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Leadership capabilities for a maritime university in the 21st century

Martin **Crees-Morris**[*] Natalia **Nikolova**[*#]
Marcus **Bowles**[+] Kiril **Tenekedjiev**[*#]

* Australian Maritime College, University of Tasmania, Launceston, 7250 TAS, Australia
\# Nikola Vaptsarov Naval Academy, Varna, 9027, Bulgaria
\+ Tasmanian Institute of Learning and Teaching, University of Tasmania, Launceston, 7250 TAS, Australia

Abstract: Faced with a rapid evolution in technology, maritime universities are under increasing pressure to recognize, anticipate and respond to the complex needs of the maritime industry. This depends on organizational leadership and the capabilities of its leaders. Our study proposes a set of 16 capabilities for the leadership in maritime universities, allocated to four groups: Self-Mastery; Interpersonal Mastery; Process Mastery; Systems Mastery. We present results from an online survey to explore these leadership capabilities, seeking to test the relevance of the proposed leadership capabilities using Bootstrap statistical analysis. It also defines and confirms the gap between the required level, at which a capability should operate, and the actual level experienced and practiced within the organization. Our study also examines the findings for both academic and professional staff to discern any statistically significant variances in the responses of the two groups, which could be seen as being culturally distinct. These results are compared to a control sample from a non-maritime university to identify if there were capabilities unique to a maritime university. As future research, we can validate these leadership capabilities across all maritime universities and then, on a more critical basis, compare these capabilities to those considered most important by the maritime industry.

Objectives:

- ✓ Explore capabilities of university leadership and their impact, focusing on MET institutions
- ✓ Adopt a modified version of the L4L framework with sixteen leadership capabilities and explore the extent to which those factors are acknowledged and measured
- ✓ Conduct an online survey across academic and professional staff at two universities in Australia and South Africa
- ✓ Use quantitative and simulation-based approaches to analyze the survey data
- ✓ Explore how well developed the capabilities are in practice to explore a gap between importance and development, and whether findings can be validated in terms of importance
- ✓ Lay foundations for development of university leadership model (focused on MET HEIs) to be further refined through larger survey, more participants and comparison with industry

Methodology:

- ✓ Data comprised of two parts:
  - ✓ a) Demographics (gender, country of residence, and type of position in the organization) each with two sublevels (male/female; SA/AU; academic/professional);
  - ✓ b) Likert responses on five-level scale of the 16 capabilities (“Completely Disagree”, “Disagree”, “Mildly Agree”, “Agree”, “Strongly Agree” coded as 0, 1, 2, 3, 4)
- ✓ A total of 66 academic/professional respondents from University KwaZulu Natal, South Africa (UKZN) and Australian Maritime College, AMC-UTAS (Australia)
- ✓ Survey conducted in QuestionPro in 2016, under ethics approval H15432 (UTAS)
- ✓ Information on importance/development of capabilities
- ✓ Answers of each respondent can be presented as a random variate of the discrete random variable X with T=5 discretes d_1=0<d_2=1<d_3=2<d_4=3<d_5=4
- ✓ We used techniques from prior works to compare two samples of a discrete parameter using Bootstrap simulations based on Pearson test statistic pn_{re} calculated from a contingency table

Experimentation:

- ✓ Analyze results about the level of development of *capability 11: Instils focus on priority actions & educational outcomes* from the leadership survey. Statistical results from simulations with N=10000 pseudo-realities
- ✓ We defined 5 populations:

Q_1– all male staff from SA&AU;
Q_2– all female staff from SA&AU;
Q_3– all academic staff from SA&AU;
Q_4– all professional staff from SA&AU;
Q_5– all staff members from SA;
Q_6– all staff members from AU.

Table 1. Framework of leadership capabilities adopted in the analysis

Self Mastery	Interpersonal Mastery
1. Develops self.	5. Connects with stakeholders & builds collaborative relationships.
2. Communicates with clarity.	6. Leads and empowers others.
3. Acts in a professional and ethical manner.	7. Displays emotional judgment.
4. Displays personal resilience.	8. Embraces individual and cultural differences.
Process Mastery	**Systems Mastery**
9. Builds positive conditions for learning.	13. Develops a shared moral purpose and vision.
10. Plans/coordinates quality curriculum, learning & teaching.	14. Fosters a learning culture.
11. Instils focus on priority actions & educational outcomes.	15. Thinks and acts strategically.
12. Leads change.	16. Fosters innovation and creativity.

Discussion:

- ✓ responses from males were very dominant in number compared to responses from females (which might be attributed to gender balances in participating universities);
- ✓ more academic and professional staff responded to the survey (which might be due to the difference between academic and professional roles and the level of understanding and interest in institutional leadership);
- ✓ responses from AU were substantially more than from SA, which might distort some conclusions based on country

Table 2. Statistical results by group of leadership mastery across gender, position and country (significant p-values are bolded)

	Gender				Position				Country			
Mastery	$\chi^{(1)}$ n_1	$\chi^{(2)}$ n_2	pn_{re}	p-value	$\chi^{(3)}$ n_1	$\chi^{(4)}$ n_2	pn_{re}	p-value	$\chi^{(5)}$ n_1	$\chi^{(6)}$ n_2	pn_{re}	p-value
Importance												
Self	187	75	2.255	0.2908	181	79	3.778	0.1808	35	225	6.609	0.0859
Interpersonal	184	76	5.891	0.0648	180	80	5.266	0.0852	36	224	2.094	0.3214
Process	186	74	5.055	0.1546	182	78	4.295	0.2238	36	224	1.819	0.5941
Systems	184	76	6.493	0.0990	181	79	9.579	**0.0246**	35	225	4.911	0.1816
Development												
Self	184	75	3.452	0.4898	180	79	4.171	0.3815	36	223	7.678	0.1004
Interpersonal	183	76	2.917	0.5820	180	79	7.664	0.1053	36	223	9.740	**0.0476**
Process	182	74	8.229	0.0745	178	78	6.864	0.1366	36	220	4.246	0.3586
Systems	181	71	6.763	0.1275	178	74	5.908	0.1783	35	217	4.041	0.3403

Table 3. Statistical results for importance of leadership capabilities (numbering based on Table 1) across gender, position and country (significant p-values are bolded)

	Gender				Position				Country			
Capability	$\chi^{(1)}$ n_1	$\chi^{(2)}$ n_2	pn_{re}	p-value	$\chi^{(3)}$ n_1	$\chi^{(4)}$ n_2	pn_{re}	p-value	$\chi^{(5)}$ n_1	$\chi^{(6)}$ n_2	pn_{re}	p-value
1	47	19	1.721	0.2167	46	20	0.0567	0.8319	9	57	0.6723	0.4668
2	47	19	0.4105	0.5962	46	20	0.4415	0.5162	9	57	0.1603	0.6361
3	45	19	0.8717	0.3775	44	20	0.9384	0.3810	8	56	2.654	0.1173
4	46	18	0.04224	0.8728	45	19	1.329	0.2840	9	55	0.9672	0.2419
5	46	19	0.8523	0.3998	45	20	0.3582	0.7163	9	56	0.3316	0.6101
6	46	19	0.4195	0.5977	45	20	0.4514	0.5188	9	56	0.1632	0.6266
7	46	19	0.02559	0.9482	45	20	1.398	0.2847	9	56	0.5055	0.5254
8	46	19	0.6656	0.5135	45	20	4.529	0.0556	9	56	1.062	0.3381
9	46	18	0.4887	0.5174	44	20	0.9384	0.3839	9	55	0.3378	0.6213
10	47	18	1.205	0.2976	46	19	1.299	0.2915	9	56	0.5055	0.5250
11	46	19	0.2231	0.7259	46	19	0.2231	0.7330	9	56	0.8705	0.4145
12	47	19	1.732	0.4230	46	20	0.06748	0.9167	9	57	1.584	0.3327
13	44	19	4.072	0.1085	44	19	2.173	0.3448	9	54	1.527	0.4130
14	47	19	0.4477	0.5838	46	20	4.06	0.0733	9	57	0.8542	0.3937
15	46	19	1.768	0.4166	45	20	3.595	0.1353	8	57	1.101	0.5081
16	47	19	0.4527	0.5285	46	20	4.744	**0.0354**	9	57	0.3257	0.6091

Table 4. Statistical results for level of development of leadership capabilities (numbering based on Table 1) across gender, position and country (significant p-values are bolded)

	Gender				Position				Country			
Capability	$\chi^{(1)}$ n_1	$\chi^{(2)}$ n_2	pn_{re}	p-value	$\chi^{(3)}$ n_1	$\chi^{(4)}$ n_2	pn_{re}	p-value	$\chi^{(5)}$ n_1	$\chi^{(6)}$ n_2	pn_{re}	p-value
1	47	19	1.759	0.6831	46	20	1.356	0.7338	9	57	5.146	0.2184
2	45	19	4.703	0.1847	45	19	2.786	0.4189	9	55	0.8723	0.8177
3	47	18	6.437	0.1384	45	20	3.611	0.4133	9	56	5.066	0.2300
4	46	19	2.436	0.4272	44	20	5.116	0.1644	9	55	7.499	0.0838
5	45	19	3.18	0.3873	45	19	0.5418	0.9159	9	55	4.106	0.2442
6	47	19	3.125	0.3954	46	20	0.7863	0.8693	9	57	1.913	0.6098
7	44	19	1.558	0.6877	43	20	1.415	0.7165	9	54	7.101	0.0681
8	47	19	3.622	0.4087	46	20	9.369	**0.0367**	9	57	2.965	0.4542
9	46	18	1.57	0.4699	44	20	2.931	0.3394	9	55	10.51	**0.0249**
10	46	19	2.23	0.5455	45	20	3.067	0.3899	9	56	5.049	0.1601
11	44	19	6.736	0.0876	44	19	8.051	**0.0452**	9	54	4.476	0.2156
12	46	18	9.869	**0.0311**	45	19	6.226	0.1550	9	55	2.499	0.5568
13	42	17	4.536	0.2156	42	17	3.795	0.2900	9	50	0.8789	0.8665
14	47	19	3.088	0.4783	46	20	2.735	0.5383	9	57	2.566	0.5151
15	45	16	3.705	0.3049	44	17	0.4003	0.9473	8	53	4.834	0.1771
16	47	19	1.152	0.7822	46	20	3.069	0.3988	9	57	2.83	0.4264

Conclusions:

- ✓ In the analysis over groups of mastery, we identified statistically significant responses based on importance of systems mastery depending on position and a borderline significance of country on the level of development of the interpersonal mastery
- ✓ In the analysis of the individual capabilities, we identified statistical significance depending on position for capability 8 (and borderline for capability 11), depending on country for capability 9, and depending on gender for capability 12.
- ✓ Directions for future research:
  - ✓ Expand our data sample with more participants from the original institutions
  - ✓ Use results to develop evidence-based leadership training programs for universities
  - ✓ Repeat the survey over more universities (incl. MET institutions) from other countries to explore the development of leadership across various education systems