

Abstract

- The U.S. Marine Corps (USMC) faces a critical heavy-lift capability gap as the CH-53E fleet approaches the end of its operational and maintenance viability. That gap jeopardizes the heavy-lift rotary-wing capability that is essential for supporting USMC expeditionary operations. This research analyzes the decision to field the CH-53K despite persistent cost growth, schedule delays, and technical deficiencies, and evaluates whether alternative solutions could better fulfill USMC heavy-lift requirements. Using a Capabilities-Based Assessment, DOTmLPF-P analysis, and an Analysis of Alternatives consistent with DoD acquisition guidance, this study compares four courses of action: continue CH-53K procurement, shift to the CH-47F Block II, extend the CH-53E while investing in autonomous heavy-lift systems, or cancel the CH-53K and sustain the CH-53E. Results show that although the CH-53K provides unmatched lift, survivability, and shipboard compatibility, it also exhibits the highest cost, greatest schedule risk, and ongoing performance challenges. The analysis finds that no single alternative fully closes the heavy-lift gap without trade-offs, but the CH-53K remains the only materiel solution capable of meeting all validated requirements. If performance is weighted more heavily than cost, schedule and technical risk, then full rate production of the CH-53K emerges as the most viable option for closing the USMC’s heavy-lift capability gap.

Methods

- Capabilities based assessment to identify capability gaps in the USMC.
- DOTmLPF-P analysis to evaluate non-materiel solutions to improve USMC heavy-lift capabilities or whether a materiel solution is required.
- Analysis of alternatives between four potential courses of action to determine the best path forward. Potential courses of action analyzed:
 - Continue with CH-53K program
 - Adopt CH-47F Block II
 - Upgrade CH-53E and invest in autonomous VTOL
 - Cancel CH-53K and maintain CH-53E

Results & Impact

- Each COA could be chosen depending on the weighting of criteria.
- CH-53K best meets all requirements but at substantially greater cost.
- CH-47F Block II provides slightly less performance at significantly less cost but less compatible on ships.
- Autonomous VTOL potentially provides best overall performance but at significant cost, risk, and timeline.
- CH-53E is the cheapest and fastest option but is least capable and highest risk to maintain aging fleet.

Qualitative Ranking of Options												
Criteria Options	APUC	RD&E	O&S	IOC	Technical Risk	Max Altitude	Max Range	Lift Capacity	Maintainability	Ship Compatibility	Interoperability	Total Score (Lower Better)
CH-53K	4	3	4	2	3	3	1	1	2.5	2.5	3.5	29.5
CH-47F Block II	2	1	2	3	2	1	2.5	3	2.5	4	1	24
Autonomous VTOL	3	4	1	4	4	2	4	2	1	1	2	28
Legacy CH-53E	1	2	3	1	1	4	2.5	4	4	2.5	3.5	28.5

Decision Matrix (Performance Weighted)														
Criteria	APUC	RD&E	O&S	IOC	Technical Risk	Max Altitude	Max Range	Lift Capacity	Maintainability	Ship Compatibility	Interoperability	Option Scores (Lower is Better)		
Criteria Weight	2	2	2	4	3	3	5	5	4	3	1	Unweighted Score	Weighted Score	
COA 1	Unweighted	4	3	4	2	3	3	1	1	2.5	2.5	3.5	29.5	79
	Weighted	8	6	8	8	9	9	5	5	10	7.5	3.5		
COA 2	Unweighted	2	1	2	3	2	1	2.5	3	2.5	4	1	24	81.5
	Weighted	4	2	4	12	6	3	12.5	15	10	12	1		
COA 3	Unweighted	3	4	1	4	4	2	4	2	1	1	2	28	89
	Weighted	6	8	2	16	12	6	20	10	4	3	2		
COA 4	Unweighted	1	2	3	1	1	4	2.5	4	4	2.5	3.5	28.5	
	Weighted	2	4	6	4	3	12	12.5	20	16	7.5	3.5		90.5
COA 1: Proceed to Full Rate Production of CH-53K COA 2: Shift to CH-47F Block II COA 3: Upgrade CH-53E fleet, while funding development of autonomous heavy-lift system COA 4: Cancel the CH-53K program and sustain the CH-53E														

Future Research

- Multi-year comparative operational cost analysis of CH-47F Block II to CH-53K.
- Long term analysis of predicted vs. actual figures of the CH-53K.
 - O&S costs, parts availability, maintenance hour requirement, readiness rates.
- Feasibility of long-term incremental upgrades to existing fleet aircraft.
- Future development of Joint / International Heavy Lift capability.



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