INSTITUTE FOR DEFENSE ANALYSES

Military Workforce Mix

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I N S T I T U T E F O R D E F E N S E A N A L Y S E S

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Executive Summary

In this paper we consider whether and how the military workforce can be used more efficiently. We identify variations in management practices across the Services and develop rough estimates of how much might be saved by adopting some less expensive approaches more broadly. Specifically, we examined four alternative paradigms for increasing the efficiency of the military workforce without sacrificing performance:

- Increasing the experience mix of personnel
- Increasing the amount of time helicopter pilots spend flying
- Decreasing the amount of time officers spend in professional military education (PME)
- Using enlisted personnel or warrant officers (WOs) in some positions now filled by regular line officers (RLOs)

Paradigms

Increasing the Experience Mix of Personnel

We consider the possibility that moving toward a more experienced workforce with more hands-on functional experience would allow a high level of performance to be attained with a smaller, less expensive workforce. There is a fairly extensive literature demonstrating the relationship between experience and performance among military personnel. RAND, the Center for Naval Analyses (CNA), the Congressional Budget Office (CBO), and the Institute for Defense Analyses have all estimated potential productivity gains associated with a more senior workforce. A 2002 study by CNA[1] provides perhaps the most compelling evidence of the potential offered by this kind of staffing. It relies on a shift in the staffing model used on Navy resupply ships.

The Military Sealift Command (MSC) uses civilian mariners to staff fleet support ships that used to be operated by Navy crews. From our perspective, the most important feature of MSC staffing is not that it uses civilians, but that it uses more experienced and better-trained people. Comparing MSC staffing of oilers with Navy staffing of the same

[1] Carol S. Moore et al., "Inside the Black Box: Assessing the Navy's Manpower Requirements Process," CRM D0005206.A2 (Alexandria, VA: CNA, March 2002), https://www.cna.org/CNA_files/PDF/D0005206.A2.pdf.

ships shows that MSC crews are 61 percent smaller. MSC can do this because its crews are more experienced than typical Navy personnel. The average MSC mariner is 46 years old, compared to 28 for a Navy crewmember. MSC mariners have considerably more experience than their naval counterparts, and more of the MSC experience is aboard ship. In addition, MSC managers must have extensive hands-on expertise to qualify for their positions, while Navy officers have little specific experience and training when they first go to sea. The MSC staffing model reduces crew costs by 60 percent because of reduced crew size.

This line of research suggests that this staffing model could be adapted for use by other kinds of units, either by using civilian personnel, as MSC does, or by using a smaller but more experienced and functionally trained military workforce.

Alternative Career Paradigms

We examine two ways in which changing how military careers are managed might increase operational capability.

First, we consider efficiencies the other Services might gain by emulating aspects of the Army's management of helicopter pilots. All four Services have helicopters and communities of helicopter pilots. In the Army, slightly more than half of the pilots are WOs, with the rest being RLOs. The other Services all rely entirely on RLOs.

We show three ways in which WO pilots contribute to a more efficient workforce. First, compared to RLO pilots, WO pilots spend a larger fraction of their career flying because they have fewer secondary obligations such as staff billets and educational activities. Second, WO pilots tend to have longer careers, so there is a greater return on their initial training costs. Finally, billet-for-billet, WOs cost less than comparable RLOs. Because of this, we estimate that the average training cost associated with filling a flying billet for a year is over $50,000 more in the Air Force and Navy compared to Army WOs. It is over $80,000 more for Marine Corps pilots. Also, Army helicopter pilot training is less expensive than that in the other Services because the Army does not require its helicopter pilots to also be trained to fly fixed-wing aircraft.

We estimate that if the other Services adopted the policy of staffing over half their helicopter pilot communities with individuals who followed the career patterns of Army WOs, pilot training costs could be reduced by 30 percent, about $100 million per year. We estimate that 1170 fewer pilots would be needed to fill flying billets, yielding an additional $170 million in annual savings. Alternatively, the policy change could alleviate pilot shortages or provide additional officers to meet other requirements.

We also take a brief look at differences in the amount and timing of PME that the Services provide. Defense Manpower Data Center data indicate that Marine Corps officers

get roughly 40 percent less PME than Army and Air Force officers. (We did not have enough information to compare Navy provision of PME to the other Services.)

Using Enlisted Personnel in Some Positions Now Filled by Officers

We look at the quality of enlisted personnel. It is quite high and has increased substantially during the All-Volunteer Force era. In 2015, almost half of both new accessions and the entire enlisted inventory were in the top 35 percent of the national distribution of knowledge and skills as measured by Armed Forces Qualification Test (AFQT) scores. In 1973, only a third of new recruits scored that well.[2]

The education level of the enlisted force increased substantially. In 1980, only 6 percent had at least some college experience. That rose to 17 percent in 2015. Looking at personnel in paygrades E-7 to E-9 (the senior enlisted force) in 2015, 46 percent had at least some college experience, compared to 33 percent in 2001. Twenty-two percent had college diplomas, compared to 12 percent in 2001. In the Air Force, 2015 fractions were especially high—over 85 percent with at least some college and almost 40 percent with diplomas.

We compare the mixes of military personnel the Services use in three functional areas: supply, human resources (HR), and intelligence. Because the Air Force has enlisted personnel with both the highest AFQT scores and the most education, one might expect it to use the smallest percentage of officers. This is the case in supply. However, the Navy has the smallest percentage of officers in HR, and the Marine Corps in intelligence. If all the other Services substituted enlisted personnel (and WOs/Limited Duty Officers (LDOs) where they are used) for officers to the same extent as the least officer-intensive Service, substantial savings may be possible.

Recommendations

Based on these results, we make the following recommendations for improving the efficiency of DoD's military workforce:

- The Services should consider increasing the average experience level of the military workforce while reducing its size. Substantial gains in productivity and reductions in cost should be achievable.
- The other Services should consider adopting a career management paradigm like the Army uses for its WO pilots for a portion of their helicopter pilots.
- The Services should consider reducing the extent of PME in the direction of the level provided by the Marine Corps.

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[2] We do not have data on the AFQT distribution of the enlisted inventory in 1973.

- Given the increasing education level of the enlisted force, all Services should assess their current officer/enlisted mix, especially in the areas of intelligence and HR, and identify opportunities for increasing the role of the enlisted workforce.

We recognize that Service requirements may limit adoption of the policies we suggest. Further analysis should address the impact of such requirements. For example, changes in the management paradigm for helicopter pilots or increases in the demand for experienced personnel would change the rank pyramid structure the Services use as management targets. The design of revised pyramid structures and the ability of management tools, including compensation, to meet the new requirements would require considerable analytic support.

The limited analyses presented here explicitly estimate potential savings of $815 million per year. They also promise improved readiness through higher levels of specific skills and experience. Extending this kind of analysis to more career fields could result in multi-billion dollar annual savings.

Contents

1. Introduction 1
2. The Potential of a Smaller, More Experienced Workforce 3
3. Analysis of Alternative Career Paradigms 9
   - A. Helicopter Pilot Management in the Services 9
   - B. Career Longevity 10
   - C. Career Management 11
   - D. Training Costs 13
   - E. Training Cost of Filling Flying Billets 14
     1. Training Cost per Year of Flying 14
     2. Annual Training Costs 15
   - F. Possible Savings from Alternative Career Management Paradigms 16
   - G. Extent and Timing of Professional Military Education 17
4. Trends in the Quality of Enlisted Personnel 21
5. Differences in the Allocation of Personnel in Three Functional Areas 25
6. Findings and Recommendations 33
   - A. Paradigms 33
     1. Increasing the Experience Mix of Personnel 33
     2. Alternative Career Paradigms 34
     3. Using Enlisted Personnel in Some Positions Now Filled by Officers 35
   - B. Recommendations 35

Illustrations A-1
References B-1
Abbreviations C-1

1. Introduction

The purpose of this paper is to consider whether and how the military workforce can be used more efficiently. Three principal hypotheses will be investigated:

- That a workforce made up of more experienced personnel who are better trained to meet the requirements of their positions could, in at least some circumstances, perform at least as well with substantially fewer people and at much lower cost.
- That military careers, particularly those of officers, could be managed in ways that allow the Services to get a greater return on their investments in expensive training. This would also give individuals more experience in doing the jobs for which they were trained, which tends to make them more productive.[1]
- That enlisted personnel and warrant officers (WOs) can successfully perform functions now assigned to regular line officers (RLOs). We examine several cases where the Services use different kinds of personnel to perform similar functions.

The paper proceeds in the following order. Chapter 2 draws on previous research to show that smaller, more experienced workforces can be better and cheaper. Chapter 3 examines possible changes in workforce management practices that affect the proportion of their careers personnel spend in operational positions. First, it presents an assessment of the potential benefits and cost savings from replacing some RLOs with WOs as helicopter pilots or from managing some RLOs' careers more like those of WOs. Then it briefly considers some of the inter-Service differences in the timing and extent of professional military education (PME). Chapter 4 demonstrates that the intelligence and education levels of the enlisted force have risen over time. Chapter 5 shows that the Services allocate positions among enlisted personnel, WOs, and RLOs differently, providing prima facie evidence that substitution of less expensive categories of personnel for more expensive ones is feasible to some extent. We estimate the potential savings of increasing the use of less expensive personnel types. Chapter 4 summarizes the findings of our case studies and presents recommendations.

[1] See, for example, Stanley A. Horowitz and Allan Sherman, "Crew Characteristics and Ship Condition (Maintenance Personnel Effectiveness Study (MPES))," CNS 1090 (Arlington, VA: Center for Naval Analyses, March 1977), http://www.dtic.mil/dtic/tr/fulltext/u2/a050404.pdf.

2. The Potential of a Smaller, More Experienced Workforce

There is a literature showing the value of a more experienced workforce.

One paper looked at the productivity of Navy enlisted personnel in six maintenance occupations.[2] The success of a work center was measured by the fraction of time that work center was free of serious mission-degrading equipment failures. The key explanatory factor was time in the Navy. A similar analysis by the Center for Naval Analyses (now CNA) at the ship—rather than the work center—level reached similar conclusions.[3] In both cases, the research showed that ships with a higher fraction of senior personnel, who were more experienced and presumably more knowledgeable, tended to be significantly more ready than other ships.

Similar work was done, also by CNA, for carrier-based aviation squadrons.[4] Proficiency was measured by the number of sorties generated in a quarter. The analysis examined the relationships between sortie generation and the characteristics of squadron enlisted personnel. The data covered 292 quarters of squadron operation between 1977 and 1980. The principal finding of the study was that squadrons with more senior personnel were significantly more ready. Indeed, the addition of junior personnel tended to reduce readiness, presumably because more junior people required their superiors to spend more time providing on-the-job training and less time making sure tasks were accomplished. The study found that a more experienced enlisted force could generate as many sorties with 12 percent fewer people at a savings of 8 percent.

Other studies focused on aircrew performance, reflecting either expert assessments or objectively measured results. These included kill probabilities in instrumented air-combat maneuvering exercises, bombing accuracy, airdrop accuracy, accident rates, torpedo exercise scores, carrier landing grades, and the overall results of operational readiness evaluations for carrier-based squadrons.[5]

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2 Horowitz and Sherman, "Crew Characteristics and Ship Condition."

3 Aline Quester, Russell Beland, and William Mulligan, "Ship Material Readiness," Professional Paper 467 (Arlington, VA: Center for Naval Analyses, March 1989).

4 A. J. Marcus, "Personnel Substitution and Navy Aviation Readiness," Professional Paper 363 (Arlington, VA: Center for Naval Analyses, October 1982).

5 Colin P. Hammon and Stanley A. Horowitz, "Flying Hours and Aircrew Performance," IDA Paper P-2379 (Alexandria, VA: Institute for Defense Analyses, March 1990); Stanley A. Horowitz, Colin P.

Different analyses studied the experience of different people (or groups of people)—sometimes pilots, navigators and co-pilots for airdrops, and the entire tactical team (including sensor operators) for torpedo exercises. The studies addressed squadron, crew-level, and individual performance in a wide range of circumstances covering Navy, Marine Corps, and Air Force operations. The studies consistently found that both recent and career flying hours were generally significant predictors of performance. Not surprisingly, career experience was more important. It is difficult for additional short-term training to make up for long-term experience.

Another CNA study looked at gains from more senior workforces in eight occupational areas. It found that, under optimal policies, personnel in the first eight years of service would decline by 8 to 22 percent. The new force structure would result in savings of from 2 to 18 percent.[6]

A RAND study documented the higher productivity of more senior enlisted personnel in the Air Force.[7] It found that the most junior personnel take an average of about 2.4 times more personnel hours to perform a fixed amount of sophisticated troubleshooting than people in the most senior manpower category. Thus, a less-experienced workforce must be larger.

A paper by the Congressional Budget Office (CBO) provides the most wide-ranging analysis of possible efficiency gains for increased experience.[8] It applied experience-productivity profiles like those found in the RAND study to all enlisted staffing in all four Services. It estimated a potential reduction in personnel costs of 2.2 percent.

Perhaps the most compelling, least hypothetical, demonstration of the value of a more experienced, highly trained workforce is the Combat Logistics Force (CLF), operated by the Navy's Military Sealift Command (MSC). The CLF has smaller, more experienced, more highly trained crews than similar Navy ships. That paradigm does not require the use

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Hammon, and Paul R. Palmer, "Relating Flying-Hour Activity to the Performance of Aircrews," IDA Paper P-2085 (Alexandria, VA: Institute for Defense Analyses, December 1987); Colin P. Hammon and Stanley A. Horowitz, "The Relationship between Training and Unit Performance for Naval Patrol Aircraft – Revised," IDA Paper P-3139 (Revised) (Alexandria, VA: Institute for Defense Analyses, December 1996); Colin P. Hammon and Stanley A. Horowitz, "Relating Flying Hours to Aircrew Performance: Evidence for Attack and Transport Missions," IDA Paper P-2609 (Alexandria, VA: Institute for Defense Analyses, June 1992); and Lt Col Thomas E. Cedel, USAF, and Lt Col Ronald P. Fuchs, USAF, "An Analysis of Factors Affecting Pilot Proficiency" (Washington, DC: Air Force Center for Studies and Analyses, December 1986).

6 Ellen Balis, "Balancing Accession and Retention: Cost and Productivity Tradeoffs," Professional Paper 380 (Arlington, VA: Center for Naval Analyses, 1983).

7 S. Craig Moore, "Demand and Supply Integration for Air Force Enlisted Work Force Planning: A Briefing," N-1724-AF (Santa Monica, CA: The RAND Corporation, 1981).

8 CBO, "Setting Personnel Strength Levels: Experience and Productivity in the Military" (Washington, DC: CBO, 1987).

of civilians (which is inappropriate for many DoD activities) and could therefore be applied to military workforces. The rest of this chapter provides more detail on the CLF and the quantitative implications of its workforce management paradigm.

The ships of the CLF, staffed by civilian mariners, are the supply lines to US Navy surface combatant ships at sea. They provide fuel, food, ordnance, spare parts, mail, and other critical supplies, enabling the fleet to remain at sea, on station, and combat ready for extended periods of time. The discussion that follows is excerpted from a 2002 study by CNA.[9] A later CNA study provides additional detail on the subject.[10]

CLF began in 1972 as the Naval Fleet Auxiliary Force, after tests demonstrated that civil service crews could maximize effectiveness and cost efficiency in operating the Navy's fleet support ships. Fleet oiler USNS Taluga became the first ship to transfer to MSC, which now operates all Navy supply vessels. Prior to this, all the Navy's logistics ships were manned by Navy crews.

There was considerable resistance to moving this functionality to MSC. It was feared that giving this essential function to civilians and reducing the number of crew members would jeopardize the mission. However, pilot programs were very successful, and now all Navy CLF ships are government-owned and crewed by Civil Service mariners, experienced maritime professionals sailing as Navy civilians under MSC. Table 1 compares the crews on formerly Navy-staffed fast combat support ships (AOEs) with those on MSC-staffed AOEs (termed T-AOEs).

Since MSC ships sometimes have small military departments handling functions appropriate for military personnel,[11] our comparative calculations will omit the top row of Table 1. While the MSC ships have a similar number of officer-equivalents as the Navy ships, they have dramatically fewer enlisted-equivalent personnel. Subtracting out the forty crew members in the top row of the table, the T-AOE has 62 percent fewer people (339/543). The MSC can do this because its personnel are much more experienced than Navy personnel. The average MSC mariner is 46 years old, compared to 28 for a Navy crewmember.[12] Only 27 percent of Navy enlisted personnel remain in the Navy after five

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9 Carol S. Moore et al., "Inside the Black Box: Assessing the Navy's Manpower Requirements Process," CRM D0005206.A2 (Alexandria, VA: CNA, March 2002), https://www.cna.org/CNA_files/PDF /D0005206.A2.pdf. This paper is also the source of Table 1 and much of this discussion.

10 Anthony R. DiTrapani and John D. Keenan, "Applying Civilian Ship Manning Practice to USN Ships," CRM D0011501.A2 (Alexandria, VA: CNA, May 2005), https://www.cna.org/CNA_files/PDF /D0011501.A2.pdf.

11 "People: MSC Personnel," Military Sealift Command, http://www.msc.navy.mil/people/.

12 Moore et al., "Inside the Black Box," 24. According to DiTrapani and Keenan, "Applying Civilian Ship Manning Practice to USN Ships," 21, 22, about a third of MSC mariners are Navy veterans, three quarters of them having reached paygrades E-5 and above.

years, compared with nearly 50 percent of civilian mariners in MSC. In addition, due to lateral entry, new MSC personnel are not all inexperienced.[13]

Table 1. MSC and Navy Manning Differences aboard the AOE-6 and T-AOE-6

	Navy Manning		MSC Manning		Navy-MSC Difference	
Department	**Licensed/ Officers**	**Unlicensed/ Enlisted**	**Licensed/ Officers**	**Unlicensed/ Enlisted**	**Licensed/ Officers**	**Unlicensed/ Enlisted**
Weapons/ operations	3	37	0	0	3	37
Deck	4	214	8	72	-4	142
Communications	3	28	1	14	2	14
Electronic repair	0	8	0	5	0	3
Purser	3	17	1	1	2	16
Medical	2	7	1	0	1	7
Engineering	5	150	11	29	-6	121
Deck machine repair	2	12	1	5	1	7
Supply	5	34	4	7	1	27
Food preparation	1	17	1	9	0	8
Food service	0	20	0	33	0	-13
Laundry	0	11	0	1	0	10
Total	**28**	**555**	**28**	**176**	**0**	**379**

In addition, MSC's licensed personnel are more highly trained in their specialties than are Navy officers. Twenty-three of the 28 licensed personnel on a T-AOE work in the engineering, deck, and supply departments. Licensed engineers must have extensive hands-on experience and must also pass Coast Guard examinations for every promotion. This is not the case for Navy officers, who usually start with little specific experience or training. The licensed MSC personnel require much less support.

The educational attainment of MSC licensed officers is similar to that of Navy WOs rather than to Navy officers. College graduation rates for MSC licensed officers and Navy WOs are currently 40 percent and 35 percent, respectively (although two-thirds of new MSC accessions in 2016 had a bachelor's degree). On-the-job training can be a substitute for formal education, and the experience in positions typically not open to enlisted service members on Navy ships eventually prepares MSC unlicensed mariners to receive a license and assume positions of leadership as licensed officers. This career path is open to almost

[13] DiTrapani and Keenan, "Applying Civilian Ship Manning Practice to USN Ships," 28.

all positions on civilian ships. Regulations set out by the Coast Guard describe the minimum requirements for service at sea and education for advanced grades.

Total crew cost for a Navy ship is $54 million per year, and for a T-AOE is $20 million per year. In addition, MSC ships are underway about 10 percent more of the time. They also have 20 percent fewer mission-degrading equipment failures.[14]

MSC uses a crewing model that relies on task-specific expertise and on-the-job experience to reduce crew costs by 60 percent. It does not require that its licensed personnel have college degrees. This model may have extensive applicability to other military staffing applications. DiTrapani and Keenan proposed pilot programs in several classes of Navy ships. Adopting an MSC-like approach does not require the use of civilians. Using similarly trained and experienced uniformed personnel, be they officers or enlisted, could yield similar savings while also enhancing readiness.[15]

[14] Ibid., 13.

[15] Ibid., 76, 77.

3. Analysis of Alternative Career Paradigms

This chapter considers two ways that officer career-management paradigms could be changed in ways that would allow Service members to spend more of their careers in operational billets. The first analyzes alternative ways helicopter pilots spend their careers. The second briefly examines variations in the extent of PME across the Services.

A. Helicopter Pilot Management in the Services

The helicopter pilot community presents additional opportunities for improving military workforce efficiency. In this chapter, we examine variations in the career paradigms across the Services. It is expensive to train pilots, including helicopter pilots. When pilots provide more years of service in flying billets, less pilot training is needed, enhancing efficiency.

All four Services have helicopters and communities of helicopter pilots, but they are staffed differently. Table 2 shows that two-thirds of the personnel trained as helicopter pilots are in the Army.[16]

Table 2. Qualified Helicopter Pilots by Service

Army		Navy	Air Force	Marine Corps
RLO	WO	RLO	RLO	RLO
4,000	4,500	1,500	600	1,800

Navy, Air Force, and Marine Corps helicopter pilots are all RLOs. In the Army, 47 percent are RLOs and the rest are WOs. WOs are on what can be considered a flying track; they spend little of their time in service doing other things. RLOs are on what can be considered a leadership track and spend more of their time being prepared for future responsibilities.

WOs are paid a bit less than RLOs, but the primary efficiency advantage of employing WOs as helicopter pilots is in the reduction of training costs for the helicopter pilot

[16] These numbers were derived from data provided by DMDC for FY 2015. They are based on coding of Primary Military Occupational Specialty and rounded to the nearest hundred. We cannot be confident that we identified all the helicopter pilots in the Services. For example, an informal Navy briefing shows over 3,500 helicopter pilots. If our observations about career patterns are accurate, understating the size of the pilot force would mean we have understated potential savings from modified career management policies.

workforce, because each WO spends more of their (longer) careers in flying billets, providing a greater return on the initial training costs.[17] The other Services could achieve these returns either by filling some pilot billets with WOs or by increasing the average career flying time in their RLO communities.

Our analysis of helicopter pilot management options proceeds as follows.

- We describe the career longevity patterns of helicopter pilots in all five communities (Army WOs, and RLOs in all four Services) after they qualify as helicopter pilots, using data we received from DMDC.
- We describe the career employment patterns of the pilots. That is, for individuals in every post-training year-of-service we calculate the fraction of pilots that are estimated to be flying. This calculation is based on informal feedback (for the Army and Marine Corps) and on published material (for the Air Force and Navy).
- We calculate the expected number of years of flying service for each community.
- We present information on the cost of training helicopter pilots.
- We calculate the training cost per billet-year of flying service in each community and then multiply by the number of flying billets.
- We estimate the potential savings associated with modifying the career patterns for helicopter pilots in some of the Services.

B. Career Longevity

Figure 1 shows the average number of years of service after the completion of training that can be expected of helicopter pilots in the five communities. Notice that Army WOs tend to remain active longer than their RLO colleagues. This is despite the fact that many WO pilots have extensive previous enlisted Service before entering pilot training, while most RLO pilots enter pilot training soon after commissioning. The longevity of Marine Corps and, to a lesser extent, Navy pilots is similar to that of Army WOs. Air Force pilots leave the Service at a faster rate.

[17] The composite standard pay rates for the O-3 and WO-3 ranks are quite similar. OUSD(C), Memorandum, "FY 2018 Department of Defense (DoD) Military Personnel Composite Standard Pay and Reimbursement Rates."

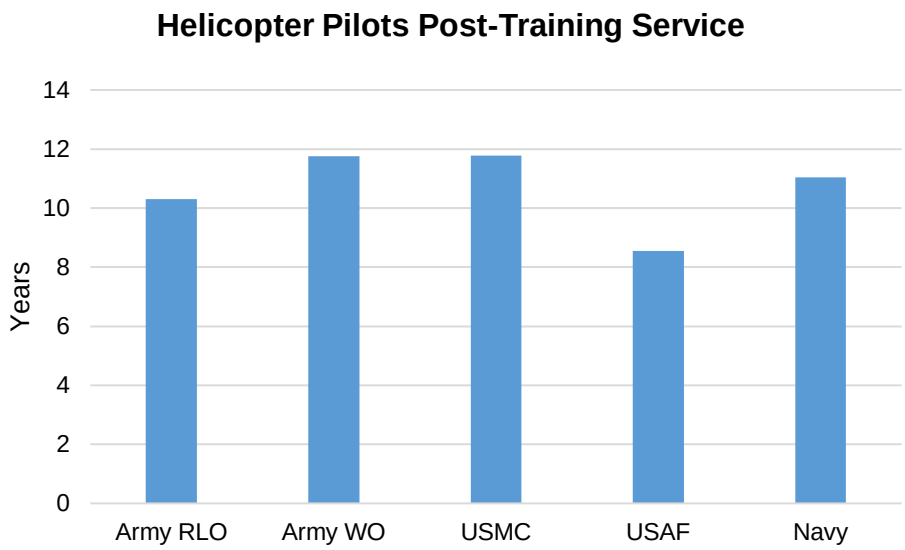

Figure 1. Years of Post-Training Service of Helicopter Pilots

C. Career Management

The percentage of helicopter pilots currently in flying billets varies substantially across communities. Army and Marine Corps sources helped us understand the career patterns in their Services. Information on Air Force career patterns comes from a published paper addressing pilot careers in general, not helicopter pilots specifically.[18] Navy information is derived from a briefing prepared by the Navy Personnel Command supported by subject matter expertise.[19] Within the Army, RLOs spend somewhat more time shortly after pilot training in educational activities than do WOs (12 months as opposed to 8). More significantly, RLOs rarely fly after their twelfth year of post-training service. Marine Corps pilots also spend a substantial portion of their careers after completing pilot training in either educational activity or in staff, non-flying positions, as do Navy and Air Force pilots.

Figure 2 presents typical career patterns for the five communities starting with initial pilot training and going out 20 years after training. In the Air Force, Navy, and Marine Corps, many later-career flying opportunities are associated with command positions and are offered to a minority of pilots.

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[18] Lt Col Lawrence Spinetta, USAF, "The Glass Ceiling for Remotely Piloted Aircraft," *Air and Space Power Journal* (July-August 2013): 101–18, http://www.airpower.au.af.mil/apjinternational/apj-c/2013/2013-4/2013_4_04_spinetta-E.pdf.

[19] US Navy Personnel Command, "FY 2017 Active-Duty Line Community Brief," n.d.

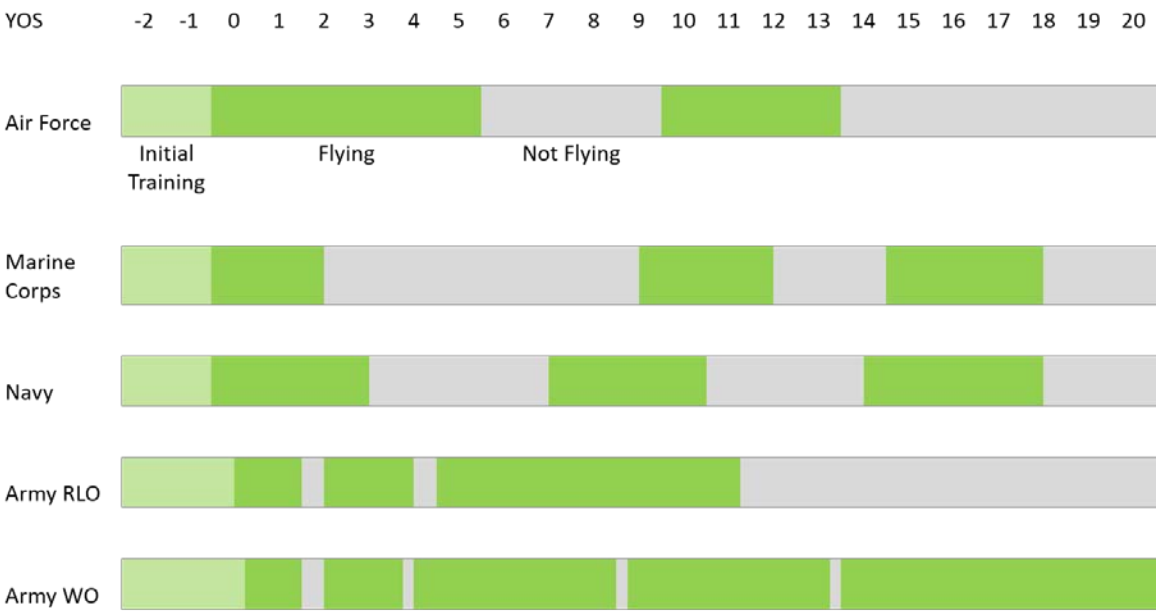

Figure 2. Typical Career Patterns for Pilots

Figure 3 combines the career pattern information with longevity information to show the fraction of their post-training careers that helicopter pilots in the five communities can be expected to spend flying.

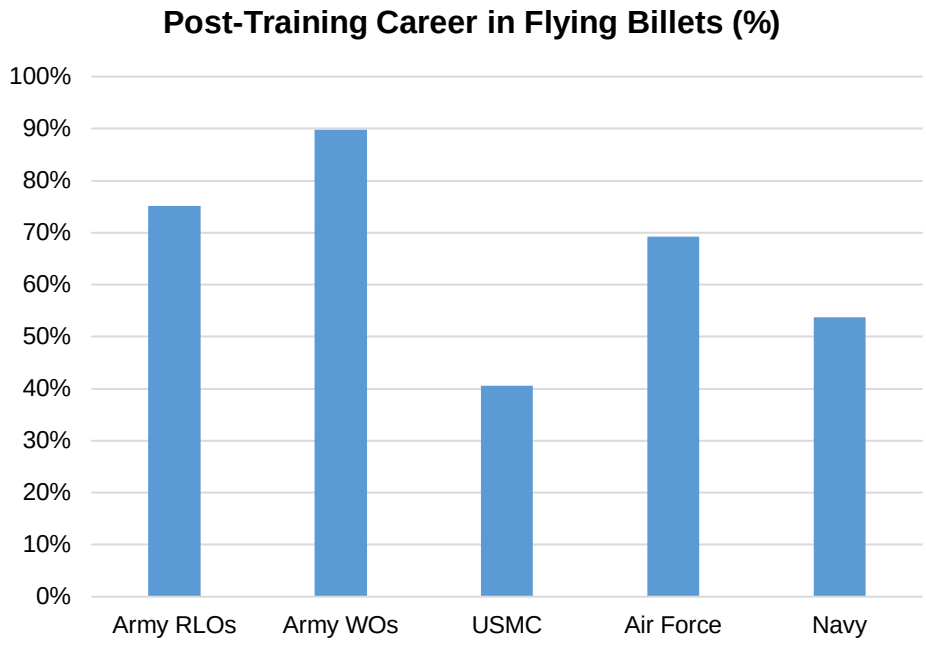

Figure 3. Percent of Post-Training Career Spent in Flying Billets

Army WO pilots spend 90 percent of their post-pilot training flying careers in flying positions, compared to 75 percent for Army RLOs. Marine Corps helicopter pilots are in PME and staff positions over half the time. Navy and Air Force pilots spend more of their careers in flying billets than do Marine Corps pilots, but less than Army pilots.

Figure 4 shows both the duration of post-training service and the average number of years actually flying.

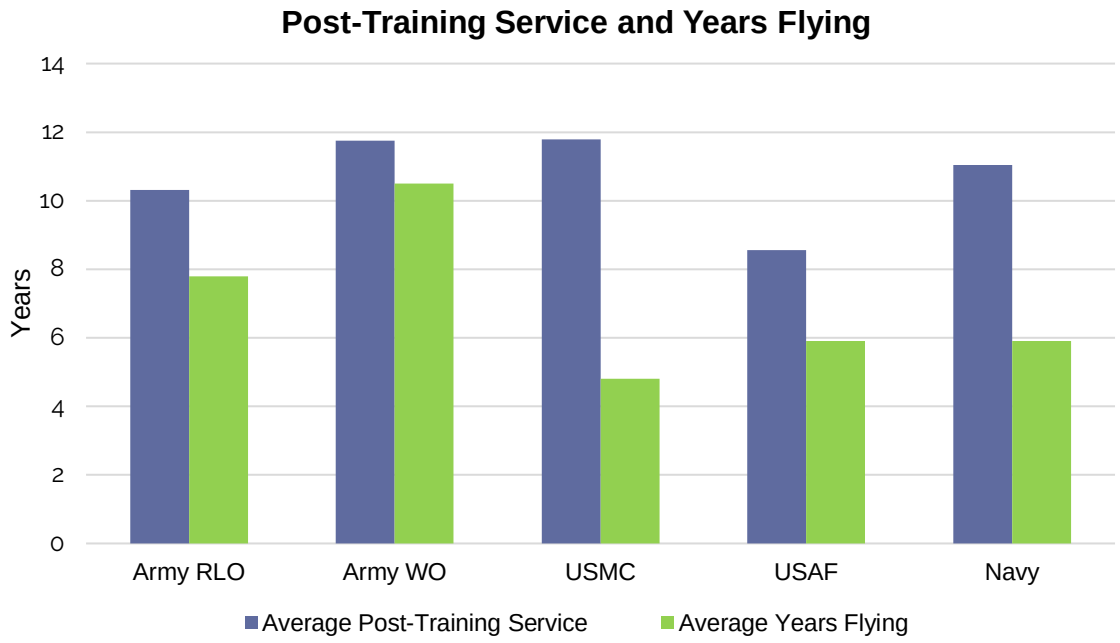

Figure 4. Post-Training Service and Years Flying

As shown in the figure, Marine Corps pilots spend less than five years flying, compared to almost six years for Navy and Air force pilots. Army RLOs average 7.8 years, while Army WOs average 10.5 years.

D. Training Costs

Our estimate of helicopter pilot training cost is based on FY 2013 data from Air Force cost and planning factors in Air Force Instruction (AFI) 65-503.[20] We only include variable costs. Introductory helicopter training cost $595K per pilot, of which $185K was for fixed-wing training. Mission pilot qualification cost an additional $275K. Thus, the cost of training a qualified helicopter pilot in the Air Force was $870K ($595 + $275). We assume costs are similar in the Navy and Marine Corps, which also require fixed-wing training.

[20] AFI 65-503, "Financial Management: US Air Force Cost and Planning Factors," 4 Feb 1994 (incorporating change 1, 23 Feb 2017).

Since the Army does not require fixed-wing training, we estimate Army per-pilot helicopter training costs to be $685K ($595 - $185 + $275) in FY 2013 dollars. Using the Gross Domestic Product (GDP) deflator to estimate cost changes since then increases the Army cost estimate to $743K per pilot and the estimate for the other Services to $944K per pilot.

E. Training Cost of Filling Flying Billets

1. Training Cost per Year of Flying

Combining information on training costs with estimates of the amount of time pilots are likely to spend in flying billets during their service allows us to calculate training cost per year of flying for individuals in the various communities. Figure 5 shows the results of these calculations.

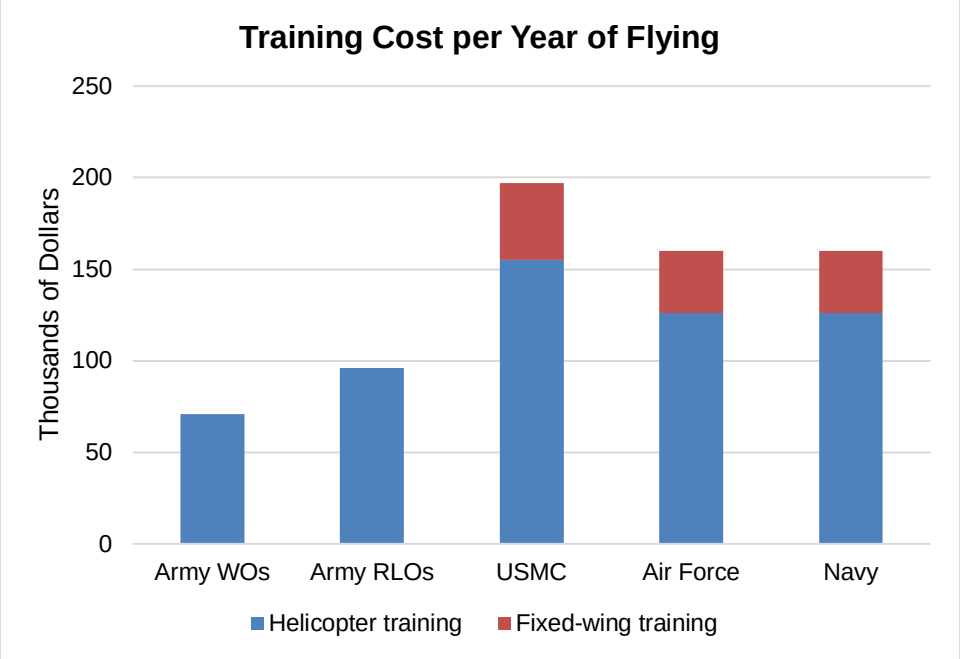

Figure 5. Training Cost per Year of Flying

On average, within the Army, the training cost incurred to fill a flying billet for a year with an RLO is $25,000 more than filling it with a WO. The costs are substantially higher in the other Services. As an example, filling a Marine Corps flying billet for a year incurs $126,000 more training cost than filling such a position with an Army WO—$42,000 of which is attributable to the different policies regarding fixed-wing training. The remaining $84,000 in savings is due to the larger share of time Army WOs spend flying as well as their longer careers.

2. Annual Training Costs

We estimate the number of pilots flying, which we assume to be the number of flying billets associated with the various communities, by multiplying the number of pilots by the fraction of time they spend flying. Then we estimate the amount spent on pilot training by multiplying the number of flying billets by the annual training cost associated with flying billets shown in Figure 5. Finally, we estimate how much could be saved if all the communities experienced the attrition and career management patterns associated with Army WO pilots. This is not a realistic case, since at least some pilots must have careers that prepare them for leadership positions. Section 3.F takes that into account.

Table 3 summarizes these calculations. It implies a cost of $235 million per year associated with the difference between the procedures followed in the other helicopter pilot communities and the WO model ($902–$667). We assume that the Air Force, Navy, and Marine Corps will continue to provide fixed wing training to helicopter pilots.

Table 3. Total Training Cost Implications of Alternative Force Management Strategies ($)

				Training Costs ($M/year)		
	Number of Pilots	Fraction of Time Flying	Number of Pilots Flying	Current	Following Warrant Model	Percent Savings
Army RLOs	4,000	0.75	3,000	289	212	27%
Army WOs	4,500	0.9	4,050	287	287	0%
Air Force	600	0.69	414	66	37	44%
USMC	1,800	0.4	720	142	65	54%
Navy	1,500	0.54	810	130	73	44%
Total DoD	**12,400**		**8,994**	**902**	**667**	**26%**

The cost difference is due to the fact that WOs tend to remain in service longer and spend a larger fraction of their careers actually flying. This estimate omits savings from reduced PME and from reducing the number of pilots in the force.

We note that many WO pilots spend several years as enlisted personnel before joining the WO pilot program. There would be additional annualized savings if WOs began their flying activities earlier in their careers, thus spending even more years flying. If they flew two more years on average, the training cost per year of flying would fall from $70,000 (as shown in Figure 11) to $59,000, yielding an additional $39 million in savings per year.

The specifics of our analysis are based on several strong assumptions, namely that:

- Our information on the career patterns of helicopter pilots is accurate. It is based on input from a variety of sources in the Services.
- The continuation data for helicopter pilots in all five communities that we received from DMDC is accurate.

- Our information on the size of the pilot communities is correct. It is based on DMDC data sorted by Primary Military Occupational Specialty. If our information on longevity and career patterns is correct, variations in community size do not affect the logic of the analysis, just the scale of potential savings.
- Air Force helicopter pilot training costs are a good proxy for helicopter pilot training costs in the other Services.
- The cost of WOs in flying billets is the same as the cost of RLOs in flying billets because of the paygrades of the individuals involved.

F. Possible Savings from Alternative Career Management Paradigms

By using WOs as helicopter pilots and by assigning them to flying billets 90 percent of the time, the Army reduces the number of pilots who have to be trained and, thus, the cost of training pilots.[21] The previous section estimates how much would be saved if all helicopter pilots in all the Services followed a career track like that of Army WO pilots. This may not be a desirable policy. RLO pilots in all the Services spend less time flying because they are being prepared for higher-level staff and leadership positions. Presumably some fraction of helicopter pilots need such preparation. One thing that is different about the Army's pilot management paradigm is that only 47 percent of its helicopter pilots are on the leadership track.

Table 4 shows an estimate of the possible savings associated with adopting a dual-track management philosophy in the other Services. If the Air Force, Marine Corps, and Navy managed only 47 percent of their helicopter pilots with an eye toward their ultimate leadership potential, pilot training costs could be reduced by $118 million a year, 35 percent of the current cost. Fewer total pilots would be needed to fill the flying billets because the pilot force would spend more time flying. We estimate that 1,192 fewer pilots would be needed to fill flying billets in the Air Force, Marine Corps, and Navy. This could yield an additional savings of $170 million per year if end-strength were reduced accordingly.

This estimate does not require that the other Services use WO personnel as helicopter pilots. It only requires that about half of helicopter pilots spend a substantially larger fraction of their careers flying. Of course, much larger savings would accrue if similar career management philosophies were applied to fixed-wing pilots.

The importance of this option is accentuated by the current shortage of pilots. A recent Government Accountability Office (GAO) report entitled "DoD Needs to Reevaluate Fighter Pilot Workforce Requirements" says that Air Force pilot staffing levels are 23

[21] It also avoids costs such as PME that are not required for individuals who are not on a leadership track. We have not included these costs in our analysis.

percent (more than 1,000 pilots) below authorizations.[22] Our analysis suggests the Air Force could address the problem by reevaluating their pilot management policy.

Table 4. Cost Implications of Not Preparing All Helicopter Pilots for Leadership

Impact of Dual-Track Management Strategy on Pilot Requirements						Annual Training Cost ($M)	
		With 47% on Leadership Track					
	Flying Billets	Number on Leadership Track	Number on Flying Track	Total Pilots	Current Total Pilots	Current Cost	With 47% on Leadership Track
USAF	414	243	274	517	600	66	41
USMC	720	509	574	1,083	1,800	142	86
Navy	810	521	587	1,108	1,500	130	93
Total	**1,875**	**1,273**	**1,435**	**2,708**	**3,900**	**338**	**220**

G. Extent and Timing of Professional Military Education

The second topic considered in this chapter on career management paradigms is PME. In Fiscal Year (FY) 2016, DoD spent $986 million on professional development (excluding medical education).[23]

In his 2012 paper on joint education, General Martin Dempsey, Chairman of the Joint Chiefs of Staff, stated that, "The enduring purpose of Professional Military Education (PME) is to develop leaders by conveying a broad body of professional knowledge and developing the habits of mind essential to our profession."[24] A body of literature supports the value of PME for commanders and leaders. For example, PME is central for developing the skills needed to operate effectively in unfamiliar cultural environments.[25] More broadly, PME programs are meant to assure the ability to understand the security environment and the contribution of all elements of national power, as well as enhancing the ability to deal with surprise and uncertainty.[26]

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[22] Government Accountability Office (GAO), "DoD Needs to Reevaluate Fighter Pilot Workforce Requirements," GAO-18-113 (Washington, DC: GAO, April 2018).

[23] Office of the Under Secretary of Defense (Comptroller), "Fiscal Year 2018 Budget Estimates: Operations and Maintenance Overview," June 2017, 153.

[24] Martin E. Dempsey, "Joint Education White Paper," Office of the Joint Chiefs of Staff, July 2012.

[25] Allison Abbe and Stanley M. Halpin, "The Cultural Imperative for Professional Military Education and Leader Development," *Parameters* (Winter 2009–10): 20–31, http://www.culturereadv.org/sites/default/files/publications/abbe%20and%20halpin-2.pdf.

[26] Dempsey, "Joint Education White Paper," 4.

The existing literature on PME does not identify how much PME needs to be provided to obtain these benefits. Should all officers receive it? How much should be provided to those who do receive it? When, in the context of individuals' careers, should it be provided?

PME is expensive. In 2016, 9,100 student-years of professional development were provided (not including the Defense Health Program, or DHP).[27] Excluding DHP, the budget for professional development was $854 million in 2016.[28] The cost of student time spent in professional development would add roughly $1.3 billion.[29]

The total amount of time officers spend in PME differs across the Services. As an example, Table 5 shows the highest level of education received by lieutenant colonels (O-5s) in the Army, Air Force, and Marine Corps. The data used to produce the table were provided by DMDC.[30] Navy data are omitted from the table because 75 percent of the Navy records were coded "unknown or not applicable."

A far higher percentage of Air Force O-5s have completed senior service schools than either Army or Marine Corps officers. Essentially all Air Force and Army O-5s have progressed beyond initial skill schools. This is not the case in the Marine Corps. That is not to say that the Marine Corps' approach should be adopted by the other Services, but there seems to be little evidence that Marine Corps officers are less well prepared for leadership positions without completing as many service schools as O-5s.

The last column of the table, labeled "Training Completion Index," or TCI, uses a value of 3 for completion of senior service school, 2 for intermediate service school, and 1 for skill progression school. If each school takes a year to complete, the TCI reflects the number of years spent in school.

Table 5. Highest Level of Professional Education Attained by O-5s (Percent)

Service	Senior Service School	Intermediate Service School	Skill Progression School	Initial Skill School	Unknown or Not Applicable	Training Completion Index
Army	2	91	6	0	1	1.93
Air Force	56	8	30	0	6	2.15
USMC	10	32	14	40	3	1.09

[27] OUSD(C), FY 2017 Budget Estimates: Operations and Maintenance Overview, February 2016, 141.

[28] Ibid., 152.

[29] Estimated by multiplying the number of student/trainee work-years by the composite standard rate for O-3s.

[30] We would have preferred to have information on the years of training individuals received, but that was not available.

Figure 6 shows the TCI for O-4s, O-5s, and O-6s in the Army, Air Force, and Marine Corps. Army officers receive more PME early in their careers, reflected by the O-4 bars, while the Air Force invests more heavily in the education of O-5s and O-6s. Marine Corps policy consistently appears to place less emphasis on professional education.

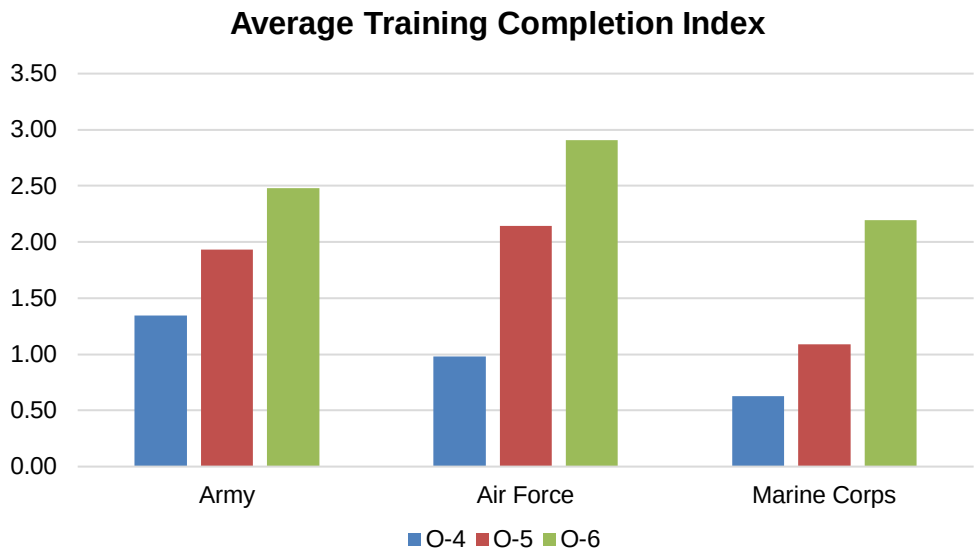

Figure 6. PME Progression by Service

In general, Marine Corps officers appear to receive perhaps 40 percent less PME than Army and Air Force officers (there are fewer O-6s than O-5s and O-4s).

We do not have enough information to recommend a reduction in the amount of PME provided by some of the Services, but the existence of alternative approaches suggests that more cost-effective alternatives may be available. The Services should evaluate the cost-benefit tradeoffs of PME.

4. Trends in the Quality of Enlisted Personnel

In this chapter we show how the high quality of the enlisted workforce presents opportunities for lowering costs by assigning highly educated/skilled enlisted personnel to positions that have historically been reserved for RLOs. Since the start of the All-Volunteer Force (AVF), the quality of enlisted personnel has increased substantially. In 1977, 34 percent of accessions were in the top half of the cognitive distribution (AFQT categories 1, 2, and 3A).[31] That rose to 68 percent in 2002 and 75 percent in 2015.

Figure 7, based on Defense Manpower Data Center (DMDC) data, shows the trend in enlisted accessions in the top 35 percent of the AFQT distribution (categories 1 and 2) from 1973 to 2015.

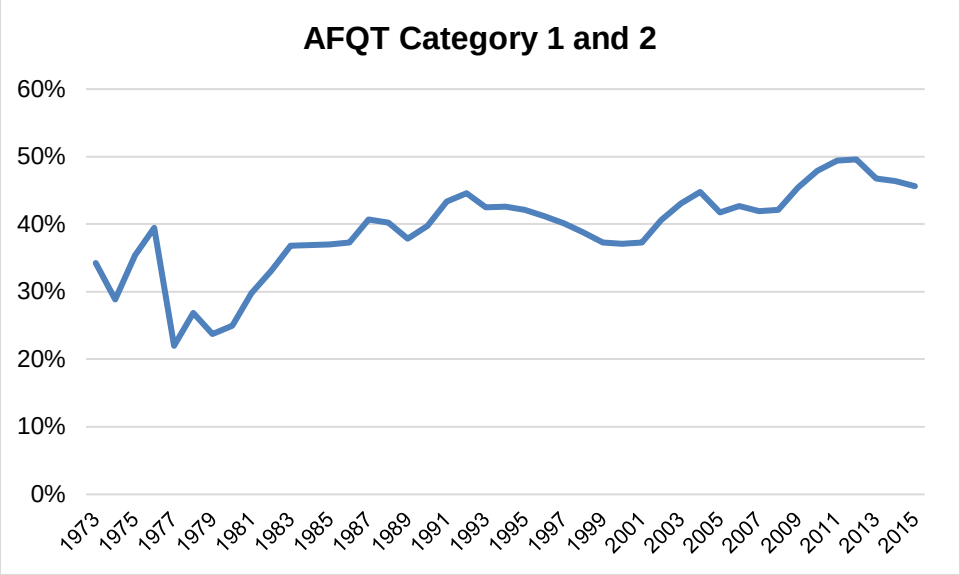

Figure 7. Trend in Entry Test Scores of Enlisted Accessions

The quality of the enlisted inventory is quite similar to that of accessions. In 2015, three-quarters of enlisted personnel were in the top half of the cognitive distribution according to their scores on the AFQT. As Figure 8 shows, between 2002 and 2015, the fraction of enlisted personnel in the top two AFQT groups increased from 41 percent to 47

[31] Office of the Under Secretary of Defense, Personnel and Readiness, "Population Representation in the Military Services: FY 2004," https://www.cna.org/pop-rep/2004/enlisted_accessions/afqt.html.

percent. Among WOs (a personnel category not used by the Air Force), it was 58 percent in 2015.

Substantial differences exist in the distribution of enlisted personnel quality among the Services, as Figure 8 shows. The Air Force and Navy have the highest proportion of people in the upper AFQT groups, with the Navy's proportion growing most rapidly. The AFQT levels of senior enlisted personnel, those in paygrades E-7, E-8, and E-9, who are most likely to be given officer-like responsibility, are quite similar to those of the larger enlisted population.

While we do not have data to compare the distribution of enlisted AFQT scores with that of RLOs (because officer candidates are not required to take the AFQT), it appears that many enlisted personnel have the cognitive ability to perform tasks typically performed by RLOs.

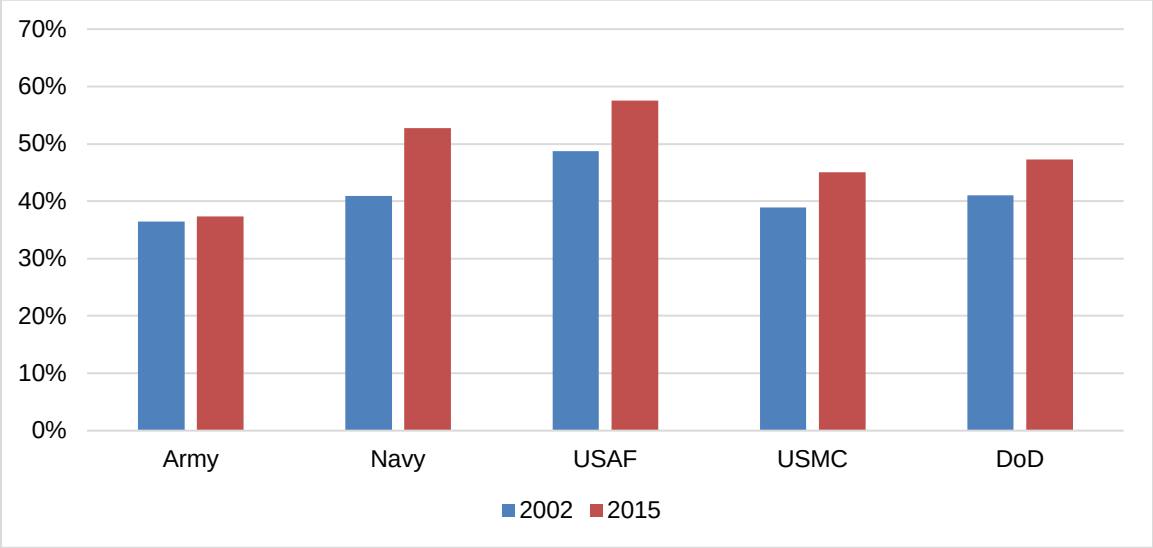

Figure 8. Enlisted Personnel in AFQT Categories 1 and 2 by Service

All RLOs in the US military must have college degrees. In some cases, this is because of requirements for specific knowledge; in other cases, it is deemed to be a requirement for management responsibility.[32] Table 6 shows that educational attainment among enlisted accessions has risen dramatically since the start of the AVF. Almost all recruits now have at least a high school diploma. In 1973, a third did not.

[32] "Becoming a Military Officer," Today's Military, http://todaysmilitary.com/joining/becoming-a-military-officer.

Table 6. Educational Attainment of DoD Accessions

	1973	1987	1999	2009	2015
Less than high school	34.4%	7.6%	11.0%	9.6%	4.7%
High school diploma			84.6%	82.1%	86.8%
Some college	65.6%	92.4%	2.6%	4.4%	3.9%
College diploma			1.8%	3.9%	4.8%

Source: DMDC. The data we received did not present additional education for high school graduates before 1999.

A growing proportion of enlisted personnel also has college experience. Table 6 shows the increase since 1999. Figure 9 combines our DMDC data with earlier information provided to the Total Force Manpower and Resources Directorate in the Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs in 2016. It reflects the entire enlisted inventory, not just accessions. Seventeen percent of enlisted personnel in 2015 had some college experience, up from six percent in 1980.

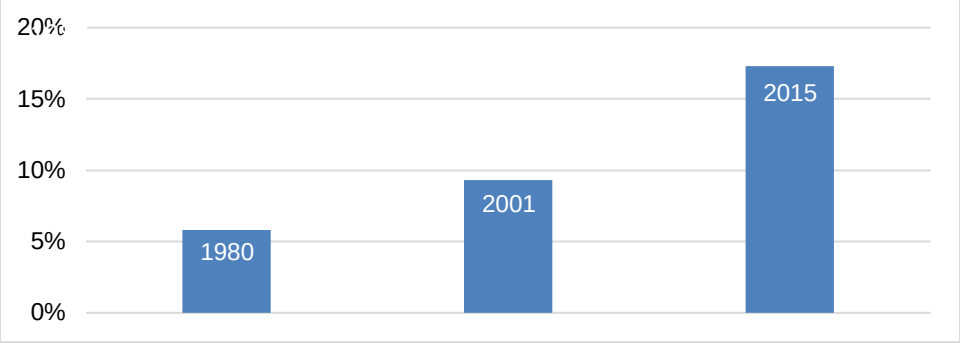

Figure 9. Enlisted Personnel with at Least Some College Experience

Table 7 shows that, as in the case of AFQT scores, there are considerable differences in enlisted educational attainment by Service. It is by far highest in the Air Force. Over a third of Air Force personnel have at least some college, compared to five percent in the Marine Corps.

Table 7. Enlisted Educational Attainment by Service (2015)

	All Enlisted					Senior Enlisted (E-7/8/9)				
	Army	Navy	USAF	USMC	Total	Army	Navy	USAF	USMC	Total
Some college	5.5%	6.8%	24.4%	2.2%	9.7%	14.7%	16.7%	51.6%	8.9%	23.8%
College degree	8.2%	7.5%	10.2%	2.6%	7.6%	19.1%	16.7%	37.3%	13.2%	22.5%

Among senior enlisted personnel, over 20 percent have college degrees and over 45 percent have at least some college experience. The fraction with college diplomas has

increased from 12 percent to 22 percent since 2001.[33] In the Air Force, over a third of senior enlisted personnel have diplomas and almost 90 percent have at least some college.

The high and increasing level of enlisted quality suggests that enlisted personnel can take on some of the positions now filled by RLOs. Enlisted personnel are substantially less expensive. For example, in the Army, pay and benefits included in the "composite standard rate" total $181,000 per year for a Major (O-4) and $118,000 for a Sergeant First Class (E-7).[34]

[33] Thirty-three percent of WOs were college graduates in 2015.

[34] Office of the Under Secretary of Defense (Comptroller) (OUSD(C)), Memorandum, "FY 2018 Department of Defense (DoD) Military Personnel Composite Standard Pay and Reimbursement Rates," June 16, 2017, http://comptroller.defense.gov/Portals/45/documents/rates/fy2018/2018_k.pdf.

5. Differences in the Allocation of Personnel in Three Functional Areas

This chapter addresses differences in the ways Services allocate positions to the various kinds of military personnel: enlisted, WOs, and RLOs.

The Navy also uses LDOs. In the Navy, the WO and LDO programs provide officer technical managers and technical specialists, who exercise leadership in key positions throughout the Service. Both programs provide the opportunity for outstanding senior enlisted personnel to compete for a commission without need for a college degree. In 2011, these two communities made up 11 percent of the Navy officer corps.[35] The Marine Corps also has both WOs and LDOs. Marine Corps LDOs must spend at least eight years as a WO before becoming an LDO. WOs and LDOs work as specialists and do not rotate to general staff billets or spend time in PME. The Army has WO pilots, unlike the Navy and Marine Corps, in addition to technical specialist WOs. Some WO pilots enter the program immediately after joining the Army. The Army does not have LDOs. The Air Force has neither WOs nor LDOs.

Overall, the Air Force has the largest fraction of RLOs, 20 percent, and the Marine Corps the smallest, 10 percent. The Army and Navy have 16 percent RLOs. These differences, at least in part, reflect differences in Service missions.[36]

Here we focus on three functional areas—supply, human resources (HR), and intelligence—because their missions are roughly comparable across the Services. Also, we suspect that some jobs now performed by RLOs in these areas are more dependent on depth of expertise than command skills. Examples might be the need for language skills and the ability to identify critical pieces of information in intelligence. Given the similarity in these functions across the Services, it is reasonable to suspect that one Service's use of a less expensive mix of personnel is evidence that a similar mix may be feasible in other Services without sacrificing performance.

An alternative way to seek efficiencies is to consider substituting civilians for military personnel in positions where a military performer is not essential. The Institute for Defense Analyses (IDA) performed such analyses for medical professionals and for the Cyber

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[35] Bureau of Naval Personnel, *The Limited Duty Officer and Chief Warrant Officer Professional Guidebook*, 2011 edition.

[36] Aline Quester and Robert Shuford, "Population Representation in the Military Services: Fiscal Year 2015 Summary Report" (Arlington, VA: CNA, January 2017).

Mission Force, finding substantial possible savings.[37] The Congressional Budget Office (CBO) and The RAND Corporation have reached similar conclusions. Here we confine ourselves to choosing among military performers.[38]

Table 8 (page 27), Table 9 (page 29), and Table 10 (page 31) present the distribution of three military personnel types—enlisted, WOs and LDOs, and RLOs—in the three selected functional areas—supply, HR, and intelligence—across the Services.

Figure 10 (page 28), Figure 11 (page 30), and Figure 12 (page 32) present the Service mixes of personnel types by percentage in supply, HR, and intelligence, respectively.

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[37] John E. Whitley et al., "Medical Total Force Management," IDA Paper P-5047 (Alexandria, VA: Institute for Defense Analyses, May 2014); and Thomas H. Barth et al., "Staffing for Cyberspace Operations: Summary of Analysis," IDA Document NS D-8089 (Alexandria, VA: Institute for Defense Analyses, August 2016).

[38] Congressional Budget Office (CBO), "Replacing Military Personnel in Support Positions with Civilian Employees" (Washington, DC: CBO, December 2015); and Jennifer Lamping Lewis et al., "U.S. Department of Defense Experiences with Substituting Government Employees for Military Personnel: Challenges and Opportunities," RR1282 (Santa Monica, CA: The RAND Corporation, 2016), https://doi.org/10.7249/RR1282.

Table 8. Distribution of Supply Personnel in the Services

Occupation		Army			Air Force			Navy			Marine Corps		
Code	**Name**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**
155100	Supply Administration	23,279			8,874			8,678			7,648		
155200	Unit Supply	171											
155300	Transportation	2,132			6,283						518		
155400	Postal				76						420		
155800	Functional Analysis				1,854								
180000	Food Service, General	8,632			3,556			7,420			2,051		
180100	Stewards and Enlisted Aides				11								
182300	Sales Store							2,112			115		
184000	Laundry and Personal Services	694											
280100	Logistics, General			6,520			1,492					94	1,628
280200	Supply		846						123	2,347		117	905
280300	Transportation		296	1,433						1		21	15
280500	Food Service		173						49	1		29	16
280600	Exchange and Commissary											13	
	Total	**34,908**	**1,315**	**7,953**	**20,654**	**0**	**1,492**	**18,210**	**172**	**2,349**	**10,752**	**274**	**2,564**

Table 8 depicts the distribution of supply personnel. Personnel were selected based on their DoD occupational codes. We chose occupational codes using the Navy's definition of the supply community as including individuals who manage inventories of parts, supply, and mail; manage retail and service activities; and manage and execute all food service occupations.[39]

Figure 10 shows that the Air Force has the fewest RLOs as a fraction of supply personnel. The other Services could reduce their supply personnel costs if they mirrored the degree of officer-intensity of the Air Force.

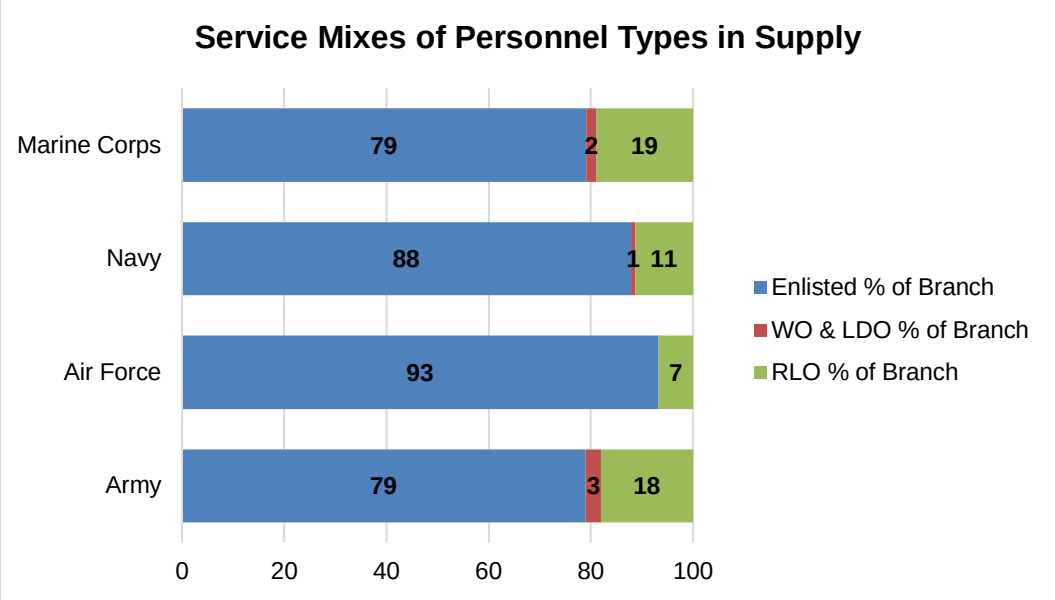

Figure 10. Summary Distributions of Supply Personnel by Service

Table 9, on the following page, displays the distribution of HR personnel.

[39] See "Supply Community," Navy Personnel Command, http://www.public.navy.mil/bupers-npc/enlisted/community/supply/Pages/default2.aspx.

Table 9. Distribution of HR Personnel in the Services

Occupation		Army			Air Force			Navy			Marine Corps		
Code	**Name**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**
150000	Personnel, General	12,067			4,713								
150100	Recruiting and Counseling	4,443			675			1,291			890		
151000	Administration, General				4,877			4,994					
152000	Combined Personnel and Administration							2,579			6,228		
270100	Administration, General						217		460	8		16	483
270300	Manpower and Personnel		401	2,784			1,599			490		265	
	Total	**16,510**	**401**	**2,784**	**10,265**	**0**	**1,816**	**8,864**	**460**	**498**	**7,118**	**281**	**483**

Figure 11 shows that the Navy uses the least officer-intensive mix of HR personnel. Hypothetically shifting personnel using the same procedure outlined above for the supply function could results in substantial savings for the Army and Air Force.

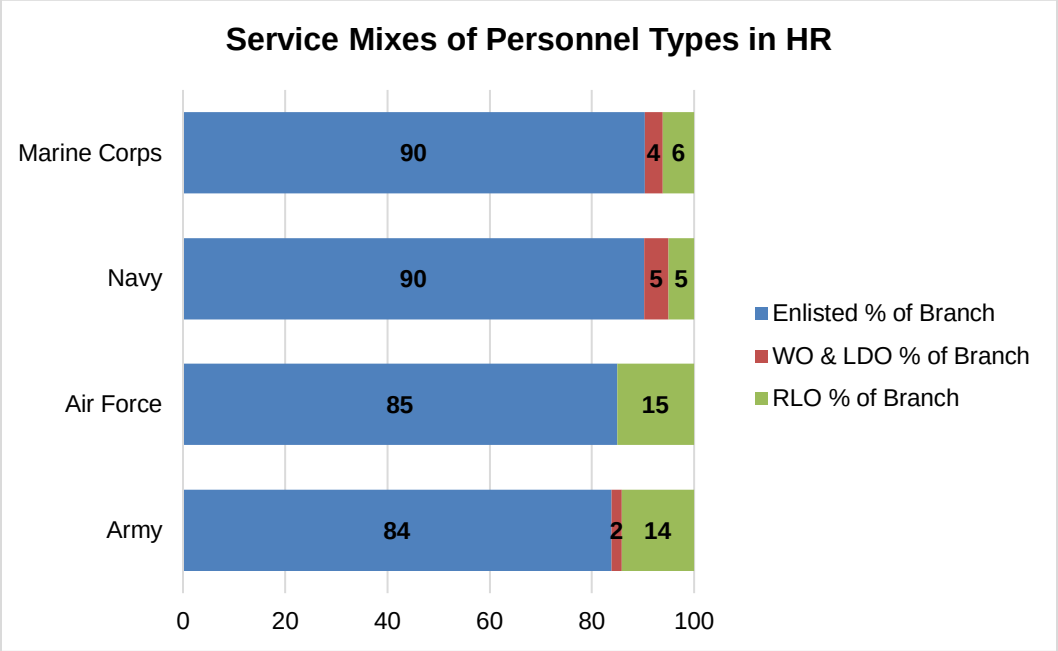

Figure 11. Summary Distributions of HR Personnel by Service

Table 10, on the following page, displays the distribution of intelligence personnel.

Table 10. Distribution of Intelligence Personnel in the Services

Occupation		Army			Air Force			Navy			Marine Corps		
Code	**Name**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**	**Enlisted**	**WO & LDO**	**RLO**
123000	Signal Intelligence/Electronic Warfare	819			256						69		
123100	Intercept Operators	3,867			2,333			5,784			1,913		
123200	Analysis	3,406			3,665			3,721			749		
123300	Electronic Countermeasures	1,604											
124100	Language Interrogation/Interpretation	3,420			35								
124200	Image Interpretation	1,479			2,817			2,914			404		
124300	Operational Intelligence	8,498			4,857						2,229		
124400	Counterintelligence	1,275									505		
230100	Intelligence, General		918	4,347			3,384			1,894		37	990
230200	Communications Intelligence		359	769			6		322	1,007		45	114
230300	Counterintelligence		334	472			357					101	
	Total	**24,368**	**1,611**	**5,588**	**13,963**	**0**	**3,747**	**12,419**	**322**	**2,901**	**5,869**	**183**	**1,104**

Figure 12 shows that the intelligence community has somewhat less variation across Services in the mix of personnel types. The Marine Corps does, however, have a smaller fraction of officers than the other Services. Using the same procedure for shifting the personnel mix to be less officer-intensive in the other Services could yield substantial savings for the intelligence community in the three affected Services.

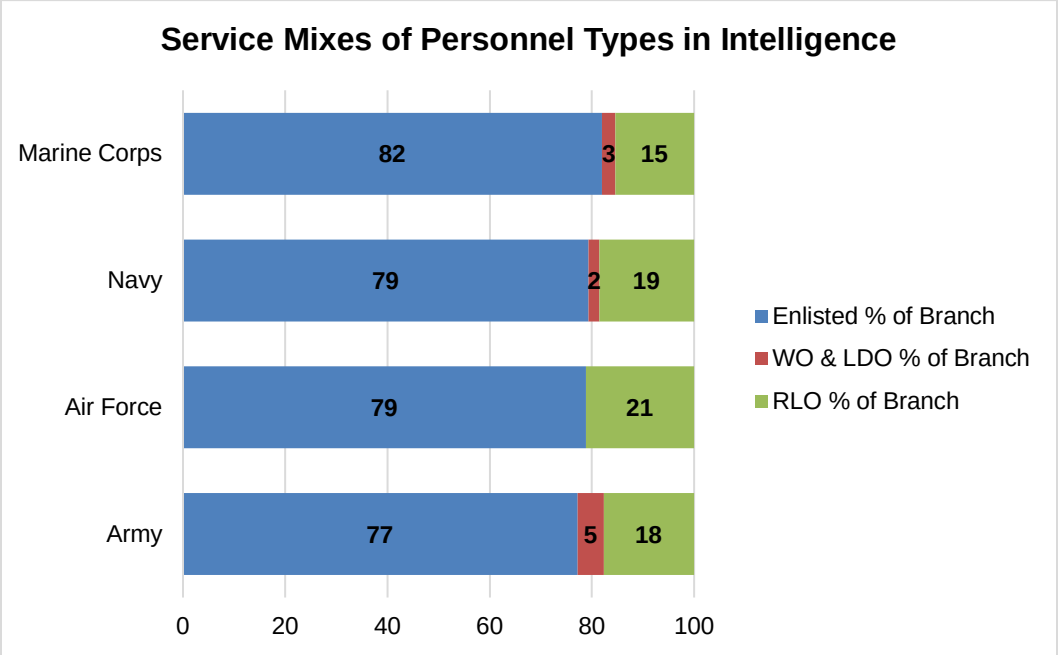

Figure 12. Summary Distributions of Intelligence Personnel by Service

We were unable to investigate why Service practices vary. There may be valid reasons for the differences and we cannot advocate substantial changes in staffing practices without knowing the specifics. Also, there is no reason to believe that the least-RLO intensive Services have found the right mix. In some cases, further reductions in the RLO proportion may be possible. Further investigation is needed. It may establish the opportunity for substantial savings.

6. Findings and Recommendations

In this paper we consider whether and how the military workforce can be used more efficiently. We identify variations in management practices across the Services and develop rough estimates of how much might be saved by adopting some less expensive approaches more broadly. Specifically, we examine four alternative paradigms for increasing the efficiency of the military workforce without sacrificing performance:

- Increasing the experience mix of personnel
- Modifying how careers are managed in two ways. First, by increasing the amount of time helicopter pilots spend flying and second, by reducing the amount of PME provided.
- Using enlisted personnel or WOs in some positions now filled by RLOs

A. Paradigms

1. Increasing the Experience Mix of Personnel

We considered the possibility that moving toward a more experienced workforce with more hands-on functional experience would allow a high level of performance to be attained with a smaller, less expensive workforce. There is a fairly extensive literature demonstrating the relationship between experience and performance among military personnel. RAND, CNA, CBO, and IDA have all estimated potential productivity gains associated with a more senior workforce. A 2002 study by CNA[40] provides perhaps the most compelling evidence of the potential offered by this kind of staffing. It relies on a shift in the staffing model used on Navy resupply ships.

The Military Sealift Command (MSC) uses civilian mariners to staff fleet support ships that used to be operated by Navy crews. From our perspective, the most important feature of MSC staffing is not that it uses civilians, but that it uses more experienced and better trained people. Comparing MSC staffing of oilers with Navy staffing of the same ships shows that MSC crews are 61 percent smaller. MSC can do this because its crews are more experienced than typical Navy personnel. The average MSC mariner is 46 years old, compared to 28 for a Navy crewmember. MSC mariners have considerably more experience than their naval counterparts, and more of the MSC experience is aboard ship.

[40] Moore et al., "Inside the Black Box."

In addition, MSC managers must have extensive hands-on expertise to qualify for their positions, while Navy officers have little specific experience and training when they first go to sea. The MSC staffing model reduces crew costs by 60 percent because of reduced crew size.

This line of research suggests that this staffing model could be adapted for use by other kinds of units, either by using civilian personnel, as MSC does, or by using a smaller but more experienced and functionally trained military workforce.

2. Alternative Career Paradigms

We examined two ways in which changing how military careers are managed might increase operational capability.

First, we considered efficiencies the other Services might gain by emulating aspects of the Army's management of helicopter pilots. All four Services have helicopters and communities of helicopter pilots. In the Army, slightly more than half of the pilots are WOs, with the rest being RLOs. The other Services all rely entirely on RLOs.

We show three ways in which WO pilots contribute to a more efficient workforce. First, compared to RLO pilots, WO pilots spend a larger fraction of their career flying because they have fewer secondary obligations such as staff billets and educational activities. Second, WO pilots tend to have longer careers, so there is a greater return on their initial training costs. Finally, billet-for-billet, WOs cost less than comparable RLOs. Because of this, we estimate that the average training cost associated with filling a flying billet for a year is over $50,000 more in the Air Force and Navy compared to Army WOs. It is over $80,000 more for Marine Corps pilots. Also, Army helicopter pilot training is less expensive than that in the other Services because the Army does not require its helicopter pilots to also be trained to fly fixed-wing aircraft.

We estimate that if the other Services adopted the policy of staffing over half their helicopter pilot communities with individuals who followed the career patterns of Army WOs, pilot training costs could be reduced by 30 percent, about $100 million per year. We estimate that 1170 fewer pilots would be needed to fill flying billets, yielding an additional $170 million in annual savings. Alternatively, the policy change could alleviate pilot shortages or provide additional officers to meet other requirements.

We also took a brief look at differences in the amount and timing of PME that the Services provide. DMDC data indicate that Marine Corps officers get roughly 40 percent less PME than Army and Air Force officers. (We did not have enough information to compare Navy provision of PME to the other Services.)

3. Using Enlisted Personnel in Some Positions Now Filled by Officers

First we looked at the quality of enlisted personnel. It is quite high and has increased substantially during the All-Volunteer Force era. In 2015, almost half of both new accessions and the entire enlisted inventory were in the top 35 percent of the national distribution of knowledge and skills as measured by Armed Forces Qualification Test (AFQT) scores. In 1973, only a third of new recruits scored that well.[41]

The education level of the enlisted force increased substantially. In 1980, only 6 percent had at least some college experience. That rose to 17 percent in 2015. Looking at personnel in paygrades E-7 to E-9 (the senior enlisted force) in 2015, 46 percent had at least some college experience, compared to 33 percent in 2001. Twenty-two percent had college diplomas, compared to 12 percent in 2001. In the Air Force, 2015 fractions were especially high—over 85 percent with at least some college and almost 40 percent with diplomas.

Next, we compared the mixes of military personnel the Services use in three functional areas: supply, HR, and intelligence. Because the Air Force has enlisted personnel with the both the highest AFQT scores and the most education, one might expect it to use the smallest percentage of officers. We found this to be the case in supply. However, the Navy has the smallest percentage of officers in HR, and the Marine Corps in intelligence. If all the other Services substituted enlisted personnel (and WOs/LDOs where they are used) for officers to the same extent as the least officer-intensive Service, substantial savings could be possible.

B. Recommendations

Based on these results we make the following recommendations for improving the efficiency of DoD's military workforce:

- The Services should consider increasing the average experience level of the military workforce while reducing its size. Substantial gains in productivity and reductions in cost should be achievable.
- The other Services should consider adopting a career management paradigm like the Army uses for its WO pilots for a portion of their helicopter pilots.
- The other Services should consider reducing the extent of PME in the direction of the level provided by the Marine Corps.
- Given the increasing education level of the enlisted force, all Services should assess their current officer/enlisted mix, especially in the areas of intelligence

[41] We do not have data on the AFQT distribution of the enlisted inventory in 1973.

and HR, and identify opportunities for increasing the role of the enlisted workforce. This could reduce costs and increase the level of technical skill.

We recognize that Service requirements may limit adoption of the policies we suggest. Further analysis should address the impact of such requirements. For example, changes in the management paradigm for helicopter pilots or increases in the demand for experienced personnel would change the rank pyramid structure the Services use as management targets. The design of revised pyramid structures and the ability of management tools, including compensation, to meet the new requirements would require considerable analytic support. The limited analyses presented here imply substantial potential savings. They also promise improved readiness through higher levels of specific skills and experience. This kind of analysis should be applied to more career fields and types of units.

Illustrations

Figures

Figure 1. Years of Post-Training Service of Helicopter Pilots 11
Figure 2. Typical Career Patterns for Pilots 12
Figure 3. Percent of Post-Training Career Spent in Flying Billets 12
Figure 4. Post-Training Service and Years Flying 13
Figure 5. Training Cost per Year of Flying 14
Figure 6. PME Progression by Service 19
Figure 7. Trend in Entry Test Scores of Enlisted Accessions 21
Figure 8. Enlisted Personnel in AFQT Categories 1 and 2 by Service 22
Figure 9. Enlisted Personnel with at Least Some College Experience 23
Figure 10. Summary Distributions of Supply Personnel by Service 28
Figure 11. Summary Distributions of HR Personnel by Service 30
Figure 12. Summary Distributions of Intelligence Personnel by Service 32

Tables

Table 1. MSC and Navy Manning Differences aboard the AOE-6 and T-AOE-6 6
Table 2. Qualified Helicopter Pilots by Service 9
Table 3. Total Training Cost Implications of Alternative Force Management Strategies ($) 15
Table 4. Cost Implications of Not Preparing All Helicopter Pilots for Leadership 17
Table 5. Highest Level of Professional Education Attained by O-5s (Percent) 18
Table 6. Educational Attainment of DoD Accessions 23
Table 7. Enlisted Educational Attainment by Service (2015) 23
Table 8. Distribution of Supply Personnel in the Services 27
Table 9. Distribution of HR Personnel in the Services 29
Table 10. Distribution of Intelligence Personnel in the Services 31

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Abbreviations

AFI	Air Force Instruction
AFQT	Armed Forces Qualification Test
AOE	Fast Combat Support Ship
AVF	All-Volunteer Force
CBO	Congressional Budget Office
CLF	Combat Logistics Force
CNA	Center for Naval Analyses
DHP	Defense Health Program
DMDC	Defense Manpower Data Center
DoD	Department of Defense
FY	Fiscal Year
GAO	General Accounting Office/Government Accountability Office
GDP	Gross Domestic Product
HR	Human Resources
IDA	Institute for Defense Analyses
K	Thousand
LDO	Limited Duty Officer
M	Million
MSC	Military Sealift Command
OUSD(C)	Office of the Under Secretary of Defense (Comptroller)
PME	Professional Military Education
RLO	Regular Line Officer
T-AOE	MSC-staffed Fast Combat Support Ship
TCI	Training Completion Index
U.S.	United States
USAF	United States Air Force
USMC	United States Marine Corps
WO	Warrant Officer

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14. ABSTRACT

This paper considers whether and how the military workforce can be used more efficiently. It examines inter-Service differences in staffing philosophy to address:

- Use of more experienced personnel to reduce the size of the workforce and increase efficiency,
- Adoption by the other Services of the Army's approach to its helicopter pilot workforce, where over half of pilots (who are warrant officers) spend the overwhelming majority of their careers flying, and
- Reduction in the amount of professional military education provided to some officers.
- Use of enlisted personnel and warrant officers to perform some jobs now done by regular line officers.

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