

Unmanned Aerial Vehicles

Application within the Marine Corps supply chain
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Historically, the application of unmanned aerial vehicles (UAVs) has been primarily slated for the use of surveillance and intelligence gathering. Originating in the United States as early as the 1950s, UAVs first operated as small radio-controlled aircraft with a small film camera attached. During this time, the UAV was primarily used for intelligence collecting on both China and North Vietnam as a method to avoid risking the lives of pilots or the possible diplomatic consequences that could result if a pilot was captured. At this time, this technology was considered niche as it was unreliable, expensive, and oftentimes pilots had to be in a nearby manned aircraft to control them. As time and technology progressed, the use of UAVs and their practical application to the battlefield advanced. As early as the 1990s, the United States began equipping drones with missiles for use in the Middle East—specifically, in the search for Osama Bin Laden.

The UAV, by definition, is a system that contains the necessary equipment, personnel, and networking capabilities to control an unmanned aircraft. UAVs can be autonomous or radio controlled. While primarily applied to tasks such as surveillance, intelligence gathering, and airstrikes, UAVs can make considerable impacts to the supply chain and logistics field within the Marine Corps if employed properly.

UAV Application

There are several uses for UAV technology within the Marine Corps supply chain and logistics field; for the purpose of this article, we will break them down into external and internal uses.

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Internal uses describe tasks associated with tasks internal to warehouses and within the unit or business-to-business operations. On the other hand, external tasks can be associated with UAV application involving outside the unit transfers or business-to-customer tasks. Business to customer tasks also include the use of UAVs within the unit but outside of warehouse operations, such as the transportation of goods from a supply warehouse to a motor transport maintenance section.

Business to Business

The integration of UAV technology in a business-to-business setting within the Marine Corps has the potential to serve measurable impacts. First, in order to gauge effectiveness and limit risk, UAV technology should be implemented at both intermediate-level and using unit-level warehouse locations such as the Supply Management Unit and unit supply warehouses. UAV applications can allow for accelerated inventories, removing items off location for distribution using optimized paths, and overall



The Marine Corps has been testing and employing logistics UAVs like the Kaman K-MAX Helicopter since 2016. (Photo: Marine Corps Air Station Yuma, AZ.)

safety improvements. UAVs can be employed to move small items within the warehouse quickly and effectively allowing for reduced time cutting out forklift use or the need to scale shelving to access a specific part—a concept known as intra-logistics or the movement of transportation within a facility. UAVs are extremely versatile in nature and can perform several tasks simultaneously, giving them an extreme advantage over their human counterpart.

For example, Amazon has been able to effectively employ the use of UAVs and robotics within their warehouse with Kiva Robotics. These UAVs move on a predetermined path with their direction determined by barcode location; they locate and carry racks loaded with goods from their location on the shelf to a single workstation where a worker is located. As a result of this technology, Amazon's fulfillment rates and speed has significantly improved while simultaneously increasing capacity and reducing labor costs. Overall, the implementation of UAVs within their warehouse has reduced Amazon's operating expenses by over 20 percent and improved total process cycle time from over 60 minutes to just 15 minutes.¹ Furthermore, because of the fact that these UAVs can navigate in significantly smaller spaces than workers, Amazon was able to reduce their inventory space by over 49 percent while additionally lowering their energy cost approximately 50 percent because of the fact that these UAVs do not need to operate in well-lit areas.²

Business to Customer

Business-to-customer tasks entail delivery tasks—primarily conducted outside of the warehouse—can be increasingly more dynamic, as they are conducted outside of the controlled environment that is typically seen in warehouse operations. The employment of UAVs for delivery within the Marine Corps would serve a measurable impact in the delivery of goods to commodities at the using unit level. Traditionally, Marines must physically go to the warehouse when parts are available for pickup. Using a UAV to deliver goods to sections cut down significantly on the time spent in transit. Unfortunately, at

this time, technology only allows for the transportation of smaller weight payloads; however, much of what is placed on order are items such as nuts, bolts, screws, and tool—all items in which would be prime for UAV delivery. Once delivered, the customer or section representative would sign the attached proof of delivery receipt, and the UAV would return to the warehouse where the supply representative would file and upload the document appropriately.

Some possible friction points with this technology include weather limitations, local restrictions, and collision avoidance with other aircraft and limited flight times and distance because of battery life. There is still much work to be done on the business to customer aspect of supply operations using UAVs; however, this technology would be prime for light package and short distance delivery trips given specific conditions.

The Way Ahead

As technology progresses the Marine Corps must adapt in order to maintain the competitive edge over our adversaries. This starts specifically with the way in which we enhance our supply and logistics capabilities. The faster we can get a product out the door and to the Marines at the using unit level and beyond, the quicker Marines can continue the fight. As we look to implement this technology, we should consider a two phased approach; phase one includes the project approval and funding followed by the distribution and employment at intermediate supply accounts such as the Supply Management Unit for a period of twelve months. The application of UAVs by our civilian counterparts allows for immediate assessment of lessons learned and confident employment of this technology. Through time and trial, this technology can then be evaluated, and a determination can be made based on the exhibited performance and benefits. Should this technology provide measurable and substantiated benefits, phase two involves the distribution of this technology to using unit supply accounts throughout the Marine Corps. Implementing this technology in an outside of continental United States

or deployed environment may prove to be challenging but not insurmountable. The technology is readily available and is employed within other facets of the Marine Corps. As Marines, we must look to effectively employ this technology sooner rather than later. It should be noted that UAVs are not a replacement for Marines but rather a supplementation and aid to meticulous and arduous tasks.

Conclusion

Driven by cost, safety, and overall efficiency, UAVs play a critical role in overall supply chain operations and can be specifically applied to use within the Marine Corps to expedite the supply chain process while simultaneously improving safety and efficiency. Given their ability to fly autonomously, carry payloads, intelligently analyze surroundings to avoid obstacles both indoors and outdoors, and operate in fleets, UAVs can provide a significant advantage over our adversaries within the field of supply chain and logistics. More importantly, this concept allows us as Marines to operate at a higher level with a smaller footprint. The Marine Corps, as called upon in the *Commandant's Planning Guidance* and *Force Design 2030*, must learn to increase lethality and effectiveness during distributed operations, the employment of UAVs within the supply and logistics field answers that call.³

Notes

1. Greg Lamm, "Here's How the \$775M Investment in a Robotics Company is Paying off for Amazon," *American City Business Journal*, (June 2016), available at <http://www.bizjournals.com>
2. Alexis Madrigal, "Autonomous Robots Invade Retail Warehouses," *Wired*, (January 2009), available at <http://www.wired.com>.
3. Gen David H. Berger, *38th Commandant's Planning Guidance*, (Washington DC: July 2019).



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