4.2) on the one hand, and their perception of the need to prioritize SD in operations and in curriculum and the determination of learning outcomes (see Table 31). Intuitively, this is a reasonable empiric outcome, since it may be argued that even in institutional contexts where there is little being done regarding SD, there may be a recognized realisation of the need to prioritize SD, perhaps even more so.

4.8 Integration of SD principles in MHEI in general and identified barriers

Broadly speaking, it appears that many institutions feel that such complex concepts as SD and CSR are captured by existing quality management systems, traditional processes and national requirements. This denies the complexity inherent in these concepts and betrays a rather limited view of the paradigm shift needed to address SD in a manner consistent with the environmental, economic and social challenges that humanity faces. These challenges were initially articulated very well by the Brundtland Commission Report as early as 1987, but have since evolved substantially as the world has failed to adapt and implement the needed paradigm shift. While some of the responding institutions may be applauded for excellent practices and exemplary initiatives, it is necessary to point out that there appears to be significant room to increase the understanding and awareness of SD and also to increase the activities/engagement of the IAMU membership in this direction. A tendency to subsume everything that a University does per, for example, a quality management system, under the broad umbrella of SD which needs clear, objective and explicit emphasis in its own right, is detrimental to achieving SD. Bagheri and Hjorth's position that "prevailing approaches of planning and strategy making, which traditionally deal with the states of systems in terms of fixed goals, fail to acknowledge the process nature of sustainable development" [18] is one that is justified and needs to be highlighted in this context.

It is also worth highlighting, as stated earlier, that almost universally, research participants recognized SD as needing a very high level of priority. For institutional survey respondents the prioritization of SD in MHEI operations and curriculum/learning outcomes was rated at 8.10 and 8.12 (on a scale of 0-10) respectively (see Table 13). Similar figures for the student survey responses were 7.70 and 7.75 (see

Table 25). However, answers to certain survey questions indicate that there is a disconnect between this espoused belief in the priority that SD needs and what is actually reflected in the actions (and inactions) of MHEI. SD is not as well integrated as is optimal in the 21st century. For example, when considering the question "Does your institution have a sustainable development policy", 42.4% answered 'Yes', 23.2% answered 'No', and a relatively high 34.2% answered 'Not sure' (see Table 2). Taken together, the 'no' and 'not sure' answers represented 57.4% of responses indicating a combination of categorically negative answers and rather low awareness levels. Several of these responses come from respondents at a relatively high level in the organizational structure. Similarly, in the students' survey, in answer to a question about their awareness of the existence of any practices or initiatives related to SD in the institution in which they are studying (see Table 17), 37% answered 'Yes', 11.6% answered 'No' and 51.3% answered 'Not sure'. This makes a total of 62.9% of respondents in the 'No-Not sure' category. Arguably, where a vigorous attention to SD in its own right and with the necessary emphasis/prioritization exists, the faculty, staff and students will be much more aware of the processes and explicit SD integration mechanisms that the institution is engaged in.

Given that essentially all respondents indicate that SD should be of high priority, the above again suggests that there is much room for improvement in the integration of SD principles in MHEI.

Other findings confirm that the awareness, understanding and implementation of SD can be improved. For example, when asked about institutional accreditation for SD practices, many respondents answered in the affirmative about the existence of certification for SD, but then proceeded to describe systems with greater relevance to quality management systems for the delivery of products and services (such as educational services) as in those required by ISO 9001, and not specifically for SD. Despite many positive responses, a number of negative SD statements are responded to in a way that highlights the room for improvement (see Table 12, for example).

An interesting finding was the respondents' views of barriers to the implementation of SD principles in MHEI. Only 2 institutions indicated that they saw no barriers. All others noted many barriers including, limited resources of time, finances and human; inertia on the part of academics regarding the integration of SD thinking in their lectures; the tendency of academics to continue working in siloed specialist areas, failing to appreciate the trans/interdisciplinary nature of SD; a lack of an innovative mindset; disconnected communities and lack of collaboration; natural resistance to change; absence of relevant offices, terms of reference, guidelines and policies; a lack of awareness/knowledge of the complexity of SD; absence of SD topics on the research agenda and in curricula; a lack of explicit SD monitoring, assessment/evaluating and reporting mechanisms; bureaucratic processes; a lack of will at different societal/institutional levels; weak or total lack of university autonomy to introduce SD principles; a laissez-faire attitude on the part of personnel/stakeholders; and a resentment toward the perceived extra work that implementing SD may bring. Most of these are similar to those found in the literature [3] which adds the absence of consensus in defining SD and which dimensions to focus on, and the lack of leadership and support from top management.

Furthermore, given the "high-priority" finding, it is surprising that relatively few institutions have signed a declaration (which may be deemed as a first step to articulating and acting on this prioritization). Only 10.9% of responding institutions have done so, 38.3% have not and 49.3% were not sure (see Table 2). Interestingly no institution categorically expressed disinterest in signing a declaration as part of a network related to SD.

4.9 Role of IAMU

It was enlightening to see the responses regarding the expectations of institutional respondents as to the role of IAMU and the help that the Association can give in furthering progress in SD. Unequivocally, both from the institutional survey and the interviews, it is clear that respondents see the IAMU as having an important role to play. As indicated in section 3.4.2.8, the Association is viewed as definitely being in a position to help and even having a mandate and the onus/duty/responsibility to do so, in particular in light of its standing at the IMO, a UN Agency working toward the UNSDGs. Additionally, while previous IAMU statements (the Tasmanian and Haiphong Statements) hardly mentioned SD, the latest IAMU (Tokyo) statement commits the Association to "highlight the imperative to engage in sustainable university operations and to educate a future generation aware of and working toward SD 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 planet" and "to recognise and respond to the unprecedented climate emergency and build the capacity of entities and individuals to enable them to respond and adapt to evolving challenges and seize or make opportunities through innovative education and research".

5. Conclusion and recommendations

The overall outcome of the research suggests that there is much room for improvement in implementing SD principles in MHEI (as represented by our IAMU sample), although it is also clear that significant progress has been made by specific institutions in the Association. The research reveals a fragmented and unstructured approach to SD in IAMU member universities with a few truly exceptional universities of a high standard in respect of SD in operations and curriculum. The Association, therefore, has a number of best practice reference points that are worthy of emulation across the board and such members - with a very high level of SD practice – can contribute to the further development of IAMU as change agents to help roll out a culture of SD across all the member universities.

The research further shows that there is near unanimous agreement that the concept of SD is of significant importance and has a place of high priority for MHEI. Nevertheless, it also indicates that there are barriers to the optimal implementation of principles and practices of SD in maritime higher educational institutions.

With regard to the signing of declarations, it was noted by one of the early adopters of the Talloires Declaration in this research, that the real issue with declarations is not their signing but their implementation. This is also recognized in the literature [19, 20] and speaks to the fact that any attempts to develop a declaration must seriously consider implementing mechanisms that are feasible and themselves sustainable. To quote Manuel and Prylipko in their citation of Amaral et al., "ideally, such commitments should be followed by implementation, verification of outcomes, and reporting mechanisms" [3].

Noting, as indicated earlier, that the IAMU Tokyo Statement 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 planet", it is clear that proper, structured and formal processes should be initiated by the Association to engender a holistic culture of SD covering its economic, environmental and social dimensions, and to optimally

implement and integrate into its membership the principles of SD. Awareness of the barriers to this will be the first step to IAMU working together to overcome them.

The following are therefore, recommended:

1. That IAMU takes proactive steps to start an explicit process of integrating the principles of SD into its body of member universities.
2. That IAMU emphasises its place and role as a proactive SD network of maritime higher education institutions.
3. That IAMU develops a comprehensive declaration (similar to the Talloires Declaration but specific to its own context) to be signed by all member universities and a sustainable mechanism to implement such a declaration.
4. That IAMU implements the relevant requirement of the Tokyo Statement by funding a Development Project and/or setting up a Working Group that formalises and creates structures for the integration of SD principles in Maritime Higher Education in the context of IAMU.

It has been noted elsewhere [21, 22], that for humanity to respond to and adapt appropriately in light of the SD challenges of the 21st century requires no less than a radical paradigm shift from our current pattern of unequal consumption and unfettered exponential growth underpinned by consummate greed. Such a paradigm shift at the macro and micro levels of society (particularly a global society) cannot be easy. Entities like the IAMU are, however, very well positioned to lead such change at least in the maritime and oceans educational community, particularly when it is noted that education is the most sustainable way of ensuring long-term change to societies (as compared to legal norms and markets) [23]. One theoretical approach to change leadership and management suggests the following sequential steps in what is termed the ADKAR change process i.e. creating/fostering **A**wareness to **D**esire to **K**nowledge to **A**bility to **R**einforcement of change [24]. Based on this theoretical reference, it is recommended that IAMU - as a critical global tool for high-level and quality maritime higher education - formally and explicitly begins a journey of:

1. Creating the AWARENESS of the need to change toward SD among its member universities;
2. Fostering the DESIRE to change towards a comprehensive paradigm of SD;
3. Developing the KNOWLEDGE of how to change;
4. Building the capacity and ABILITY of stakeholders to change; and
5. REINFORCING positive change when it happens.

6. Research limitations

Validity and reliability are well known issues with research when responses are received based on individual perceptions and subjective perspectives. In this work, all attempts were made to reduce this limitation by using a mixed-methods approach. It was intended that based on the philosophy of triangulation, a more comprehensive picture and informed conclusions could be arrived at. Accordingly, the mixed-methods approach drawing from both quantitative and qualitative methodological paradigms was used as was presented in section 2 of the report. Furthermore, for the quantitative approach where a couple of surveys were used, the reliability of the responses from the two stakeholder groups considered was checked by comparing the group responses with each other where the sample sizes allowed. Instances where there were differences of statistical significance between responses from the two stakeholder groups in the specific context of the quantitative method used (2 surveys), did not imply decreased validity and reliability. Overall, both the quantitative and the qualitative research methods[8] converged in findings. The mixed-methods approach therefore served its intended purpose of ensuring trustworthiness and credibility [10] based on a convergence of quantitative and qualitative methods and the associated findings.

A census approach to collecting data from all the IAMU members would have led to more defensible findings. Given the limitations in resources, a sampling approach was taken. Future research that takes a census approach is recommended.

Another limitation was imposed by the COVID-19 pandemic which led to an ongoing situation where the relevant institutions could not be physically visited for onsite verification of interview data. Attempts to reduce the effect of this limitation including making online interviews as comprehensive as was possible.

The research was also limited to primarily analysing the data in aggregate with a global perspective. Nevertheless, there were insights into the SD dynamics in specific institutions. It is hoped that these can be explored in future research.

Finally, the use of the data collected has been limited to the objectives of this research.

7. Other deliverables

Apart from this final report the following deliverables will be presented to IAMU at the AGA of 2021.

- A peer-reviewed article based on the systematic literature review on SD in (maritime) higher education that informed the determination of the survey questions.
- A peer-reviewed article based on further analyses of the data from this research.
- A guide to increased implementation of SD in IAMU member universities

[8] The crux of the mixed-methods approach relates to the divergence, convergence or complementarity of the two different approaches (qualitative and quantitative) and not to differences of responses in one (in this case, quantitative) method.

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Appendix Ⅰ

Appendix I – Responding Institutions

Table 32 shows the institutions whose representatives responded to the institutional survey. In total there were 73 responses from 31 IAMU member-universities.

Table 32: Institutional survey – Responding institutions

	Institution	Country	IAMU Region
1	Academy of Maritime Education and Training (AMET) University	India	Asia, Pacific & Oceania
2	Admiral Makarov State University of Maritime and Inland Shipping (AMSU-MIS)	Russia	Europe and Africa
3	Arab Academy for Science and Technology and Maritime Transport (AASTMT)	Egypt	Europe and Africa
4	Australian Maritime College (a specialist institute of the University of Tasmania [UTAS])	Australia	Asia, Pacific & Oceania
5	Baltic Fishing Fleet State Academy of the Kaliningrad State Technical University	Russia	Europe and Africa
6	Barcelona School of Nautical Studies - UPC	Spain	Europe and Africa
7	Batumi State Maritime Academy	Georgia	Europe and Africa
8	Dalian Maritime University	China	Asia, Pacific & Oceania
9	Estonian Maritime Academy, Tallinn University of Technology	Estonia	Europe and Africa
10	King Abdul Aziz University (Faculty of Maritime Studies)	Saudi Arabia	Europe and Africa
11	Ho Chi Minh City University of Transport	Vietnam	Asia, Pacific & Oceania
12	Hochschule Wismar, University of Applied Sciences Technology, Business and Design	Germany	Europe and Africa
13	Indian Maritime University	India	Asia, Pacific & Oceania
14	John B. Lacson Colleges Foundation (Bacolod), Inc	Philippines	Asia, Pacific & Oceania
15	Kobe University	Japan	Asia, Pacific & Oceania
16	Liverpool John Moores University	UK	Europe and Africa

	Institution	Country	IAMU Region
17	Maritime Academy of Asia and the Pacific	Philippines	Asia, Pacific & Oceania
18	Massachusetts Maritime Academy	US	Americas
19	Fisheries and Marine Institute of Memorial University of Newfoundland	Canada	Americas
20	Myanmar Maritime University	Myanmar	Asia, Pacific & Oceania
21	National University "Odessa Maritime Academy"	Ukraine	Europe and Africa
22	Maritime Institute Willem Barentsz NHL Stenden University of Applied Sciences	Netherlands	Europe and Africa
23	Satakunta University of Applied Sciences	Finland	Europe and Africa
24	Svendborg International Maritime Academy	Denmark	Europe and Africa
25	Tokyo University of Marine Science and Technology	Japan	Asia, Pacific & Oceania
26	Universidad Tecnologica del Peru	Peru	Americas
27	University of Rijeka, Faculty of Maritime Studies	Croatia	Europe and Africa
28	University of Split Faculty of Maritime Studies	Croatia	Europe and Africa
29	Vietnam Maritime University	Vietnam	Asia, Pacific & Oceania
30	Volga State University of Water Transport	Russia	Europe and Africa
31	World Maritime University	UN (Sweden)	Special member

Table 33 shows the institutions whose students responded to the student survey, 29 institutions from 17 countries.

Table 33: Student survey – Responding institutions

	Student's Institution	Country	IAMU Region
1	Academy of Maritime Education and Training (AMET) University	India	Asia, Pacific & Oceania
2	Admiral Makarov State University of Maritime and Inland Shipping	Russia	Europe and Africa
3	Arab Academy for Science and Technology and Maritime Transport (AASTMT)	Egypt	Europe and Africa
4	Australian Maritime College (a specialist institute of the University of Tasmania [UTAS])	Australia	Asia, Pacific & Oceania
5	Baltic Fishing Fleet State Academy of the Kaliningrad State Technical University	Russia	Europe and Africa
6	Barcelona School of Nautical Studies - UPC	Spain	Europe and Africa
7	Blackpool and the Fylde College	UK	Not an IAMU member
8	Dalian Maritime University	China	Asia, Pacific & Oceania
9	Gdynia Maritime University	Poland	Europe and Africa
10	Ho Chi Minh City University of Transport	Vietnam	Asia, Pacific & Oceania
11	John B. Lacson Colleges Foundation (Bacolod), Inc	Philippines	Asia, Pacific & Oceania
12	Kobe University	Japan	Asia, Pacific & Oceania
13	Maritime Academy of Asia and the Pacific	Philippines	Asia, Pacific & Oceania
14	Maritime State University named after Adm. G. I. Nevelskoy	Russia	Europe and Africa
21	Myanmar Maritime University	Myanmar	Asia, Pacific & Oceania
22	National University "Odessa Maritime Academy"	Ukraine	Europe and Africa
23	Technological Institute of the Philippines	Philippines	Not an IAMU member
24	Tokyo University of Marine Science and Technology	Japan	Asia, Pacific & Oceania
25	Universidad Tecnologica del Peru	Peru	Americas
26	University of Split Faculty of Maritime Studies	Croatia	Europe and Africa
27	West Negros University	Philippines	Not an IAMU member
28	Western Norway University of Applied Sciences	Norway	Europe and Africa
29	World Maritime University	UN (Sweden)	Special member

Table 34 shows the institutions whose representative granted interviews, 14 in all from 13 countries.

Table 34: Interviews – Responding institutions

	Institution	Country	IAMU Region
1	Academy of Maritime Education and Training (AMET) University	India	Asia, Pacific & Oceania
2	Baltic Fishing Fleet State Academy of the Kaliningrad State Technical University	Russia	Europe and Africa
3	Barcelona School of Nautical Studies - UPC	Spain	Europe and Africa
4	Chalmers University of Technology	Sweden	Europe and Africa
5	Constanta Maritime University	Romania	Europe and Africa
6	Maritime Academy of Asia and the Pacific	Philippines	Asia, Pacific & Oceania
7	Myanmar Maritime University	Myanmar	Asia, Pacific & Oceania
8	National University "Odessa Maritime Academy"	Ukraine	Europe and Africa
9	Shanghai Maritime University	China	Asia, Pacific & Oceania
10	Tokyo University of Marine Science and Technology	Japan	Asia, Pacific & Oceania
11	University of Rijeka, Faculty of Maritime Studies	Croatia	Europe and Africa
12	University of Southeast Norway	Norway	Europe and Africa
13	University of Split Faculty of Maritime Studies	Croatia	Europe and Africa
14	Vietnam Maritime University	Vietnam	Asia, Pacific & Oceania

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