

## **To ENHANCE ENROLLMENT OF FEMALE CADETS AT MARITIME INSTITUTIONS AND TO INCREASE WOMEN SEAFARERS IN THE SHIPPING INDUSTRY**

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**Abstract** It has been widely agreed that it is time to enhance opportunities for women to be educated and gain experiences in the maritime sector. Taking Massachusetts Maritime Academy as a case-study, and applying school wide questionnaires and data collected over the course of about 40 years, this paper presents an analysis of what maritime institutions can do to advance opportunities for women to survive and thrive in the maritime field, and empower female cadets with the necessary skill sets to embrace a new era of technologically facilitated maritime industry. The findings suggest that post-graduation job market success of the senior female cadets will have the most important impact on future female enrollment and its projected growth rate at MMA.

### **1 INTRODUCTION**

Shipping has a long-standing tradition of being a male dominated industry. However, it is widely agreed that now is the time to advance women's role in maritime activities and increase opportunities for women to be educated and gain experience in the maritime sector. This expansion of the available work force is particularly crucial in recent years due to the emergence and potential application of new technology, such as autonomous ships, unmanned cargo ships, etc. To achieve this goal, we must aim to fundamentally change the culture surrounding the maritime field, reduce the prejudices women encounter on a daily basis, and target the inherent social bias against women entering the industry.

Changes are quite noticeable across the maritime industry. There are increasingly more female role models for young women to look up to, including captains Tshepo Motloutsi of South Africa, Kate McCue, the first American female to captain a mega-cruise ship last year, and successful female entrepreneurs like Karin Orsel, MF Shipping Group CEO and president of WISTA International. The enrollment of female cadets in maritime institutions all over the world has been steadily increasing over the years. For instance, the Massachusetts Maritime Academy (MMA) of the USA started to recruit female cadets in 1980. In 2017, MMA had reached a record of 13.9% of female cadets enrolled in the undergraduate programs. At Dalian Maritime University of China, all seagoing majors, including navigation, started to accept

female cadets in 2015. Maritime companies have been hiring an ever-increasing number of female graduates for diversification of their workforce and the skill sets of their employees. A prime example is Bio-Gene Technology in 2017. A pharmaceutical company, Bio-Gene was initially interested in hiring one female cadet within the Marine Engineering major from MMA, but ended up hiring both female cadets recommended by the academy.

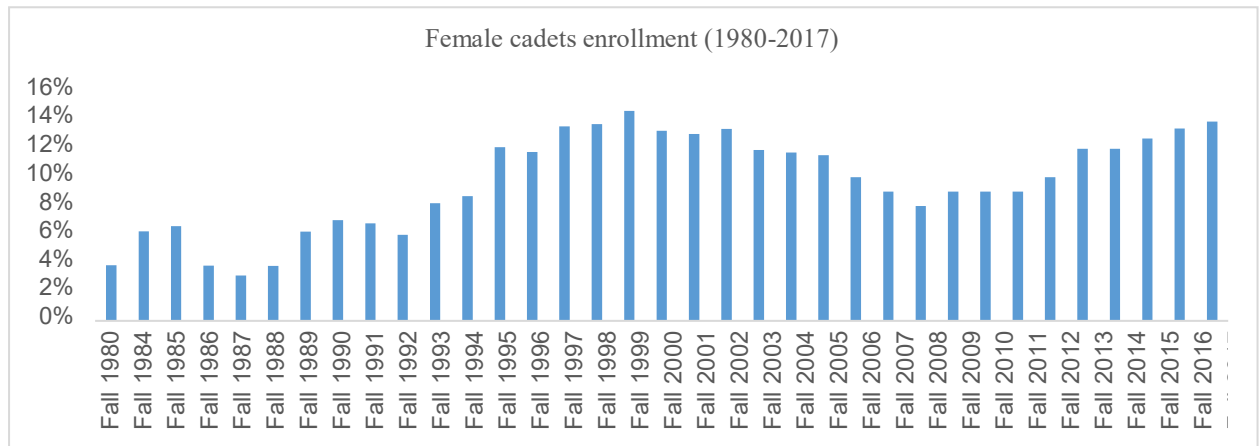
This paper presents an analysis of what maritime institutions can do to advance the opportunities for women to survive and thrive in the maritime field, and empower female cadets with skill sets to embrace the new era of technologically facilitated maritime industry. Taking MMA as a case-study, applying school wide questionnaires, and data collected over the course of about 40 years, the paper examines the exact measures a maritime institute could use to increase the enrollment of female cadets, to give female cadets the exact skills and trainings which would help them face the challenges and climb the shipping sector ladder, to prepare them culturally and socially to blend in well with their male peers in the work-place.

The paper is structured as the following: Section II describes and analyses the upward trend of female enrollment over the course of nearly forty years. Section III presents the changes brought about as a result of a more diversified campus. Section IV considers how job opportunities become the most important factor when attracting female cadets enrolled at the academy. Section IV offers a conclusion.

## 2 TO ENHANCE ENROLLMENT OF FEMALE CADETS

Though MMA is male-dominated institute, we could observe that in the past thirty-eight years, the enrollment of female cadets at MMA has been rising from 4% in the fall of 1980 to 14% in 2017.

Figure 1: The enrollment of female cadets from 1980 to 2017



Data source: Key Data Elements & Indicators Report 2017-2018, MMA Office of Institutional Effectiveness

The graph shows the upward trend of female enrollment at MMA from 1980 to 2017, with the greatest percentage growth happened in the 1990s. Since the year 2008, we can observe a steady increase in female enrollment. Notably within the last three years, the figure indicates

the constant rising of female enrollment of 12.7% in 2015, 13.4% in 2016 and 13.9% in 2017.

The two most important reasons that explain the upward trend of female enrollment at MMA, particularly the twin peaks of late 1990' and past three years, should be the expansion of non-licensed majors for maritime education and constantly school-wide efforts to build a more diversified campus with regards to culture, gender and race.

## 2.1 Expansion of academic majors

The establishment of non-seagoing, majors, such as Marine Safety & Environment Protection (MSEP), should be given due credit for their role in the rising female enrollment.

Since the founding of MMA in 1891, the academy has been focusing on the licensed majors, such as Marine Transportation (MT) and Marine Engineering (ME). To tackle the problem of slow-down of business growth rate in USA in the late 1980' and early 1990', the academy developed the first non-licensed major of Facilities Engineering (FE) and began enrolling cadets in 1989. And starting from 1991, the academy began to enroll more non-seagoing majors such as Marine Safety & Environment Protection (MSEP) in 1991, International Maritime Business (IMB) in 2000, Emergency Management (EM) in 2005, and Energy Systems Engineering (ESE) in 2012.

The data in Table 1 indicates that the non-sea-going majors such MSEP, EM and IMB, have recruited the highest percentage of female cadets against the total number of cadets. Though only the data of 2017 was presented here, it is a good indication for the distribution of female cadets by majors at MMA.

Table 1. Enrollment by Primary Academic Program and Gender: Fall 2017

Program & the year started	Male cadets	Female cadets	% Female
Marine Transportation (1948)	260	33	11%
Marine Engineering (1948)	376	32	8%
Facilities Engineering (1989)	226	12	5%
Marine Safety & Environment Protection (1991)	110	56	34%
International Maritime Business (2000)	202	23	10%
Emergency Management (2005)	195	28	13%
Energy System Engineering (2012)	66	8	11%

Source: Data from Academic Dean's Office

The female cadets see the non-sea-going majors as wonderful opportunities for them to balance the call for open ocean and traditional feminist role, as they could work at the maritime sector ashore. One MSEP female cadet explained, "to work at a shipyard as a manager, it is a dream come true, I could be in the maritime area and at the same time have a good family life".

On the other hand, the constant emergence of automation and digitalization also offers new kinds of operational jobs which are, on many occasions, shore-based. Just as KD Adamson, CEO of Futureautics Group, pointed out, "The digital transformation of shipping will see it become part of larger intelligent mobility ecosystems, and that will create a variety of highly-skilled roles which have nothing to do with the sea. That's a big opportunity for women to join maritime and that opens the industry up for qualified women".

## 2.2. Role model effect

MMA is the only fully regimented maritime academy in US, unlike other maritime institutions that only apply the regimented lifestyle to licensed majors. Therefore, it might impose some concerns, or even misperceptions on female applicants for the academy, since they must go through the same rigorous military rules and training as their male peers, as well as the heavy academic requirement. By so-doing, female cadets risk giving up some of their femininity. One colleague recalled her experience as a cadet here in 1980s, “We have to wear uniforms, and we couldn’t wear the beautiful dresses and gowns, we couldn’t style our hair the way we choose. We did not feel appealing, especially in comparison to the girlfriends of male cadets.” However, when potential female applicants have family members, for example, a father or older brother who came to MMA before, it greatly helps in clearing up misperceptions about the academy and its regimental lifestyle. It is very evident in the June 2018 survey that a great majority of female cadets enrolled in MMA came to know the school through trusted sources including family members, relatives, teachers, and friends. This suggests that female students regard MMA much more enthusiastically as a viable prospect if they are educated about what to expect by a knowledgeable source.

Once female cadets did enroll, they tended to work even harder than their male counterparts. The previous department chair said, having observed over his 30 years teaching at MMA, “Female cadets tend to be more persistent, hardworking and motivated. Under male-dominated areas like maritime, they would push harder to succeed, and show their male counterparts that they can be productive and successful. Male cadets are less attentive. I would rather teach an all-female class.”

The survey I conducted in June 2018 has the sample size of 61 current cadets majoring in all programs except Business at MMA. Seven of them are female cadets and represent 13% of the sample, comparable to the overall female percentage of the student population at the academy. The answers to the question, “Sources from which you came to know MMA?” are summed up in the following table.

Table 2: Sources cadets know about MMA – survey conducted in June 2018

Survey	Family	friend	Teacher/ counselor	MMA Cadets	Sport camp	Campus visit	MMA website	MMA in news	others
Total	54%	59%	8%	21%	3%	30%	15%	5%	8%
Female	29%	57%	0%	43%	0%	14%	0%	0%	0%

Given the facts, the surveyed students could choose multiple options, thus we can only offer approximate conclusions of the determining sources. The data shows that the great majority of cadets, both male and female, got to know the academy through their trusted sources: family members, friends, and MMA cadets. This is particularly true for female cadets. Regimental life and maritime profession seems relatively mysterious and daunting for many female high school students. However, if they had access to firsthand information about the academy through their family and friends who had been to the institute, and understood the big picture advantage of going through the education and training, female cadets might very well feel that draw between the academy and other pursuit of a college education and career path. The survey

results coincide with the questionnaires conducted by Professor Maleki and Professor Stephens of Engineering Department for their report “A Study on the Gender Gap in Engineering in 2017”. According to their two surveys, with sample size of 115 and 36 female cadets respectively, the responses to the question, “How did you come to know of MMA?”, more than 90% of female cadets in their first survey and more than 70% in the second chose to enroll in MMA through the recommendation of someone they knew and trusted.

### 3 TO BUILD A MORE DIVERSIFIED STUDENT BODY

#### 3.1 To set up international programs

For ten years, MMA has been facilitating a student exchange program with Shanghai Maritime University (SMU) of China and expanded this program to Dalian Maritime University (DMU) in 2013. The exchange students need to survive the culture shock, overcome language barriers, and adapt successfully to a new challenging environment. Presently the exchange program has become increasingly popular at MMA. The participating students, who have been “gold gilded” in China, tend to stand out in the job market upon graduation, especially in comparison to their peers who have not participated in the international program.

Table 3. Participation number of MMA cadets in the MMA-SMU/DMU exchange program 2010-2018<sup>1</sup>

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Female cadets	1	2	2	6	7	3	3	2	5
Total	11	16	17	27	23	25	22	17	16
% of females	9%	12.5%	11.8%	22.2%	30.4%	12%	13.6%	12%	31.2%

<sup>1</sup> Starting from the Spring term of 2013, MMA began to send five cadets over to Dalian Maritime University (DMU) of China and receive the equal amount of DMU cadets each year.

Data sources: MMA Office of Multinational Affairs

Table 3 shows clearly that female cadets composited a large fraction of students participating in the international exchange program. Looking at the available data, it is obvious that the female exchange students are given an edge over their peers. In regards to international experience that can easily be applied to future jobs, cadets who choose to take this opportunity find themselves much better candidates within a rapidly expanding job market. When combined with the females’ outstanding qualities, such as statistically higher grades, language proficiency, cultural adaptability, flexibility, genuine curiosity and persistence, it becomes an invaluable tool to help them stand out within the male-dominated field and gain, what Schneider and Barsoux (1997) refer to, the capacity to operate “across national borders somewhat like James Bond”.

Table 4. Participation number of SMU/DMU cadets in the MMA-SMU/DMU exchange program 2009-2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Female cadets	3	3	5	2	8	10	13	10	14	16
Total	10	10	15	20	23	21	22	23	23	22
% of females	30%	30%	33%	10%	35%	48%	59%	43.5%	60.8%	72.7%

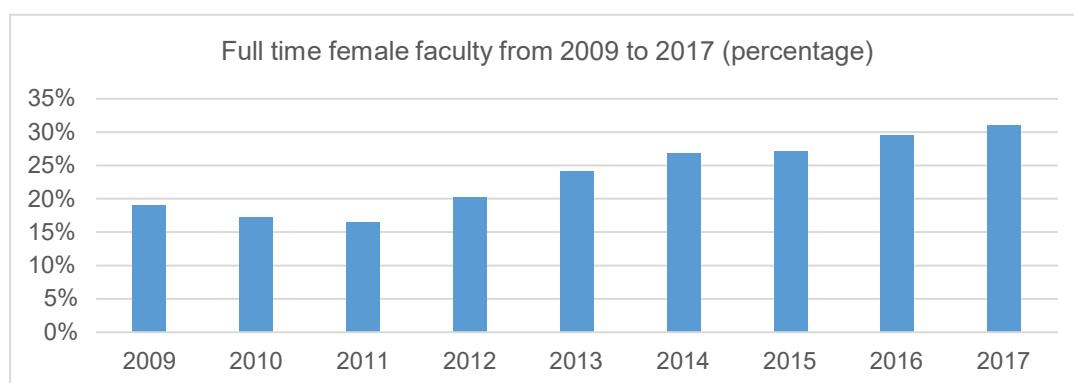
Data source: Office of Multicultural Affairs at MMA

Table 4 shows that visiting cadets from SMU/DMU of China consistently compose a large proportion of females at MMA. This certainly helps the diversification and cultural blend at MMA campus. In addition, Chinese cadets, both male and female, are diligent and focused students, just as one MMA professor of Marine Engineering said: “It is a pleasure to have the Chinese students in my class. They work so hard and get the best grades.”

### 3.2 Woman faculty and foreign-born/minority professors at MMA

Another very noticeable change is the increase in female faculties, female master mariners and foreign-born professors at the academy over the last 10 years.

Figure 2. Female faculty members at the MMA (2009-2017)



Sources: MMA Common Data Set 2017-2018

At the beginning of the fall term of 2009, MMA had 13 full time female professors, accounting for 19% of the total faculty at the academy. In 2017, the institute hired 27 out of 87 full time female faculty, reaching a historical high of 31%.

Figure 3. Percentage of full time minority faculty members at MMA 2010-2017

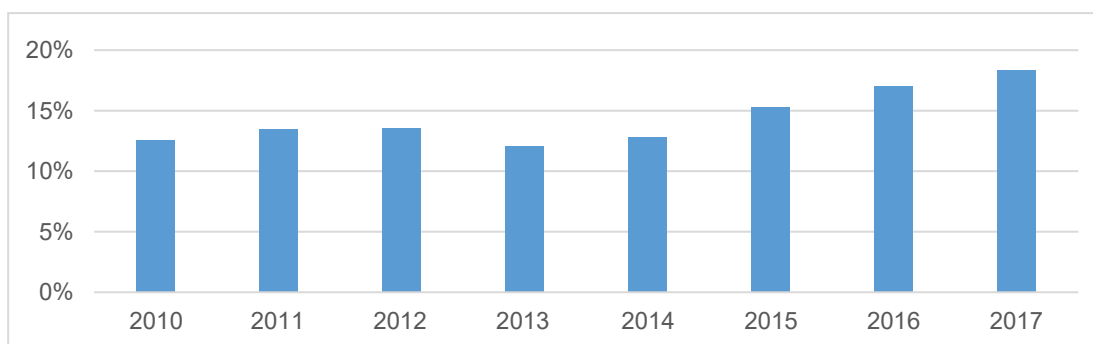


Figure 4 shows that the minority faculty members at MMA has been increasing slowly yet steadily over the past eight years. In 2010, minority faculty at MMA counted for 12.5% of total faculty. In the fall of 2017, minority professors at the academy held 18. A more race and gender diversified campus, and culturally aware maritime institution certainly helps enrollment and retention of female cadets.

#### 4 JOB MARKET SUCCESS FOR FEMALE CADETS

Job market success for graduating cadets and their comparable salaries is sensational news that circulates the academy each year. Widespread news reports and articles in the media make the job market success of our cadets a well-known fact. The article by Jim Probasco in 2017 indicates that MMA is one of the top “27 colleges with the highest-earning graduates” in the USA, next to Harvard, MIT, Stanford, and many other prestigious institutions. According to the report, the 10-year median salary for MMA is \$69,000 in comparison to Harvard’s \$95,000. If we also take into consideration of the cost of a college education, it is no surprise that MMA was ranked #14 of Best Value Colleges nationally, #9 Best Value Public Colleges, and #2 Best Value Colleges in Massachusetts. Rankings data reflect the 20-year net return on investment (ROI) for on campus students at in-state rates with no financial aid. When 20-year net ROI is annualized, MMA is tied at #5 nationally.

In the questionnaires conducted in June 2018, cadets responded to the question, “Why do you come here?” to collect goal-orientated data.

Table 5. Factors that lead cadets decide to enroll at MMA (June 2018)

Survey	Job opportunities	Academic	Regiment	affordable tuition	Close to home	others
Total	95%	15%	25%	43%	44%	16%
Female	86%	14%	29%	29%	29%	14%

The survey results coincide with the responses, collected by Professors Maleki and Stephens, to the question of “Factors motivating Female Cadets to enroll at MMA”, almost 92.2% of female cadets from the first survey and 63% of the students from the second survey reported that future job opportunities was the determinant factor in their enrollment.

Table 6. Facts of 2017 graduates from MMA

Career Outcome Rate ( % placed ) – overall	81%
Career Outcome Rate by Gender (female/male)	81% / 82%
Career Outcome Rate by Race/Ethnicity (student with color/white)	81% / 82%
Annual full time Salary \$ 50K or higher	79%

Data Source: MMA Office of Placement 2018

Table 6 shows that 81% of the graduates got full time jobs on graduation and about 80% of the hired earned entry level salary of 50,000 US dollars or higher. This is quite impressive, especially considering the median household income of \$53,000 in the USA in 2017. In addition, the career outcome rate is 81%, relatively equal between male and female cadets, and among the cadets with different ethnic background. The career outcome rate, or total placement rate, of 81% could be further explained with the following table.

Table 7 Career outcome, or % of cadets get jobs by majors, March 2018

programs	MT	ME	FE	MSEP	MB	ESE	EM	All
Career outcome (% placed )	71%	74%	91%	96%	86%	83%	92%	81%
Number of cadets placed	51	65	35	22	22	12	12	219

We can see from Table 7 that the non-licensed majors like Marine Safety & Environment Protection (MSEP) and Marine Business (MB) which enroll most of the female cadets are doing well with placement rate in recent years. This is especially observable in comparison to that of the two sea-going majors of Marine Transportation (MT) and Marine Engineering (ME). The job market success does in turn encourage greatly the enrollment of female cadets in the days to come.

#### IV CONCLUSION

It becomes especially useful to study thoroughly the experiences of one maritime institution, as MMA has made significant efforts to recruit more female cadets for nearly forty years, from 1980 to 2018. MMA has established a diverse school curriculum, including terms at sea for hands-on experience, internships and classes that empower young women to give them proficient skills to survive and thrive next to their male cohorts, and has given tremendous help to female cadets in securing jobs upon graduation. The successful stories drawn from the study would provide an inspiration and guide for other maritime institutions all over the world, and serve as a valuable reference for maritime companies and maritime authorities looking for valuable diversification in this age of breakneck advancements that favors adaptability.

Though for the past forty years, MMA has made tremendous progress in recruiting female cadets and building a more diversified student body, it is still far from enough. The percentage of female cadets and minority students are still at a tenuous level, and efforts to enroll more female cadets must be emphasized as a long term project with many facets affecting growth.

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