KEY LOGISTICAL AND INFRASTRUCTURE CHALLENGES IN SUPPORT OF THE DEFENSE OF TAIWAN

By: Captain Jaimie Leatherman

In an event where the U.S. Military intervenes in a China invasion of Taiwan, there are multiple aspects of war that would need to be considered operating in the Pacific. The United States (U.S.) has been operating in the Middle East fighting the global war on terrorism, however, a conflict in the Pacific presents unique geographical issues, specifically on infrastructure and logistics. To win in the defense of Taiwan against China, the U.S. Military will need to preposition assets, apply Agile Combat Employment (ACE), and utilize vertical take-off aircraft to meet the logistic and infrastructure requirements in the Pacific region.

LOGISTICS AND INFRASTRUCTURE

Operating in the Indo-Pacific region presents issues unlike the Middle East, where supplies can easily be moved in theater on trucks and railways. The geography of the Pacific does not allow that ease and everything that will need to be moved will have to go by air or sea[1]. Because of this issue, there becomes an added stress of moving equipment, parts, and supplies that must be reliant on the weight limits of cargo airplanes and a time constraint when routing supplies by sea. One solution is prepositioned assets in the Pacific.

1. Prepositioned Assets

Prepositioned assets play two roles for the U.S. to be successful. First, it can decrease the number of needed pallet positions on cargo aircraft as well as on ships to make room for more people or more equipment and aircraft parts. These prepositioned assets can range from medical

[1] Insinna, Valerie. "The US Air Force Has Unconventional Plans to Win a War in the Asia-Pacific." Defense News. Defense News, February 11, 2020. https://www.defensenews.com/digital-show-dailies/singapore-airshow/2020/02/11/the-us-air-force-has-unconventional-plans-to-win-a-war-in-the-asia-pacific/.

supplies, aircraft parts, runway repair kits, fuel, and more[2]. The Air Force is developing supply kits that are module-based for a plug-and-play effort into whatever the user needs[3]. The kits could include runway repair material and communication gear. Col Daniel Lockert, chief of Pacific Air Forces' logistics plans division said: "That central location would have a majority of these prepositioned clustered items, and then when we branch out to another location, we can peel parts of that prepositioning kit out and move it forward"[4]. Being able to move these kits forwards is the second reason these kits will aid in the U.S. strategy.

2. Agile Combat Employment (ACE)

Having prepositioned kits in the Pacific aids in applying Agile Combat Employment (ACE). ACE is the concept of dispersed operations to successfully survive and operate in contested environments[5]. ACE is one of the many new concepts evolving to operate in what the National Defense Strategy (NDS) is calling logistic under attack (LUA)[6]. LUA in this case, would be the threat of China attacking Main Operating Bases (MOBs) in the Pacific region first[7]. By implementing ACE, the Air Force would be able to "move to win"[8]. By spreading out aircraft, people, and assets, makes the Air Force a harder target to engage, which will increase resiliency. Lt Gen Clint Hinote stated, "We tried to design ourselves where we would be a hard

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[2] Insinna, Valerie. "A US Air Force War Game Shows What the Service Needs to Hold off - or Win against - China in 2030." Defense News. Defense News, April 12, 2021. https://www.defensenews.com/training-sim/2021/04/12/a-us-air-force-war-game-shows-what-the-service-needs-to-hold-off-or-win-against-china-in-2030/.

[3] Insinna, Feb 2020

[4] Insinna, Feb 2020

[5] Thomas, Lt Gen Jon T. "Bases, Places, and Faces Operational Maneuver and Sustainment in the Indo-Pacific Region." *JOURNAL OF INDO-PACIFIC AFFAIRS*, no. Summer (2021). https://media.defense.gov/2021/Jun/03/2002733832/-1/-1/1/THOMAS.PDF.

[6] Barry, Lt Gen Warren. "Air Force Persistent Logistics Sustaining Combat Power during 21st Century Competition and Conflict." *The Mitchell Forum*, no. 37 (December 2020). https://a2dd917a-65ab-41f1-ab11-5f1897e16299.usrfiles.com/ugd/a2dd91_e5e06eb2f4254bcbaa9fa7452de5eece.pdf.

[7] Thomas, 2021

[8] Barry, 2020

target. As an example, we never filled up any airfield more than 50 percent, so even if you lost that entire airfield, you wouldn't lose your entire fleet"[9]. Lt Gen Jon T. Thomas echoes Lt Gen Hinote, that China's weapon capabilities can reach the second island chain, and for the U.S. to win, being able to disperse will give the U.S. the advantage[10].

Dispersed operations can present some challenges. Having to send medical supplies or water to one location in the Pacific can be a hurdle in a contested environment but will be exacerbated by ACE and delivering supplies to multiple FOBs across multiple countries. Operating in multiple domains across multiple areas of responsibilities is going to take joint communication across all the branches of service to successfully execute the ACE concept.

3. Vertical-lift aircraft

Lt Gen Hinote highlights another logistical issue, losing an entire airfield. The Air Force suspects that China will target MOBs first, so implementing ACE is crucial, but what if there are no runways or limited runways? With the current aircraft inventory, there are not a lot of aircraft that can fly in and out of small or decimated airfields. Therefore, the U.S. needs to invest in additional vertical take-off aircraft. The benefit of having vertical take-off aircraft is two-fold but does come with some secondary effects. Vertical lift can make aircraft a harder target because it would not be tied to a long runway and can potentially avoid incoming enemy fire[11]. It is also going to be important for ACE and operating in smaller forward operating bases (FOBs) that potentially have smaller or no runways to launch aircraft. Having the freedom of vertical lift will increase options for logistics planner for moving parts, equipment, and people around the Pacific. The U.S. in both the military and private sector are building prototypes for

[9] Insinna, April, 2021
[10] Thomas, 2021
[11] Tirpak, John A. "Air Force Eyes Vertical Lift Tech to Replace C-130." Air Force Magazine, June 8, 2021. https://www.airforcemag.com/air-force-c-130-replace-vertical-lift-technology/.

vertical lift aircraft, but they are small and cannot carry large amounts of cargo. This would mean producing more sorties to match what a cargo aircraft could carry. Even with ACE and rapid runway repairs, some of the potential austere locations could be impossible to land a C-130 or C-17 whereas a vertical take-off aircraft could.

The current inventory of vertical lift aircraft includes the CV-22, HH-60G, HH-60W, UH-1N, and new MH-139 Grey Wolf, none of which can operate with the capabilities of a cargo aircraft[12]. For vertical lift aircraft to be successful, there needs to be an aircraft that can withstand the vast distances of island hopping in the Pacific, as well as being able to carry troops, patients, equipment, or weapons and do it swiftly. Unmanned aircraft or remotely piloted aircraft can assist with bringing in supplies and equipment, but is still limited on space, but could drop in emergency supplies to austere locations.

SUPPLY CHAIN ISSUES

The looming issue on the supply chain will be a challenge. Needing supplies for aircraft parts, weapons and even food and water are going to be a challenge for this conflict and to prepare for this type of engagement, the military will need to become less risk-averse[13]. One example is for troops on the ground to not have to carry as much food and water supplies by utilizing local resources that are vetted and approved to sustain themselves on missions[14]. This leaves ground troops more room for extra weapons and communication equipment or makes them lighter to move more swiftly[15].

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[12] Tirpak, 2021

[13] Myers, Stephanie, Eric Shirley, Brian Joseph Anderson, and Steven Hejmanowski. "Logistics Under Fire Changes for Meeting Dynamically Employed Forces." *Joint Force Quarterly* 100 (January 2021): 57–64. https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-100/jfq-100_57-19_Myers-et-al.pdf?ver=kfk0emD9LVkOwykSE2lWRA%3D%3D.

[14] Myers et. al., 2021

[15] Myers et. al., 2021

Another example is utilizing Business Intelligence. This is an emerging cloud-based technology that each Combatant Command would have access to view all supply sources, both Defense Logistics Agency (DLA) and locally available on smartphones and tablets[16]. The database would use crowdsource updates to have real-time information on stock levels in different countries, transportation available, theater clearances, and host nation agreements[17]. This would enable Combatant Commanders to make real-time decisions on supply assets and transportation capabilities[18]. If Combatant Commanders choose to utilize ACE and disperse troops, having this type of technology, can accelerate finding local resources for medical supplies, food, water, and parts vendors even after hostilities have started[19]. The Army is already utilizing In-Transit Visibility (ITV) which uses Radio Frequency and Automatic Identification Technology to source, support, ship, and track equipment, and parts directly to the warfighter[20]. ITV can also re-route packages to support troops that have changed locations, which would increase ACE capabilities[21]. However, these types of technologies can be targeted in space and cyberspace domains and could further disrupt the supply chain. There needs to be evolving technology to operate these systems on a secure network from the enemy, while still gathering information from local communities.

OTHER CONSIDERATIONS

A conflict of this magnitude will be brutal and violent, but there has been little talk about patient movement. This adds an entirely new challenge to the logistical challenges already identified. What risks are combatant commanders willing to take to send in aircraft with a

[16] Myers et. al., 2021
[17] Myers et. al., 2021
[18] Myers et. al., 2021
[19] Myers et. al., 2021
[20] CASCOM. "In-Transit Visibility (ITV)." In-Transit Visibility, Sustainment Business System Integration, Fielded Forces Integration Directorate, CASCOM, July 13, 2020. https://cascom.army.mil/g_staff/cdi/esd/itv/.
[21] CASCOM, 2020

medical aero-evacuation team on board? Aircraft would have to be dedicated to this cause and could potentially take away from the fight. This also ties into out how maintenance recovery teams (MRTs) will be sent into austere locations to fix aircraft that Flying Crew Chiefs (FCCs) can't fix alone. If runways are being targeted and the Air Force is operating in an ACE environment, there is going to be a need for all available assets to be available to the warfighter.

CONCLUSION

The U.S. Military has not operated in a contested environment without air superiority since World War II[22]. There are many challenges to overcome in the next decade if the U.S. wants to compete with near-peer adversaries like China to protect Taiwan. Prepositioned assets and vertical lift aircraft will give the Air Force the best chance at successfully implementing ACE and ensuring success against China.

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[22] Myers et. al., 2021

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