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China's Logistic Support to Expeditionary Operations

Key Judgments

- People's Liberation Army (PLA) logistics capabilities are crucial to support expanding overseas non-war and wartime missions. While the PLA assesses current military and civilian logistics capabilities as inadequate to support increased operations globally, research over the past decade has examined methods to improve logistics capabilities.
- China views a strategic delivery capability as a critical logistics component to support expeditionary operations as well as an important means of deterrence and gaining influence. The Joint Logistic Support Force plays an important role in coordinating strategic delivery.
- The 2017 *Science of Strategy* contains a chapter on overseas operations identifying war and non-war military operations. The PLA currently conducts a broad range of non-war operations overseas such as peacekeeping, maritime escort, training and exercises, and military diplomacy. Potential overseas combat operations could range in scale from limited counterterrorism operations, operations to maintain maritime rights to a regional conflict in the case of operations against Taiwan.
- The 2017 National Defense Transportation Law strengthens construction and development of national defense integration, as well as promoting civil-military transportation integration. The Transportation Law provides the basis for mobilizing civilian transportation resources to support peacetime or wartime military missions.
 - The mobilization structure is complex relying on coordination between military, civilian government and civilian enterprise organizations. An additional mobilization issue is that the required civilian transports could be anywhere in the world when needed.
 - Under the law, civilian transportation assets are formed into reserve formations.
 - Incorporation of military standards into civilian construction is meant to ensure compatibility with military requirements. However, civilian enterprises do not appear to be fully complying with the Law and PLA sources believe the law is inadequate as currently formulated.
- Civil-military integration is an important component supporting PLA modernization and improving military capabilities. This integration allows the PLA to leverage civilian research, expertise and capabilities to support the military. The Joint Logistic Support Force plays an important role in civil-military integration in the area of logistics.

- The Joint Logistic Support Force is responsible for logistic and equipment support for general supplies common to all the services as well as coordination of strategic delivery. The services maintain logistics for items specific to the service. Both the Joint Logistic Support Force and service logistics will support overseas operations. Navy logistics are especially important as that service undertakes expanded global missions.
- Current logistics support for non-war overseas missions is mostly adequate. The establishment of the Djibouti Logistics Supply Base eases logistics and maintenance for the anti-piracy escort missions, although escort ships continue to seek support from friendly foreign ports in the region.
- The PLA has had difficulties providing equipment support for peacekeeping. The South Sudan peacekeeping battalion has had difficulties meeting the United Nations strict equipment verification procedure. Current PLA logistics problems supporting a relatively small force indicate supporting a larger force under combat conditions would stress the logistics system.
- PLA logisticians are examining requirements for a network of overseas logistics bases both ports and airbases. Base on PLA analysis, it appears that additional logistics bases will be established. The 2017 *Science of Strategy* states the need to establish both temporary and fixed overseas supply points highlighting the strategic maritime corridors in the Pacific and Indian Ocean. Chinese overseas enterprises can also provide support to operations.
- PLA strategists advocate the establishment of airbases to support strategic delivery of forces, equipment and material. Air transport is the most rapid method for moving supplies and forces. The Belt and Road Initiative has led to China establishing international air passenger agreements with 65 countries and freight transportation agreements with 26 countries taking part on the economic project. PLA sources identify five strategic regions for potential airbases Africa, the Middle East and Central Asia, South Asia, Southeast Asia, and Central and South America.
- In addition to establishing a support network of overseas ports and airbases, PLA sources identify several other methods for supporting operations. These methods include constructing artificial islands or floating bases. The Chinese concept for floating bases resembles the US military "mobile offshore base" concept using a very large floating structure made of modules that can be linked together. The PLA's assessment of the advantages of these support methods include avoiding host nation restrictions.
- The PLA recognizes prepositioning of material and equipment as an important means to rapidly introduce forces into a region. PLA theorists have examined US military prepositioning for lessons. Prepositioning could use military or civilian ships, in addition to floating bases, artificial islands or bases on land. The PLA recognizes prepositioning as an important component of future naval logistics.

- The Joint Logistic Support Force plays an important role in coordinating strategic delivery, although multiple organizations are involved. Some PLA sources recommend establishing centralized organizations similar to the US Air Force Military Airlift Command and US Navy Military Sealift Commands. The Central Military Commission could empower the Logistic Support Department's Transport and Delivery Bureau to play a more centralized role in coordinating strategic delivery resources.
- The PLA Navy's current logistics and strategic delivery capabilities are limited. The fleet of comprehensive supply ships and tankers are few and relatively slow, while newer, more capable amphibious assault ships for transportation are few, albeit growing.
- PLA Air Force strategic delivery capabilities are currently limited as well. The Y-20 transport is being fielded, but large numbers of heavy transports are needed to meet strategic delivery requirements. Refueling tankers are also few.
- The PLA will mobilize large and medium civilian shipping enterprises to support overseas missions. Some PLA sources suggest mobilizing at least 100 civilian ships to support emergency operations. Since 2012, civilian shipping companies are forming a "strategic delivery support fleet" to include support to PLA offshore and open sea offensive and defensive operations.
- The PLA assesses the training of the civilian reserve fleet as inadequate. Skills required for wartime support missions are particularly lacking. Civilian ships do train with the PLA active force, but in small numbers. Despite the Transportation Law, many civilian ships require modifications before augmenting the Navy.
- As with the PLA Navy, the Air Force can mobilize civilian aircraft. China began establishing a strategic delivery support force for civil aviation in 2013. Currently there are 15 civil support fleets based on major airlines to meet increasing requirements for overseas non-war and wartime missions. While the civil air fleet has many cargo aircraft, only approximately 143 large and medium cargo planes are assessed as meeting PLA standards, many of them Boeing transports.
- The PLA Air Force has begun experimenting with the use of unmanned aerial vehicles for resupply to remote locations. The Air Force Logistic Department has partnered with a civilian company using medium-size drones. The Air Force views the experiment as part of the intelligent battlefield revolution.
- Road and rail delivery remain an important transportation method, although more suitable for operations along China's land borders, for example in Central Asia under the auspices of the Shanghai Cooperation Organization. In addition to rail movement, the PLA employs heavy equipment transporters (HET) for moving heavy equipment over long distances. The number of PLA and civilian HETs meeting military requirements are too few, with recommendations that the PLA acquire additional equipment. The PLA also has a large but unknown number of motor transport brigades and regiments for movement of supplies and forces.

- PLA overseas logistics support and strategic delivery requirements are currently limited, and air and maritime transports will need considerable expansion to meet future expeditionary operation requirements. Logistics' weaknesses include the following:
 - Lack of a network of overseas logistics support bases and prepositioning of material and equipment for rapid deployment and continued sustainment of forces operating overseas.
 - A complex coordination system for strategic delivery and mobilization of civilian asset including military, civilian government, and civilian enterprises. Requirement for greater centralization of coordination responsibilities.
 - Greater civil-military integration with the incorporation of military standards into ship and aircraft construction.
 - Civilian transportation personnel need regular and improved training to include more extensive training with the PLA active duty force.
 - The need to incorporate new technologies into the military and civilian logistics force to provide for a precision logistics support capability to overseas forces. These technologies include big data, intelligent delivery decision making systems, autonomous logistic systems, dynamic monitoring systems, precision airdrop technology, hypersonic transport aircraft, and logistics equipment capable of operating in special and extreme environments.
 - Improvements in rapid loading and unloading; greater palletization and containerization; faster and larger long-range transport ships and aircraft
- While the PLA acknowledges that its current logistics and strategic delivery capabilities even with civilian augmentation are inadequate, modernization and planning efforts appear likely to improve the PLA's capability to support future non-war and wartime expeditionary operations.
- Non-war missions provide the US an opportunity to work cooperatively with China and the PLA. However, as the PLA expands its capability to support wartime missions globally, the threat to US and allied forces operating overseas will increase. The mobilization and employment of civilian assets could make identification and targeting of transportation assets conducting military missions difficult. Overseas PLA bases, civilian ships, aircraft and enterprises can provide intelligence and targeting data.
- The US will need to carefully consider cooperation and technology transfers on critical technologies that can contribute to the PLA's precision logistics. This consideration should include sales, cooperation and technology transfers to Chinese shipping and airline enterprises.

Background

The 2017 "Science of Strategy (战略学)" published by the PLA's National Defense University highlights overseas operations with a chapter on force employment in war and nonwar situations. The PLA identifies basic overseas operations mainly as the following: peacekeeping; humanitarian assistance and rescue; maritime escort; evacuation of overseas personnel; international military exercises; strategic cruises; maritime training; military assistance; warship visits; and international antiterrorism.¹ In addition to the PLA's list of nonwar missions, conflict scenarios could range from limited combat operations exemplified by counterterrorism operations in Central Asia in support of Shanghai Cooperation Organization (SCO) countries to a regional conflict as in the case of operations against Taiwan. Any overseas mission has the fundamental requirement of logistics support if it is to succeed.

The *Science of Strategy* (2017) acknowledges the difficulty of providing comprehensive support to overseas operations; in part based on the PLA's accumulated experience in international peacekeeping, humanitarian assistance, overseas evacuations, and exercises and training with foreign militaries. Strategic delivery, primarily sea and air transport, and timely support of overseas forces are difficult as domestic logistics support facilities and mechanisms cannot play a role in overseas operations.²

China's BRI, the "new security concept (新安全观)", and the "Go Out (走出去)" strategy are placing greater importance on Navy and Air Force long-range capabilities. The Navy is moving towards a blue water, distant sea force while the Air Force is becoming a strategic force. This transformation towards global operations creates complex logistics requirements. Overseas operations are conducted over long distances, require endurance as well has exhibiting high consumption rates, posing difficult problems for the PLA to overcome currently. Naval logistics has relied on shore-based replenishment from China's coast, accompanying maritime replenishment from a small fleet of supply ships, or reliance on replenishment and maintenance in friendly countries. As China's overseas missions continue to expand, logistics support will transition to the development of a network of overseas support bases, prepositioning, relay support, strengthening accompanying support with the construction of new-type rapid, multifunction supply ships, and replenishment from civilian ships or overseas enterprises. Some PLA sources suggest the use of floating bases or the creation of artificial islands to support logistics and the prepositioning of supplies and equipment.³

The PLA is expanding it logistics capabilities, including civilian strategic delivery forces, to deploy and sustain forces during overseas missions. The PLA has experience in supporting non-war, for example peacekeeping, training and military diplomacy missions overseas. The PLA is also improving civil-military integration to leverage the civilian sector to support overseas operations. Logistics mobilization can call-up substantial civilian assets to support the military. PLA discussions include the possibility of employing foreign transportation assets.

¹ Xiao Tianliang (肖天亮) chief ed., 战略学 (Science of Strategy), Beijing, China: NDU Press, 2017, pp. 307-308.

² Xiao Tianliang (肖天亮) chief ed., 战略学 (Science of Strategy), Beijing, China: NDU Press, 2017, p. 314

³ Han Yue (韩跃), "中美海军远海护航行动后勤保障模式比较研究" ("A Comparative Study of Logistic Support Methods of China and US Navy Escort Operations"), *National Defense* (*国防*), June 2017, pp. 40-43

Some PLA sources suggest the need to establish a specialized overseas logistics support force. Expeditionary logistics support requires specialized capabilities, advanced skills training, and a high degree of informationized or intelligent systems to support diverse operations. Personnel serving overseas also require knowledge of international of foreign laws and regulations, local military geography, local customs, culture and religion.⁴

The PLA views strategic delivery as an important aspect of overseas logistics support. The PLA is examining US, as well as Russian, strategic delivery capabilities and operations to support expeditionary operations. The PLA believes that strong strategic delivery capabilities can also serve as a deterrent or influence countries actions.

Transportation Regulations

China intends to improve civilian-military integration and transportation support to military logistics and strategic delivery. The National Defense Transportation Law that came into force in 2017 strengthens civil-military construction and development of national defense transportation and mobilization of civilian resources. The law promotes integration of military standards into civilian transportation construction as well as requiring overseas enterprise support to military operations. The 2017 transportation law provides for the following:⁵

- Railways, roads, waterways, shipping, aviation, and pipelines are planned, constructed and managed to support defense requirements.
- Civil-military integration optimizes the allocation and sharing of all transportation resources in peacetime, emergencies and wartime.
- The state national defense transportation administration provides planning, direction and coordination of local national defense transportation administrations at and above the county level. These organizations may expropriate civilian vehicles, transportation facilities, transportation materials, and other civil transportation resources.
- Technical standards and specifications of transportation facilities and equipment will meet national defense requirements.
- Improved information construction supporting national defense transportation.
- The armed forces determine the scope and categories of civil transportation requirements and deliver the standards to the civilian sector in a timely manner.
- The state, in coordination with large and medium transport enterprises, organizes the construction of civilian strategic delivery support forces to augment the military, enhance the strategic delivery capacity, and provide effective support for the rapid organization of long-distance and large-scale national defense transport.
- State agencies stationed abroad, enterprises engaged in international transportation and their overseas institutions shall aid with the replenishment, maintenance and repair of military vessels, aircraft, vehicles and personnel engaged in overseas operations.

⁴ Dong Zhigao (董智高) and Zhou Lei (周磊), "关于海外军事后勤保障力量建设的认识与思考" ("The understanding and reflections on overseas military logistics support force construction"), 国防科技 (National Defense Science & Technology) Vol. 37 No. 2 April 2016, pp. 83-86

⁵ "中华人民共和国国防交通法" ("National Defense Transportation Law of the People's Republic of China"), available from <u>http://www.mod.gov.cn/regulatory/2016-09/03/content_4724196.htm</u>, accessed December 20, 2019

- The state government at or above the county level, with support by the military, shall organize the relevant enterprises to carry out the rush repair of traffic facilities and vehicles to ensure the smooth progress of national defense activities.
- The state government and the military will organize training and drills of the transportation enterprises under the relevant provisions of the militia's participation in military training.
- Mobilized transportation assets may be given movement priority.
- A national defense transportation reserve system will support transportation requirements during peacetime and war.

The standards and technical requirements for civilian ship construction includes container ships, roll-on roll-off (RORO), multi-purpose, bulk cargo and general cargo ships. The requirements define ship performance, utilization objectives, and design. Civilian aircraft and other transportation resources are included. The standards requirement is intended to transform China's large civilian ship and aircraft inventory into a military strength for strategic delivery and logistics support.⁶

The transportation law is intended to improve civil-military integration and civil enterprise mobilization and support to internal and external military operations. However, numerous PLA sources detail problems with a lack of suitable civilian ships and aircraft, equipment not meeting military standards, as well as poor training.

Civil-Military Integration⁷

Civil-military integration is a critical foundation to enhance support for military operations including overseas operations relying on civil aircraft and shipping to supplement military capabilities. The Joint Logistic Support Force (JLSF) plays an important role in civil-military integration related to logistics. This is important for leveraging civilian expertise, research, production and capabilities to reinforce joint logistics. Outsourcing to the private sector of certain logistics requirements is intended to create greater efficiency, flexibility, and timeliness to support activities. The logistics force has arrangements with private companies to provide supplies directly to units, and Chinese overseas enterprises will support military missions. Logistics mobilization in wartime relies greatly on civilian resources. The concept of "supporting the front" has local governments and the population supporting military forces with manpower, material and financial resources, medical, transportation, maintenance, and engineering support, as well as intelligence.⁸

⁶ "《新造民船贯彻国防要求技术标准》颁布实施" ("Promulgation and implementation of 'Technical Standards for the Implementation of National Defense Requirements for Newly Built Civil Ships'"), available from <u>http://www.mod.gov.cn/regulatory/2016-02/19/content_4617916.htm</u>, accessed December 20, 2019 ⁷ The PLA consistently translates 军民融合 as civil military integration, not civil military fusion or military civilian fusion.

⁸ "国家国防交通" ("National Defense Transportation"), 中国国防报 (China National Defense News"), April 18, 2017; "联勤保障部队探索被装供应保障新模式" (Joint Logistic Support Force Explores New Model of Outfitting Supply Support"), available from http://www.81.cn/jfjbmap/content/2017-05/03/content_176307.htm, accessed December 20, 2019; "国防部举行联勤保障体制改革专题新闻发布会" ("Ministry of National Defense Holds Special Press Conference on Joint Logistics Support System Reform"), available from http://www.81.cn/jwgz/2016-

Key components of the integration are improving the military logistics research and production system supported by the State Administration for Science, Technology and Industry for National Defense (SASTIND), as well as improving military specialized talent and education. The current form of civil-military integration promotes the following objectives:⁹

- Accelerating logistics mobilization capability through the integration of the civilian economy, industry, and infrastructure to support military requirements, and the leveraging of civilian capabilities in the areas of medical, materials, maintenance and transport.
 - Civilian construction projects are designed to meet military requirements. This
 includes civilian aircraft and shipping, construction of highways to include
 aircraft landing strips, and civilian airports and ports. In particular, the
 development of civilian transportation and communications infrastructure is
 designed to improve the national defense mobilization system.
 - Military logistics incorporates the civilian support system for military reserves, transportation and distribution.
- The PLA leverages civilian scientific research to support its interests in key technologies such as quantum computing and communications, artificial intelligence and other emerging technologies believed capable of the next revolution in military affairs.

Joint Logistic Support Force

Logistics and equipment support are divided between the Joint Logistic Support Force (JLSF) and service support forces. The JLSF is responsible for logistics and equipment support of general items common to all the services, while the individual service logistics and equipment support is focused on items specific to the service. Based on this division of labor, both joint and service support systems would support overseas missions. The JLSF is part of a complex system of organizations responsible for mobilization and strategic delivery. Navy and Air Force service logistics systems would have significant overseas involvement due to the likelihood of those two services extensive participation in overseas operations.

The JLSF appears to be currently focused on support to theater command (TC) joint operations and training, as well as supporting transiting forces during cross-region exercises.¹⁰

¹⁰ Zhang Tao, ed., "China Establishes Joint Logistic Support Force," available from <u>http://eng.chinamil.com.cn/view/2016-09/13/content_7256651.htm</u>, accessed December 12 2919; Tian Xuejun (田学军) and He Yongliang (何永良), "军委联勤保障部队首次高级专业技术资格评审" ("The First Senior Specialized and Technical Qualification Evaluation of Joint Logistic Support Force of CMC"), available from <u>http://www.xinhuanet.com//politics/2016-12/16/c_1120128046.htm</u>, accessed December 12, 2019; "揭秘新成立 的中央军委联勤保障部队" ("Revealing the Newly Established Joint Logistic Support Force of the Central Military Commission"), available from <u>http://military.people.com.cn/n1/2017/0119/c1011-29035648.html</u>, accessed December 12, 2019

^{09/13/}content 7257124.htm, accessed December 20, 2019; "军语" ("Military Terms"), Beijing: Military Science Press, 2011, pp. 481-482

⁹ Guo Zhonghou (郭中侯) chief editor, "军民融合概论" ("Introduction to Civil Military Integration"), Beijing: National Defense University Press, 2015, pp. 32-39

Joint Logistic Support Centers' support brigades are modular adhoc units to provide long-range mobile comprehensive joint logistics support in a main operational direction. There are also Army reserve logistics support brigades available for mobilization. These brigades could support cross border operations along China's periphery; for example, as part of a Shanghai Cooperation Organization (SCO) combined force.¹¹



Command coordination for force projection under the new theater command organization is complicated. An example given in a PLA article discusses the following commands and organizations involved in coordination of force projection: the theater joint command center, the joint logistic support center command, the headquarters of the participating unit(s), the country involved, and national and local rail, road, water, air transportation dispatch centers depending on the situation as well as the civilian enterprise if their assets are mobilized. The joint logistic support center within a theater assists in planning and use of the civilian and military transportation resources.¹²

Examples of Current Overseas Missions

The PLA's conducts diverse non-war missions abroad. Logistics and strategic delivery requirements for the non-war missions are not overly taxing and have been supported by military and civilian transport and support assets, although logistics problems have arisen. The following are select examples of PLA missions abroad.

Maritime Escort

 ¹¹ PLA Daily, November 12, 2012; <u>Chinamil.com</u>, August 15, 2013; <u>PLA Daily</u>, October 9,2013; <u>Chinamil.com</u>, July 26, 2014; *Joint Operations Research*, (Beijing: National Defense University Press, 2013), pp. 289-290
 ¹² Li Peng (李鹏) et al, "战区联合投送指挥研究" ("Study on Joint Projection Command for Theater Command"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 21 No. 5 May 2019, pp. 1-5

The Gulf of Aden anti-piracy escort mission began in 2008. In December 2019 the 34th escort fleet departed Sanya consisting of the guided missile destroyer *Yinchuan*, the guided missile frigate *Yuncheng*, and the comprehensive supply ship *Weishanhu*. The escorts typically include two warships and a comprehensive supply ship.¹³ Until August 2013 a "supply ship troika" of the *Weishanhu*, *Qiandaohu*, and *Qinghaihu* alternately accompanied the escort taskforce. Since then a variety of supply ships have accompanied the escort taskforce providing experience to the Navy's supply ships.¹⁴ Some logistics highlights for the escort mission include the following:

- The 11th naval escort conducted the first maritime replenishment of fuel and water in 2012.¹⁵
- In 2014 the 16th escort's comprehensive supply ship conducted longitudinal and lateral replenishment of the two guided missile frigates in the Atlantic Ocean for the first time.¹⁶
- In 2017 the 26tth escort's supply ship provided fuel and water to a destroyer and frigate en route to a Sino-Russian exercise in the Baltic Sea.

Prior to the establishment of the Djibouti Support Base the escort fleets received replenishment in friendly regional ports, for example the Port of Salalah in Oman. The escort ships continue to conduct some resupply and maintenance at foreign ports after the establishment of the Djibouti base.¹⁷

Peacekeeping Missions

The PLA has participated in 24 United Nations (UN) peacekeeping operations since 1990 and has become a major contributor of financial support and forces. From 2006 to 2015 the PLA organized more than 240 flights transporting more than 37,000 personnel and 2,700 tons of material to its peacekeeping missions. As of May 2019, most of the missions are in Africa followed by the Middle East, with the largest located in South Sudan UNMISS 1.055 personnel. As of June 2019, China's UN peacekeeping missions include Mali MINUSMA 413 personnel, Lebanon UNIFIL 419 personnel, Darfur UNAMID 365 personnel, Democratic Republic of the Congo MONUSCO 218 personnel, Western Sahara MINURSO 12 personnel, Jerusalem UNTSO 5 personnel, and Cyprus UNFICYP 4 personnel.¹⁸

¹⁴ Huang Panyue, editor, "PLA Navy ends era of "supply-ship troika" in its escort mission." available from <u>http://eng.chinamil.com.cn/view/2018-08/09/content_9247256.htm</u>, accessed December 17, 2019

http://eng.mod.gov.cn/Photos/2014-10/08/content_4542052.htm, accessed December 14, 2019; "第 33 批护航 编队开始第 2 轮靠港补给" ("The 33rd Escort Formation begins the Second Round of Port Resupply"), available from <u>http://www.81.cn/ifjbmap/content/2019-10/26/content_246132.htm</u>, accessed December 17, 2019 ¹⁸ Chen Zhuo, editor, "Graphics: China's role in world's peacekeeping cause," available from

http://eng.mod.gov.cn/news/2019-05/30/content_4842503.htm, accessed December 14, 2019; Zhang Xin (张昕) et al, "依托战略投送支援机队实施海外航空战略投送" ("Overseas Aviation Strategic Projection Using Strategic

¹³" 第 34 批护航编队起航" (The 34th Escort Sets Sail"), available from <u>http://www.81.cn/ifjbmap/content/2019-</u> <u>12/24/content 250599.htm</u>, accessed December 24, 2019

¹⁵ "11th Chinese naval escort taskforce conducts first maritime replenishment," China Military Online, March 5, 2012

 ¹⁶ "Chinese escort taskforce conducts replenishment in Atlantic Ocean," *China Military Online*, May 14, 2014
 ¹⁷ Guo Renjie, editor, "Chinese naval ship berths in Salalah Port for replenishment," available from

The UN has an integrated logistics network and each peacekeeping mission provides procurement plans. UN logistics includes purchasing and distributing supplies such as fuel, drinking water and food. Contributing country contingents are responsible for first-line self-sustainment which is transportation of supplies from battalion level to company level and below, as well as equipment maintenance and repair.¹⁹ Chinese peacekeeping units also use local procurement for fresh food. The Djibouti Support Base improves Chinese peacekeeping logistics serving as a transit hub for operations in Africa and the Middle East.²⁰ China's peacekeeping personnel are transported by chartered civilian aircraft or Air Force transports while much of the logistics support is sent by ship which takes about 10 days to reach the Gulf of Aden.²¹

The PLA peacekeeping infantry battalion in South Sudan is equipped with more than 100 vehicles including command, infantry fighting, personnel, protective assault, transport and special vehicles. The maintenance and support organization consist of a support company including a logistics platoon with a repair shop responsible for the entire battalion. The equipment support personnel are too few and require high levels of training to support the arduous task of maintaining and repairing equipment. PLA sources report that the quality of logistics personnel has been problematic. The harsh environment and battalion's high-tempo operations combined with difficulties obtaining spare parts rapidly degrade equipment performance. Apparently, the logistic platoon's ability to anticipate spare part requirements has been poor. The UNs equipment verification of peacekeeping forces is strict with PLA units having difficulty passing.²² These difficulties providing logistics support to a relatively small unit overseas could indicate that the PLA would currently have difficulty supporting a larger force under combat conditions.

Exercises Abroad

The PLA conducts combined exercises on the territory of other nations and at sea. The PLA has participated large exercises in Russia including some of the Peace Mission exercise

Projection Support Fleet"), 军事交通学院学报 (Journal of Military Transportation University), Vol 20 No. 4 April 2018, p. 6

¹⁹ "Military Logistics Unit for United Nations Peacekeeping Operations," available from dag.un.org/bitstream/handle/11176/400724/Military Logistic Unit STM 3.1.pdf?sequence=13&isAllowed=, accessed on December 14, 2019

²⁰ Institute for Security & Development Policy, "China's Role in UN Peacekeeping;" available from http://isdp.eu/content/uploads/2018/03/PRC-Peacekeeping-Backgrounder.pdf, accessed December 14, 2019

²¹ Yao Jianing, editor, "Chinese peacekeeping engineers to Lebanon set out," available from <u>http://eng.mod.gov.cn/TopNews/2016-05/20/content_4661717.htm</u>, accessed December 14, 2019; Yu Donghai and Chen Kaikai, "6th Chinese peacekeeping infantry battalion to South Sudan (Juba) sets out," available from <u>http://eng.mod.gov.cn/news/2019-11/20/content_4855272.htm</u>, accessed December 14, 2019; Ma Fangfang (马 方方), "加强我军维和行动后勤保障的几点思考" ("Some Thoughts on Strengthening the Logistic Support of our Army's Peacekeeping Operations"), 国防 (National Defense) No. 12 2017, pp. 33-36

²² Chen Xiangbin (陈祥斌) et al, "驻外维和步兵营车辆装备保障探析" ("Vehicle Support for Peacekeeping Infantry Battalions Stationed Abroad"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 21 No. 2 February 2019, pp. 33-36; Ma Fangfang (马方方), "加强我军维和行动后勤保障的几点思考" ("Some Thoughts on Strengthening the Logistic Support of our Army's Peacekeeping Operations"), 国防 (National Defense) No. 12 2017, pp. 33-36

series sponsored by the Shanghai Cooperation Organization, the Russian Vostok-2018 exercise (PLA forces included 3200 troops, 900 pieces of equipment and 30 fixed and rotary-wing aircraft) and the Russian Tsentr-2019 exercise (PLA forces included 1600 troops, 300 pieces of equipment, and approximately 30 fixed and rotary-wing aircraft).²³ The various SCO sponsored exercises are focused mostly on large scale counter-insurgency operations for potential SCO combined force operations within the Central Asian member states. The PLA has used primarily rail and military aircraft to transport troops, equipment and supplies to these exercises.²⁴ There have been no reported logistics issues during these foreign exercises.

Evacuation of Overseas Personnel

Military transport forces require the capability to respond rapidly to overseas crises requiring the evacuation of personnel. Evacuations of citizens from Libya and Yemen are examples of this mission. The 2011 deterioration of the security environment in Libya required the evacuation of Chinese citizens. The military in cooperation with the Ministry of Foreign Affairs, the Ministry of Transport and diplomatic missions was able to evacuate 35,860 personnel within ten days. Most citizens were transported by chartered shipping with 5,000 evacuated by aircraft.²⁵

In March 2015 the Gulf of Aden escort ships were redirected to evacuate Chinese citizens and diplomats from Yemen after the Saudi-led coalition began air strikes on rebel forces. The Chinese press reported that there were approximately 590 Chinese nationals as well as over 200 foreign nationals evacuated.²⁶

Overseas Logistics Bases

Overseas bases are critical for strategic delivery and timely logistics support. While most speculation involves future naval support bases, the expansion of China's military air transport capability will possibly lead to access to foreign airfields or the establishment of external airbases. However, the PLA notes that overseas bases can lead to strategic competition and complicate relations with other countries in addition to the high costs related to establishing and maintaining bases.²⁷

²³ Li Meng, "Top ten firsts of Chinese military diplomacy from 2002 to 2012," available from <u>http://en.people.cn/90786/7960693.html</u>, accessed December 10, 2019; "Chinese military to participate in strategic drills in Russia," available from <u>http://www.globaltimes.cn/content/1116371.shtml</u>, accessed December 10, 2019; "First batch of Chinese troops arrive in Russia for Center-2019 drills," available from <u>http://eng.mod.gov.cn/news/2019-09/06/content</u> 4849920.htm, accessed December 10, 2019

²⁴ "我军参加"中部-2019"演习部队全部抵俄" ("All Our Troops Participating in the "Center-2019" Exercise Arrived in Russia"), available from <u>http://www.81.cn/ifjbmap/content/2019-09/08/content_242867.htm</u>, accessed December 13, 2019

²⁵ Xiao Tianliang (肖天亮) chief ed., 战略学 (Science of Strategy), Beijing, China: NDU Press, 2017, p. 308. ²⁶ "Warship arrives to evacuate Chinese nationals from Yemen," available from

http://usa.chinadaily.com.cn/world/2015-03/30/content 19950055.htm , accessed on December 10, 2019; "China helps 10 countries evacuate nationals from Yemen," available from http://usa.chinadaily.com.cn/china/2019; "China helps 10 countries evacuate nationals from Yemen," available from http://usa.chinadaily.com.cn/china/2015-04/03/content_19995132.htm, accessed on December 10, 2019

²⁷ Hu Xin (胡欣), "国家利益拓展与海外战略支撑点建设" ("Expansion of National Interests and Construction of Overseas Strategic Strong Points"), 世界经济与政治论坛 (Forum of World Economics and Politics), No. 1 January

China's Ministry of Foreign Affairs announced the construction of a logistics support facility in Djibouti in 2016. This first overseas military base conducted a flag raising ceremony opening China's first permanent overseas base on August 1, 2017. The naval support facility provides logistics and personnel recuperation for the anti-piracy escort taskforce, as well as supporting humanitarian assistance, disaster relief and peacekeeping missions in the region.²⁸

China's reclamation of islands in the South China Sea are equipped with harbors, berthing areas, airfields and facilities to provide logistics support for PLA Navy and Air Force operations in this critical sea lines of communication.

The PLA sources and Chinese academics have proposed the establishment of "strategic strong points (战略支撑点)" to support the Maritime Silk Road. Strategic strong points are needed to support and sustain overseas operations. A network of strong points will provide comprehensive supply, maintenance and repair, information collection, maritime monitoring, humanitarian and medical rescue, as well as maintain maritime development, control and rights. Establishing a network of strong points can reduce the Navy's dependence on comprehensive supply ships which are too few currently to meet expanded Navy requirements. PLA sources state that the strong points would become part of an integrated intelligence network.²⁹

It appears that China will certainly establish additional overseas logistics bases in the future. It is also likely that China will carefully and systematically plan the location of future bases due to the costs of establishing and maintaining bases, as well as the potential negative international reactions to base construction that could promote the "China Threat" narrative. Future bases need to be strategically placed to provide maximum support as a hub of operations with good transportation, geographical conditions and security situation. Maritime bases should be on major international sea lines of communications. Prepositioning of equipment and supplies on ships, mobile offshore bases such as floating platforms, or artificial islands can avoid host country restrictions. PLA theorists propose a combination of land and sea-based support points.³⁰

²⁸ Wang Xu and Zhang Yunbi, "Logistics base in Djibouti 'essential,' ministry says," available from <u>http://usa.chinadaily.com.cn/china/2016-02/04/content_23399429.htm</u>, accessed December 17, 2019; Zhang Tao, editor, "Defense Ministry's regular press conference on Feb. 25," available from <u>http://english.chinamil.com.cn/news-channels/china-military-news/2016-02/25/content_6929065.htm</u>, accessed December 17, 2019; "Additional overseas PLA bases 'possible'," available from

http://www.china.org.cn/china/2019-01/10/content_74358640.htm, accessed December 17, 2019 ²⁹ Zheng Chongwei (郑崇伟) et al, "经略"21 世纪海上丝路":战略支撑点的构建" ("Managing the "21st Century

^{2019,} pp. 21-35; Guo Yiming, "China to conduct medical service operations in Djibouti," available from http://www.china.org.cn/china/2019-11/29/content 75460578.htm, accessed December 30, 2019; Chen Liwang (谌力汪) and Li Weizheng (丽韦政), "新安全观视域下海外基地转型重塑的影响及启示" ("Influence and Enlightenment of Overseas Base Transformation and Reconstruction from the Perspective of New Security Concept"), 国防 (National Defense) Issue 9 2017, pp. 41-45

Maritime Silk Road": Construction of Strategic Support Points"), 第八届海洋强国战略论坛论文集 (Proceedings of the Eighth Forum on the Strategy of Maritime Power), October 21, 2016.

³⁰ Dong Zhigao (董智高) and Zhou Lei (周磊), "关于海外军事后勤保障力量建设的认识与思考" ("The understanding and reflections on overseas military logistics support force construction"), 国防科技 (National Defense Science & Technology) Vol. 37 No. 2 April 2016, pp. 83-86

The *Science of Strategy* (2017) states that temporary and fixed overseas supply bases will support overseas operations. The authoritative publication recommends strengthening relationships with countries along strategic maritime corridors in the Pacific and Indian Ocean to improve the accompanying support capability for overseas naval operations. The authors recommend that China should explore agreements with friendly states to use airports in addition to ports. Chinese enterprises and personnel overseas can also provide support to operations.³¹

One PLA academic described four types of bases or strategic strong points. These include a long-term or temporary leased support base; a multifunctional ocean port built or improved primarily with China's investment; a port facility leased for commercial operations; and overseas base with sustained usage rights.³²

China would also require access to airfields in friendly nations or establish airbases to support air delivery. The Belt and Road Initiative (BRI) has provided China with links to international air passenger and freight transportation. As of 2019 China has established international air passenger links with 65 countries and 89 cities along the BRI. International air cargo links are established with 14 countries and 26 cities. These links provide China with an air transport network that leverages economic cooperation.³³

PLA sources have proposed several additional methods to support expeditionary operations to include construction of artificial islands for use as support bases or pre-positioning. The PLA is moving towards the use of modular and prefabricated structures and logistics facilities. These structures could be used to construct temporary support facilities abroad.³⁴ An exhibition in Beijing unveiled a concept for floating bases similar to the US military "mobile offshore base" concept. The exhibit depicted a very large floating structure (VLFS) made of modules that can link together. The PLA Navy reportedly has two mobile landing platforms to support operations.³⁵

³¹ Xiao Tianliang (肖天亮) chief ed., 战略学 (Science of Strategy), Beijing, China: NDU Press, 2017, pp. 304, 320-321 ³² Hu Xin (胡欣), "国家利益拓展与海外战略支撑点建设" (National Interest Expansion and Overseas Strategic Support Point Construction"), 世界经济与政治论坛 (Forum of World Economics & Politics) No. 1 January 2019, pp. 21-35

³³ Chen Yu (陈瑜) et al, "境外空中战略投送能力建设研究" ("Research on Development of Overseas Strategic Airlift Capability"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 21 No. 2 February 2019, pp. 5-8 and 40

³⁴ Xu Yi, "Chinese military to use more modular buildings and prefabricated structures," available from <u>http://eng.mod.gov.cn/news/2019-12/04/content 4856228.htm</u>, accessed December 27, 2019; Han Yue (韩跃), "中美海军远海护航行动后勤保障模式比较研究" ("A Comparative Study of Logistic Support Methods of China and US Navy Escort Operations"), *National Defense* (*国防*), June, 2017, pp. 40-43; Liang Feng (梁峰) et al, "关于我

军海上预置能力建设的思考" ("Thoughts on the Construction of Our Army's Maritime Pre-positioning Capability"), *军事交通学院学报* (Journal of Military Transportation University), Vol. 20, No. 6, June 2018, pp. 46-49

³⁵ Liu Gang (刘刚) and Yu Pengcheng (虞鹏程), "关于组建快速动员海运力量的思考" (Our Reflection on the Quick Organization of Military Sealift Reserve Forces"), 国防交通工程与技术 (National Defense Transportation Engineering and Technology), Issue 3 2014, pp. 2-3; "无锡联勤保障中心积极做好新下水半潜船" 民参军"各项工作" ("Wuxi Joint Logistic Support Center actively completes the work of "people's participation in the army" for newly launched semi-submersible ships"), available from http://www.81.cn/jfjbmap/content/2017-04/16/content_174964.htm, accessed January 25, 2020; "China Unveiled its First VLFS Project Similar to the US

Large comprehensive base requirements would include large material delivery flow, unloading and loading equipment, storage facilities, fuel storage, maintenance and repair equipment, transport vehicles, medical facilities, and an information system for managing and dispatching material and forces.³⁶

While China currently has confirmed one overseas military base, it appears highly likely that Beijing will establish additional military support bases in the future as overseas missions expand in number and scale. PLA theorist note that bases attenuate the problem of supporting forces over long distances. Chinese company investments in ports and terminals primarily along the BRI can provide sites for replenishment and maintenance as they have for the anti-piracy escort formations. However, an over reliance on these enterprises for logistics support is not conducive to maintaining a pure business image and could negatively impact overseas investments and enterprise operations. It is also likely that Beijing will gain access to foreign airfields on at least a temporary basis to support strategic air delivery.

Prepositioning

As China's overseas military requirements expand, the need for prepositioning becomes an important solution to the current limitations of strategic delivery and maritime accompanying support capabilities. The PLA has examined US military prepositioning for lessons to support future operations. The PLA is examining the future development primarily of maritime prepositioning of supplies and equipment to supplement a future network of comprehensive support bases which could also provide prepositioning.³⁷

The PLA assesses maritime pre-positioning should be an important component of naval logistics support to increase capabilities from the current limited method of accompanying support. Pre-positioning ships can include civilian ships. The PLA acknowledges that its comprehensive supply ships' capabilities are low, increasing the importance of overseas bases, and the pre-positioning. The establishment of pre-positioned equipment could support the deployment of a rapid reaction force – likely based on the expanding Marine force as well as the

Military Mobile Offshore Base Concept," Navy Recognition, available from

http://www.navyrecognition.com/index.php?option=com_content&view=article&id=2973, accessed on January 29, 2020

³⁶ Yu Dianxiang (于殿祥) and Ju Xiaolin (鞠小林), "综合性投送基地建设基本构想" ("Basic Conception of Comprehensive Projection Base Construction"), 军事交通学院学报 (Journal of Military Transportation University), Vol. 20 No. 3 March 2018, pp. 1-5; Pan Hongda (潘宏达) et al, "战略投送基地物资投送保障能力构成与生成机 理" ('Constitution and Generation Mechanism of Material Delivery Support Ability for Strategic Projection Base"), 军事交通学院学报 (Journal of Military Transportation University) Vol. No. 5 May 2017, pp. 48-52

³⁷ Liang Feng (梁峰) et al, "关于我军海上预置能力建设的思考" ("Thoughts on the Construction of Our Army's Maritime Pre-positioning Capability"), *军事交通学院学报* (Journal of Military Transportation University), Vol. 20, No. 6, June 2018, pp. 46-47; Cao Yang (曹杨), "新时代海上战略投送体系建设的思考" ("Thoughts on Construction of Maritime Strategic Projection System in New Era"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 21 No. 2 February 2019, pp. 1-4

airborne force - for timely deployment abroad. The PLA cites the US military objective of delivering one brigade in four days, one division in five days, and five divisions in 30 days.³⁸

The overseas support requirement characteristics and methods are complex and diverse. Maritime pre-positioning has the advantage of reducing dependence on foreign countries and bases where access to ports and airports cannot be guaranteed. The PLA considers maritime pre-positioning as having a rapid response and effective support to a crisis impacting the effectiveness of expeditionary mobile combat support. However, pre-positioning ships require defensive support as they would be the focus of enemy attacks in wartime as well as threats from pirates, terrorists, enemy agents or special force as well as weather. Furthermore, pre-positioned ships have high operating costs, although they can reduce the cost and increase the speed of deploying emergency forces.³⁹

In analyzing US pre-positioning, the PLA has drawn the lessons of containerization to improve the efficiency and speed of long-distance delivery of material; reliance on RO/RO ships; special transport ships with high speed and load capabilities; and ships capable of carrying transport helicopters. The PLA clearly intends to improve the construction of its maritime logistics support system to include maritime pre-positioning. Emphasis is placed on formulating plans for the construction of large floating bases and the creation of artificial islands in key areas to provide large-scale logistics support for Navy operations.⁴⁰

Strategic Delivery

The PLA views a strategic delivery capability as a core element of its overseas logistics capability providing greater flexibility for support and force deployment. This is especially true as China enters a new historical stage with global interests.⁴¹

The PLA considers strategic delivery as a core military capability blending strategic mobility, logistics support, and national mobilization. Construction of a strategic delivery capability is required to respond to crises, safeguard peace, deter war, protect national interests, and win wars. Strategic delivery includes both military and civilian maritime, air and ground transport. The PLA considers a strategic delivery capability as a strategic deterrent; an important factor in determining the outcome of a war; an important requirement enabling overseas joint logistics and joint operations; and an important means for gaining global influence.⁴²

³⁸ Liang Feng (梁峰) et al, "关于我军海上预置能力建设的思考" ("Thoughts on the Construction of Our Army's Maritime Pre-positioning Capability"), *军事交通学院学报* (Journal of Military Transportation University), Vol. 20, No. 6, June 2018, p. 47

³⁹ Liang Feng (梁峰) et al, "关于我军海上预置能力建设的思考" ("Thoughts on the Construction of Our Army's Maritime Pre-positioning Capability"), *军事交通学院学报* (*Journal of Military Transportation University),* Vol. 20, No. 6, June 2018, pp. 47-48

⁴⁰ Liang Feng (梁峰) et al, "关于我军海上预置能力建设的思考" ("Thoughts on the Construction of Our Army's Maritime Pre-positioning Capability"), *军事交通学院学报* (Journal of Military Transportation University), Vol. 20, No. 6, June 2018, pp. 48-49

⁴¹ Cao Tingze (曹廷泽) and Yin Peixiang (殷培祥) ed., 战略投送问题研究 (*Research on Problems of Strategic Delivery*), (Beijing: National Defense University Press, 2014), Forward

⁴² Cao Tingze (曹廷泽) and Yin Peixiang (殷培祥) ed., 战略投送问题研究 (Research on Problems of Strategic Delivery), (Beijing: National Defense University Press, 2014), pp. 1-10

The PLA assesses the current inventories and capabilities of air, maritime and ground transport as well as civilian transport limit long-range logistics support and strategic delivery. These capabilities will increase with the fielding of additional military heavy air transports and rapid maritime transport means, as well as integration of military standards into the construction of civilian resources. Mobilization of civilian transportation as mandated in the transportation law serves as an important means to augment military capabilities.

Maritime Strategic Delivery

Navy Logistics and Strategic Delivery Capabilities

The PLA considers its current long-range supply and transport capability to support overseas operations as relatively weak. The Navy would require civilian shipping mobilization with RORO; container; bulk cargo; oil and water tankers; auxiliary crane; carrier barges; and semi-submersible ships in the 5,00 to 30,000 ton range.⁴³ PLA naval logisticians recommend the use of containers for bulk cargo as well as equipment – including wheeled and tracked vehicles - to enable rapid loading and unloading. The Navy has several comprehensive supply ships, and new large amphibious warfare ships to support strategic delivery; however, supply and oiler ships are currently a weak link in Navy long-range accompanying support. The Navy currently has approximately 18 supply ships, which is a low ratio to first-line ships for a Navy with global ambitions.⁴⁴ The Navy reportedly has more construction planned to improve support capabilities. The Type 901 comprehensive supply ship has a sophisticated logistics support system that allows real time monitoring via data link of consumption and remaining stocks of all ships under its assignment. The Navy's newer amphibious ships are most suitable for long-range delivery of forces compared to older amphibious ships. The Type 071 amphibious dock ship (LPD) is the Navy's newest and most capable amphibious warfare ship for delivering forces.

Current Navy Supply and Transport Ships				
Ship	Type/Tonnage	Maximum	Capability	Estimated
		Speed		Inventory
Type-901	Fast Combat	25 knots	Fuel, water, dry	2
	Support		cargo; medical	
	Ship/45,000		support; 2 x Z-8	
			helicopters	

⁴³ Liu Gang (刘刚) and Yu Pengcheng (虞鹏程), "关于组建快速动员海运力量的思考" (Our Reflection on the Quick Organization of Military Sealift Reserve Forces"), 国防交通工程与技术 (National Defense Transportation Engineering and Technology), Issue 3 2014, pp. 1-3

⁴⁴ The US Navy has a ratio of 1 supply ship to 5 supported ships: Liu Baoxin (刘宝新) and Su Chunhua (苏春华), "军 事装备的水路集装箱运输研究" ("Research on Maritime Container Transportation of Military Equipment"), 物流 技术与应用 (Logistics Technology and Application), January 2018, pp. 124-126

see also Conor M. Kennedy, "China Maritime Report No. 4: Civil Transport in PLA Power Projection," U.S. Naval War College, December 2019

Туре-	Replenishment	20 knots	Fuel, water,	2/6/1
903/903A/908	Ship		cargo; 1 Z-8 or	
			Z-9 helicopter	
Type-	General	22 knots	Not capable of	2/1/2
904/904A/904B	Stores/10975		underway	
			replenishment;	
			Primarily	
			resupply	
			offshore	
			garrisons;	
			helipad	
Type-905	Replenishment	18 knots	helipad	2
	Oiler			
Type 071	LPD/25,000	25 knots	500-800 troops	5; plans for total
			& 60	of 6
			amphibious	
			IFVs; 4 x Z-8	
			transport	
			helicopters; 4 x	
			Yuyi LCAC	
Type 075	LHD/40,000	23 knots	30 helicopters;	One under
			can provide	construction
			command and	
			control	

Logistics Support to Amphibious Landings

The US Department of Defense's Annual Report to Congress assess that the PLA does not currently have the amphibious lift required to deliver first echelon campaign forces to conduct a full-scale invasion of Taiwan. However, the PLA is examining methods to provide logistics support to an island landing campaign. In addition to seizing a port by the first echelon group army, these methods include construction of floating piers and elevated fixed piers for RORO ships to unload equipment and supplies. Another method would employ a floating maritime transport platform. This method would have transport ships unload equipment and supplies on the transfer platform for lightering to unloading areas at the support area on the shore. These methods rely on a landing base secured by a first echelon group army. Civilian cargo ships could be used at offshore transfer areas to offload supplies to smaller landing craft for ship-to-shore lightering.⁴⁵

The PLA believes that civilian semi-submersible transport vessels could support overseas military logistics and strategic delivery with their ship-to-shore landing capability. The ships' large flat deck can carry amphibious vehicles and air cushion landing craft if a port or wharves are not available for unloading. Semi-submersibles as well as other suitable civilian ships

⁴⁵ Department of Defense, "Military and Security Developments Involving the People's Republic of China 2019," available from <u>https://media.defense.gov/2019/May/02/2002127082/-1/-</u> <u>1/1/2019 CHINA MILITARY POWER REPORT.pdf</u>, accessed January 29, 2020

carrying fuel supplies could use floating or underwater pipelines to pump fuel to the shore. As of 2016 there were 13 semi-submersibles in Chinese civilian.⁴⁶

In addition to increasing the use of containers to ship military material, a PLA source recommends developing the capability to unload containers without a terminal. This includes the development of auxiliary crane ships, specialized unloading and transport equipment to allow the unloading of containers without a terminal or wharf.⁴⁷

The PLA considers the civil fleet lacking the capabilities for amphibious force delivery, equipment and material unloading without a wharf, at sea roll-off, hoisting and load change, and sea-to-shore large-scale pipeline unloading. In addition, active or reserve specialized technical personnel need to supplement the civilian crews; however, the PLA assesses specialized reserve personnel are too few.⁴⁸

Civilian Maritime Strategic Delivery Support Fleet

The PLA can mobilize large and medium state-owned civil shipping enterprises to support overseas logistics and strategic delivery. The PLA estimates the requirement to mobilize at least 100 civilian vessels in an emergency, as well as using civilian ships to preposition equipment and supplies. There are two methods of civilian ship mobilization: agreement mobilization is employed to mobilize civilian ships for non-war maritime support missions; compulsory requisition is employed in an emergency to mobilize civilian ships into the active force as reserves. China established the first national maritime strategic delivery support fleet in October 2012 based on the China Shipping Group (now merged with COSCO). The joint logistics force has identified civilian ships built to military specification for mobilization.⁴⁹

The strategic delivery support fleet is a component of the national strategic delivery support force. It is a reserve component formed from large shipping enterprises - China COSCO Shipping, Hainan Strait Shipping Company, China National Offshore Oil Corporation, and China Shipbuilding Industry Corporation for example - responsible primarily for force transport and logistics support. They are formed into a three-tier structure – "general corps (总队)," "group (大

⁴⁶ Liu Gang (刘刚), "我国半潜式运输船动员需求及能力展望" ("Prospect and Demand for Mobilization of Semisubmersible Carriers in China"), 国防交通工程与技术 (National Defense Transportation Engineering and Technology) Issue 3 2015, pp. 1-3

⁴⁷ Liu Baoxin (刘宝新) and Yuan Mu (袁沐), "基于 SWOT 分析的军事装备水路集装箱运输发展策略研究" ("Research on the Development Countermeasures of Military Equipment in Waterway Container Transportation Based on SWOT Analysis Method"), 物流科技 (Logistics Sci-Tech) No.7, 2018, pp. 134-136

⁴⁸ Liu Gang (刘刚) and Yu Pengcheng (虞鹏程), "关于组建快速动员海运力量的思考" (Our Reflection on the Quick Organization of Military Sealift Reserve Forces"), 国防交通工程与技术 (National Defense Transportation Engineering and Technology), Issue 3 2014, p. 3

⁴⁹ Liu Gang (刘刚) and Yu Pengcheng (虞鹏程), "关于组建快速动员海运力量的思考" (Our Reflection on the Quick Organization of Military Sealift Reserve Forces"), 国防交通工程与技术 (National Defense Transportation Engineering and Technology), Issue 3 2014, pp. 2-3; "无锡联勤保障中心积极做好新下水半潜船" 民参军"各项工作" ("Wuxi Joint Logistic Support Center actively completes the work of "people's participation in the army" for newly launched semi-submersible ships"), available from http://www.81.cn/jfjbmap/content/2017-04/16/content_174964.htm, accessed January 25, 2020

队)," and "squadron (中队)." The civilian fleet is also required to support offshore and open sea offensive and defensive operations.⁵⁰

The Air Force has relied on civilian shipping as well as aircraft to support units stationed at bases in the South China Sea. The Air Force experience has reinforced other PLA sources that problems exist with mobilization and employment of civilian shipping. The Air Force complains that Navy transport capabilities are inadequate and at best can only support the Navy. The Air Force has found coordination of civilian ship and aircraft mobilization through the various relevant military and civilian organizations difficult and confusing. The Air Force has also found the capability of civilian shipping to support its transportation requirements is limited with regards to large RORO ships, oil tankers, container ships as well as large transport aircraft. Contributing to mobilization issues is the required civilian vessel or aircraft could be deployed anywhere in the world when needed. The transport of fuel and particularly ammunition create special transport problems for civilian ships as they require loading and unloading at special ports with specialized handling requirements, transport on special ships, and cannot be mixed with personnel. PLA sources have proposed a four-level cross-sea delivery system to provide logistics support to South China Sea bases. This system would employ the mainland as the rear base; Hainan as the "pivot base (枢纽基地 - a key central point);" Xisha as the forward base; and Nanshan as the front support. This would include expanding transportation, supply and container handling facilities and the use of the Guangdong Hainan Railway for military shipments to Hainan.⁵¹

A PLA article from 2017 noted that the civilian shipping force needs improved training for wartime operations and training assessment standards to ensure the overall quality of the civilian force. PLA sources complain that the commercial enterprises are focused more on business than military related training and have not established the training required under the National Defense Transportation Law. Training issues include training organizations with designated personnel have not been established to formulate training requirements and plans, and crews are not trained for skills required to operate under combat conditions. The PLA has made proposals to improve training organization to include establishing training supervision and guidance for the strategic delivery support fleet; annual assessments of the civilian fleet to improve quality; establishment of a training department at the general corps, a training section at the group, and a training group at squadron to ensure training requirements are met.⁵² However, it is not known whether any proposals have been implemented. PLA sources also recommend

⁵⁰ He Guoben (何国本) et al, "战略投送支援船队训练现状及对策" ("Current Situation and Countermeasures of Strategic Projection Support Fleet Training"), 军事交通学院学报 (Journal of Military Transportation University), Vol. 19 No. 5 May 2017, pp. 1-4; Liang Feng (梁峰) et al, "关于我军海上预置能力建设的思考" ("Thoughts on the Construction of Our Army's Maritime Pre-positioning Capability"), *军事交通学院学报* (Journal of Military Transportation University), Vol. 20, No. 6, June 2018, pp. 48-49

⁵¹ Liu Yonghua (刘永华) et al, "空军部队南海岛礁驻训水路投送问题研究" ("Maritime Projection for PLA Air Force Troops of Training in South China Sea Islands and Reefs"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 21 No. 7 July 2019, pp. 10-13

⁵² He Guoben (何国本) et al, "战略投送支援船队训练现状及对策" ("Current Situation and Countermeasures of Strategic Projection Support Fleet Training"), 军事交通学院学报 (Journal of Military Transportation University), Vol. 19 No. 5 May 2017, pp. 1-4

increased training of mobilized civilian shipping with the Navy focused on logistics support, overseas delivery and wartime operations.⁵³

The table below lists civilian ship missions and mission relevant ships to support the PLA. Civilian ships require some modifications including deployment of specialized military communications equipment; living areas for military personnel augmentation; medical facilities; improvements to ship structure and performance such as reinforcing decks or preparing helicopter landing sites; and firefighting and rescue equipment.⁵⁴

Civilian Ship Support Missions ⁵⁵			
Mission Purpose	Support Task	Applicable Ship Type	
Transportation and Delivery	Conduct joint implementation	Passenger RO/RO ship or	
	of troop, equipment and	vehicle RO/RO ship, multi-	
	material supply transportation	purpose ship, container ship,	
	support	bulk cargo ship, general	
		cargo ship, oil tanker	
	Landing and unloading	Semi-submersible barge	
	support for organic units	(ship) or heavy cargo carrier,	
		multi-purpose ship or bulk	
		carrier, decked barge, tugboat	
At Sea Replenishment	As a supplement to	Oil tanker, multipurpose or	
	comprehensive supply ships,	container ship	
	dry and liquid replenishment		
	for maritime fleet		
Medical Support	As a supplement to the	Passenger RO/RO ship	
	standard medical service	(refitted as health transport	
	equipment, implement rescue	ship), container ship (refitted	
	and transfer of patients, early	as hospital ship), high-speed	
	treatment and evacuation	passenger ship and maritime	
	support for large numbers of	motorized fishing boat	
	patients	(relitted as rescue boat),	
En sin serie s Comment		Teschest desled heres	
Engineering Support	As a supplement to military	Tugboat, decked barge,	
	auxinary snips, assist in port	salvage boat	
	dradging and obstacle		
	algoring and obstacle		
	clearing, etc.		

⁵³ Liu Gang (刘刚) and Yu Pengcheng (虞鹏程), "关于组建快速动员海运力量的思考" (Our Reflection on the Quick Organization of Military Sealift Reserve Forces"), 国防交通工程与技术 (National Defense Transportation Engineering and Technology), Issue 3 2014, p. 4

⁵⁴ Wang Hewen (王和文), "新形势下推动民船贯彻国防要求体系发展的思考" ("Thoughts on Promoting Development of Civilian Ship Carrying Out National Defense Requirements Under New Situation"), 军事交通学院 学报 (Journal of Military Transportation University) Vol. 17 No. 11 November 2015, pp. 22-26

⁵⁵ Wang Hewen (王和文), "新形势下推动民船贯彻国防要求体系发展的思考" ("Thoughts on Promoting Development of Civilian Ship Carrying Out National Defense Requirements Under New Situation"), 军事交通学院 学报 (Journal of Military Transportation University) Vol. 17 No. 11 November 2015, p. 23

Equipment Technical Support	Implement maintenance,	Tugs, semi-submersibles
	towing and other equipment	(barges) or heavy cargo
	technical support for ship	carriers, crane boats
	repair, as well as helicopter	
	relay support, etc.	
Safeguard Maritime Interests	Participation in protecting	Maritime motorized fishing
	maritime rights and other	boats
	support operations	

The PLA has tested mobilization of civilian shipping in training with the active force, albeit on a small scale. Several examples include the following:

- In 2014 a China Shipping Tanker oil tanker refueled Navy ships in the East China Sea.⁵⁶
- The 2016 mobilization of a 5,000-ton civilian tanker as part of a "strategic maritime delivery group (战略海运大队)" in training with the active force in the East China Sea. The exercise included the ship preparing quarters for military personnel, installment of the prepositioned piping system for use with military ships and switching to prepositioned military communications equipment. The maritime transport group mainly consisted of passenger RORO, oil tanker, and container ships. Multiple departments were involved in the mobilization.⁵⁷
- In March 2017 a maritime emergency delivery exercise occurred based at the Port of Guangzhou including the "5th strategic maritime delivery group (战略海运五 大队)"⁵⁸ from the Sinotrans & CSC Holdings Co., Ltd. The Sinotrans company and CSC RORO Logistics Co., Ltd. had worked previously with the Military Representative Office to modify two RORO ships under construction to accommodate heavy equipment.⁵⁹
- A ship from Sinotrans & CSC Holdings Co., Ltd provided at sea replenishment of dry cargo. During exercises by the Southern Theater Command Navy between May and June 2019, a civilian ship replenished two Navy ships in parallel. The Naval Research Institute and the Northern Theater Command Navy had developed a resupply module that can easily be installed on a civilian ship to resupply Navy ships.⁶⁰

⁵⁶ Hu Shanmin(胡善敏) and Yang Jun (杨俊), "民船首次对军舰实施海上输油补给" ("Civilian Ships Supply Warships with Oil at Sea for the First Time"), available from <u>https://china.huanqiu.com/gallery/9CaKrnQh8ap</u>, accessed February 1, 2020

⁵⁷ "战略投送支援船队开进联合演练场" ("Strategic Delivery Support Fleet Enters Joint Exercise"), available from http://www.81.cn/jfjbmap/content/2016-09/11/content_156271.htm, accessed January 31, 2020

⁵⁸ Also identified are a 7th Strategic Maritime Delivery Group and an 8th Strategic Maritime Delivery Group based on the Bohai Ferry Group Co., Ltd. which has, 11 RORO ships.

⁵⁹ Lu Wendi (鲁文帝), "一场海上应急投送演练在广州港拉开战幕" ("An Emergency Maritime Delivery Drill begins in the Port of Guangzhou"), available from http://www.81.cn/gfbmap/content/2017o3/28/content 173420.htm, accessed January 31, 2020

⁶⁰ "Chinese PLA Navy uses civilian ship to supply warships," Global Times, available from <u>http://www.globaltimes.cn/content/1170225.shtml</u>, accessed January 29, 2020

Air Force Strategic Delivery Capabilities

The Air Force is fielding and developing larger transport aircraft to support strategic delivery. Air transport can deliver supplies and personnel over great distances more rapidly than ships. The Army Aviation force is expanding as well, with new transport helicopters fielded, and a heavy lift helicopter planned for delivery of forces and supplies suitable for operations across China's borders. The Y-20 medium transport entered military service in 2016 and can reportedly carry the 58-ton Type 99A2 main battle tank. Chinese press reports speculate that the Air Force will eventually receive 100 to 400 or more Y-20s. Large numbers of this or future large transport aircraft are required if the PLA plans on a significant rapid strategic air delivery capability. In addition, the Air Force has the Y-8C and Y-9 medium transport. A Y-30 transport aircraft, reportedly capable of a larger payload than the Y-9, is in development.⁶¹

Current Air Force Heavy and Medium Transports ⁶²			
Aircraft	Maximum Payload	Maximum Range	Estimated Inventory
Il-76/TD Transport	44 tons	4500 km/2795 miles	24
Y-20/A Transport	66 tons	4400 km/ 2734 miles	9
Y-9 Transport	20 tons	5200 km/3231 miles	24
Y-8C Transport	22 tons	5615 km/3032 miles	64

The Air Force and Naval Air Force have a small number of refueling for extending aircraft ranges. China is reportedly developing Y-20 tanker variant.⁶³

Current Air Force and Navy Refueling Tankers			
Refueling Tanker	Refueling Capacity	Combat Range	Estimated Inventory
H6-U / H6-DU	18.5 tons	5600 km/3480 miles	10 / 5
II-78	65 tons	7600 km/4722 miles	4

The Air Force has studied US military use of unmanned vehicles and precision air delivery to provide logistics support in Afghanistan.⁶⁴ In 2017 the PLA Air Force began experimenting with delivering supplies to remote units with unmanned aerial vehicles (UAV).

⁶¹ Xinhua, July 7, 2016; <u>WantChinaTimes</u>, March 5, 2014; – Zhao Lei, "Y-20 gives air power push," available from <u>http://usa.chinadaily.com.cn/epaper/2013-01/28/content 16180440.htm</u>, accessed January 3, 2020; Zhao Tao, "Heavy-duty Y-20 military airlifter weighs in at show," available from <u>http://eng.mod.gov.cn/DefenseNews/2014-11/13/content 4550942.htm</u>, accessed January 3, 2020; Zhao Lei, "Transport planes boost PLA capabilities," available from <u>http://usa.chinadaily.com.cn/a/201712/20/WS5a39a438a31008cf16da24a8.html</u>, accessed January 3, 2020; "China, Russia progress in talks to produce heavy-lift helicopters," available from

http://www.globaltimes.cn/content/1066343.shtml, accessed January 3, 2020; see also Cristina L. Garafola, Timothy R. Heath, "The Chinese Air Force's First Steps Toward Becoming an Expeditionary Air Force." RAND Corporation, March 2017

⁶² Based on a database maintained by Lawrence Sid Trevethan; Andreas Rupprecht, *Modern Chinese Warplanes: Chinese Air Force – Aircraft and Units*, Houston: Harpia Publishing, 2018

⁶³ Zhang Tao, "H-6U aerial refueling tanker improves PLA Air Force's long-range raid capability," available from <u>http://english.chinamil.com.cn/news-channels/china-military-news/2015-09/08/content_6671974.htm</u>, accessed January 3, 2020

⁶⁴ Zhao Xiangang (赵先刚), "打通保障链"最后一公里"" ("Open the 'Last Mile' of the Support Chain"), available from http://www.81.cn/ifjbmap/content/2019-10/15/content/245287.htm, accessed January 29, 2020

The Air Force Logistic Department partnered with the civilian company SF Express to use a medium-size drone to provide supplies by parachute. The Air Force viewed this experiment as part of the intelligent battlefield revolution.⁶⁵

Civilian Airline Strategic Delivery Support Fleet

The civil air fleet reserve force is an important resource to augment the Air Force's current limited strategic delivery capabilities. The CMC in 2011 incorporated the establishment of a strategic delivery reserve force in the 12th Five-Year Plan. China began establishing a strategic delivery support fleet for the civil aviation force in 2013. This force was initially based on the China Southern Airlines and China Eastern Airlines followed by other air transport enterprises. Currently there are 15 civil support fleets based on major airlines to meet increasing requirements for overseas non-war and wartime operations. The civilian airlines support fleet has supported evacuations from Libya and international disaster relief operations such as the Indian Ocean tsunami and earthquakes in Haiti and Chile.⁶⁶

China's civilian passenger aircraft numbers by airline are shown in the table below. Air transport of personnel is the most rapid method of delivery and could combine in the future with prepositioning of equipment to provide an overseas rapid reaction capability. According to the PLA, China currently has 143 civilian large and medium cargo aircraft that would meet PLA standards for overseas strategic delivery. These civilian cargo aircraft have a total payload of 6,200 tons and include sixty 737 and thirty 757 and twenty-six 777 Boeing cargo aircraft. The indigenous C919 airliner reportedly will constitute a large proportion of the future civil air fleet.⁶⁷

China's Major Civilian Airlines and Passenger Aircraft Inventory		
Airline Company	Number of Aircraft	
Air China	662	
China Southern	786	
China Eastern	642	
Hainan Airlines	740	
Xiamen Air	116	
Shenzhen Airlines	116	
Sichuan Airlines	130	

⁶⁵ Zhang Mimi (张汩汩) and Feng Guobao (冯国宝), "我军首次运用无人机实施联合补给演练" ("Our Army Uses UAVs for the First Joint Supply Exercise"), available from http://www.81.cn/jwgz/2018-

^{01/27/}content_7923080.htm, accessed January 29, 2020

⁶⁶ Zhang Xin (张昕) et al, "依托战略投送支援机队实施海外航空战略投送" ("Overseas Aviation Strategic Projection Using Strategic Projection Support Fleet"), 军事交通学院学报 (Journal of Military Transportation University), Vol 20 No. 4 April 2018, pp. 5-7 and 12; Sun Zhenlan (孙振岚) and Hai Jun (海军), "我国民航运输业建 设现状与未来发展" (" On the Present Situation and the Future Development of the Construction of Civilian Aviation Transportation in China"), 国防交通工程与技术 (National Defense Traffic Engineering and Technology) Vol. 17 No. 01 January 2019, p. 1

⁶⁷ Sun Zhenlan (孙振岚) and Hai Jun (海军), "我国民航运输业建设现状与未来发展" ("On the Present Situation and the Future Development of the Construction of Civilian Aviation Transportation in China"), 国防交通工程与技术 (National Defense Traffic Engineering and Technology) Vol. 17 No. 01 January 2019, pp. 1-3

Supporting non-war missions does not appear to pose a great problem for Chinese civilian airlines. However, the PLA recognizes that strategic air delivery missions are difficult and complex without overseas airbases or access to airfields in friendly countries. PLA writings suggest using airfields in friendly nations in five strategic regions – Africa, the Middle East and Central Asia, South Asia, Southeast Asia, and Central and South America – to create a system of bases with a central hub and spoke airport structure. PLA sources believe the primary emphasis for this system of airfields would be in Africa, Central and South America with greater distances from China. As part of this hub and spoke system, the central base would provide comprehensive support to rest personnel, supply fuel, ground service, aviation maintenance and storage. Trunk centers would provide basic support, while branch stations would provide temporary support functions during technical stops.⁶⁸

The PLA identifies significant problems with coordination of the strategic air delivery system, with top-level design and direction in the area of civil air transport integration with the military as lacking. Transport Delivery Departments exist in the theaters, the joint logistic support base and centers, but the division of responsibilities and workflow are not entirely resolved. PLA sources recommend the establishment of a full-time organization to coordinate strategic delivery support fleet overseas missions. Strategic air delivery requires the coordination between military and government departments, civil airlines, public security, and customs for example. Some sources discuss the US Air Force Military Airlift Command as an example of a centralized command. Such a command mission could become part of the CMC Logistic Support Department's Transport and Delivery Bureau since the Joint Logistic Support Force plays a key role in strategic delivery,⁶⁹

Additional issues with strategic air delivery include the following: an inadequate ground support system with limited quantities of loading and unloading equipment, where loading and unloading capabilities are critical to rapid delivery of forces and equipment; poor management; weak specialized support teams; a requirement to ensure access to aeronautical charts and meteorological support data for overseas air operations; special training for civilian air crews supporting the military, especially during wartime missions; and out of date military standards for civilian equipment production.⁷⁰

Civilian aircraft are mobilized to transport new recruits, units on trans-regional exercises, units responding to floods or earthquakes, and for logistics support. The following are several examples of civilian aircraft support to the PLA:

⁶⁸ Zhang Xin (张昕) et al, "依托战略投送支援机队实施海外航空战略投送" ("Overseas Aviation Strategic Projection Using Strategic Projection Support Fleet"), 军事交通学院学报 (Journal of Military Transportation University), Vol 20 No. 4 April 2018, p. 7

⁶⁹ Zhang Xin (张昕) et al, "依托战略投送支援机队实施海外航空战略投送" ("Overseas Aviation Strategic Projection Using Strategic Projection Support Fleet"), 军事交通学院学报 (Journal of Military Transportation University), Vol 20 No. 4 April 2018, p. 7

⁷⁰ Zhang Fang (张方) et al, "加强空中战略投送地面保障体系建设的思考" ("Thoughts on Accelerating Ground Support System Construction for Air Strategic Projection"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 19 No. 4 April 2017, pp.1-4

- In January 2019 the Air Force called for emergency support from the Joint Logistic Support Force. The JLSF sent relief by air and road, with civilian aircraft mobilized to delivery supplies.⁷¹
- The former Shenyang Military Region conducted a large force projection exercise "Tengfei 2011 (腾飞-2011)" using civilian aircraft in 2011. Air China and China Eastern Airlines transported troops and supplies including ammunition.⁷²
- The "Firepower-2015- Qingtongxia A" trans-regional exercise included transporting units employing China Eastern Airlines aircraft.⁷³

Rail and Road Delivery

The PLA conducts long-range trans-regional exercises employing road and rail transport within China, as well as movement to foreign countries for combined exercises as described above. Rail or heavy equipment transport is often used for movement over long distances. The PLA could employ road and rail movement to support operations in Central Asia for example, with permission of the transited countries or PLA control of the lines of communication. The theater commands have Dispatch Centers to coordinate transport between various Joint Logistic Support Centers' Military Representative Offices embedded in the rail system to coordinate and prioritize military rail transport. The PLA does not always use permanent rail transfer points (RTP) for loading and unloading equipment. Mobile ramps and field expedient means - for example ramps made from wooden railroad ties - are used for loading and unloading equipment. The use of mobile and field expedient ramps in place of fixed RTPs allows the PLA to load or unload in the field as well as attempt to avoid detection.⁷⁴

Units also road march, particularly wheeled vehicles. Heavy equipment transporters (HET) are an important peacetime and wartime transport asset. HET units are subordinate to the Joint Logistic Support Force and the Army for strategic delivery of heavy and tracked equipment. These transport brigades and regiments, as well as mobilized civilian equipment, are becoming increasingly important as the PLA mechanizes. Employment of these transportation units requires coordination between multiple departments. The PLA inventory includes an

⁷¹ Huang Yuliang (黄余良), "联勤保障部队组织冬季实战化演练" ("Joint Logistics Support Force Organizes Winter Combat Training"), available from <u>http://mod.gov.cn/power/2019-01/07/content 4833748.htm</u>, accessed February 1, 2020

⁷² "解放军演练调民航客机投送兵力 军人登机前须验枪" ("People's Liberation Army Exercises Tune Civil Aviation Passenger Jets' Projection Strength"), available from http://military.people.com.cn/GB/15220334.html. Accessed February 1, 2020

⁷³ Zhang Zhenxing (张振兴) and Li Ke (李科), ""火力-2015•青铜峡 A"跨区演习拉开战幕" (""Firepower-2015 - Qingtongxia A" Cross-region Exercise Kicks off"), available from <u>http://www.81.cn/syjdt/2015-</u>06/24/content 6553109.htm, accessed February 2, 2020

⁷⁴ "军事运输:更快更远更智能" ("Military Transportation: Faster, Farther, Smarter"), available from <u>http://www.81.cn/ifibmap/content/2019-01/14/content 225216.htm</u>, accessed December 13, 2019; :东部战区某 调度中心挖掘人员和制度潜力" ("Exploiting Personnel and System Potential in a Dispatch Center in the Eastern Theater"), available from http://www.xinhuanet.com/mil/2019-08/26/c_1210257264.htm, accessed December 13, 2019; "东部战区某调度中心协调军地破解跨局投送难题" (" An Eastern Theater Dispatch Center Coordinates Military and Local Forces to Solve the Problem of Cross Bureau Delivery"), available from http://www.chinamil.com.cn/zg/2019-09/18/content 9684254.htm, accessed December 13, 2019

unknown number of HETs, and civilian HETs are mobilized when required.⁷⁵ The PLA also fields a large albeit unknown number of motor transport brigades and regiments for strategic delivery by road.⁷⁶

The PLA assesses that the current numbers of military and civilian HETs are insufficient to support emergency requirements. Large numbers of civilian HETs would need to be mobilized for wartime employment. The PLA requires additional construction of military and civilian HETs to support transportation requirements. Civilian enterprises contain large numbers of HETs, but many including newly produced vehicles do not meet military requirements for movement of armor. Additionally, civilian HETs are not evenly distributed throughout China, with HETs concentrated in eastern and southern coastal regions, with few in the north or west. Semi-trailers that are suitable for military use often require modification by the receiving unit. PLA sources assess the current vehicle mobilization system as immature. Problems with vehicle mobilization include the following issues: a National Defense Mobilization Department is established but civilian organizations at the local levels are inadequate for the task; the mobilization information system requires greater integration between the military and civilian networks as well as improvements in civilian information systems; a comprehensive database to track civilian vehicle and equipment support resources for precision mobilization; increased civilian training with the military; poor communications interoperability between HET units and supported units, and occasional unavailability of the Beidou satellite navigation and the dynamic monitoring system of the transportation units hindering operations.⁷⁷ It is unknown if these problems are being addressed.

⁷⁶ "磨砺能打胜仗的通途劲旅" ("Thoroughfare Strong Brigade Grinding Can Win the War"), available from http://www.81.cn/jfjbmap/content/2019-09/02/content 242319.htm, accessed December 13, 2019; Ren Jie (任) et al, "军民融合履带式重装备公路运输力量建设" ("Construction of Road Transportation Force for Tracked Heavy Equipment in Conditions of Civil Military Integration"), 军事交通学院学报 (Journal of Military; Transportation University), Vol. 17 No. 6 June 2015, pp. 11-13 and 40; Wang Chungang (王春刚) et al, "提高陆军 重装备公路运输力量运用效能的思考" ("Thoughts on Improving Use Efficiency of Army Heavy Equipment Road Transport Capacity"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 21 No. 11 November 2019, pp. 5-8; a Chinese forum site posted an order of battle with over 60 motor transport regiments ⁷⁷ Wang Xianfeng (王仙凤) and Wu Kehua (吴克华), "军民融合战略下车辆装备保障力量动员问题探析" ("Vehicle Equipment Support Force Mobilization Under Civil-military Integration Strategy"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 19 No. 5 May 2017, pp. 28-31 and 60; Li Qinzhen (李勤真) et al, "基于军民融合的重装备战略投送公路支援车队建设研究" ("Research on Construction of Heavy Equipment Strategic Delivery Highway Support Fleet Based on Civil Military Integration"), 物流科技 (Logistics Technology) No. 1 2019, pp. 152-155; Wang Chungang (王春刚) et al, "提高陆军重装备公路运输力量运用效能的思考" ("Thoughts on Improving Use Efficiency of Army Heavy Equipment Road Transport Capacity"), 军事交通学院学报 (Journal of Military Transportation University) Vol. 21 No. 11 November 2019, pp. 5-8; "磨砺能打胜仗的通途劲 旅" ("Thoroughfare Strong Brigade Grinding Can Win the War"), available from http://www.81.cn/jfjbmap/content/2019-09/02/content 242319.htm, accessed December 13, 2019; Ren Jie (任) et al, "军民融合履带式重装备公路运输力量建设" ("Construction of Road Transportation Force for Tracked Heavy Equipment in Conditions of Civil Military Integration"), 军事交通学院学报 (Journal of Military; Transportation University), Vol. 17 No. 6 June 2015, pp. 11-13 and 40

⁷⁵ "我军首支重装备运输部队亮相 "大家伙"这样上高原组图" ("The First Heavy Equipment Transportation Unit of Our Army Appears on the Plateau like "Big Guy"), available from <u>http://photo.81.cn/pla/2016-</u> <u>12/27/content_7425199.htm</u>, accessed December 13, 2019

Logistics Weaknesses and Modernization Requirements

PLA theorists assess that overseas combat operations will have high consumption rates and strategic delivery requirements. These sources assess that the main direction will be maritime requiring a strong naval logistics support capability augmented by civilian mobilization. Military and civilian air strategic delivery will also be important for global operations, while road and rail movement can support operations along China's periphery.⁷⁸

The PLA recognizes deficiencies in logistics support that will adversely impact China's ability to conduct and sustain larger expeditionary operations, particularly combat operations. Current logistics problems supporting small peacekeeping units reinforces PLA analysis that logistics support is inadequate. The PLA plans to correct identified issues and develop capabilities commensurate with the intention to expand expeditionary operations. While it appears certain that China will establish a network of logistics support bases as part of the solution for overseas support, PLA sources recognize that bases can lead to negative international reactions and high financial costs. Proposals for creating artificial islands, floating bases, and maritime prepositioning could avoid some of the issues with bases on foreign soil. The PLA is analyzing foreign logistics and strategic delivery capabilities for solutions.⁷⁹

PLA sources asses both military and civilian logistics and maritime, air, road and rail transport resources are inadequate to support future expeditionary operations, especially combat actions. The National Defense Transportation Law provides for the mobilization of civilian assets and incorporation of military standards into civilian construction. However, civilian enterprises are not fully complying with the law, many civilian transportation assets do not meet military requirements, and PLA reporting highlights the need for revisions to the law. The mobilization system is complex and requires centralization. A problem stressed by multiple PLA sources is that civilian personnel are not adequately trained to support PLA missions, particularly combat actions. While civilian transportation assets do train with the active force, PLA sources assess the training and integration with the active force as inadequate, limited in scale and not routine.

Future modernization requirements to address logistics weaknesses revolve in part around new – or at least new to the PLA - technologies to improve precision logistics support in general. PLA logisticians believe these technologies will provide for a modern precision logistics system that can better support global operations. These technologies include the following: intelligent driving and autonomous vehicles; automatic identification technologies such as RFID chips and QR codes; data mining technology; the Internet of Things; Big Data; cloud computing; 5G mobile communications; and artificial intelligence technologies. The PLA believes intelligent logistics can provide timely decision making and enhanced precision logistics to include

⁷⁸ Liu Jiasheng (刘嘉生) et al, "基于国家安全需求的战略投送载运工具建设" ("Development of Carriers for Strategic Projection in Response to National Security Needs"), 军事交通学院学报 (Journal of Military Transportation University), Vol. 21 No. 2 February 2019, p. 10

⁷⁹ Liu Jiasheng (刘嘉生) et al, "基于国家安全需求的战略投送载运工具建设" ("Development of Carriers for Strategic Projection in Response to National Security Needs"), 军事交通学院学报 (Journal of Military Transportation University), Vol. 21 No. 2 February 2019, pp. 9-10

monitoring combat logistics requirements, casualties, warehouse allocation, sorting and packing, automatic loading and unloading, and rapid long-range delivery.⁸⁰

The PLA has identified specific areas requiring improvement for a logistics capability to support expanding overseas operations. These areas include the following:⁸¹

- Establish a network of comprehensive logistics bases at key ports and airbases to enable timely support to overseas operations in peacetime and war.
- Prepositioning of equipment at bases, on ships, artificial islands or floating bases to support the rapid deployment of units.
- Expanded integration of military standards into civilian transportation construction
- Rapid and self-loading and unloading capabilities, including palletized and containerized systems
- Development of large strategic fast delivery ships and aircraft for long-distance rapid transport of military forces; development and deployment in large numbers of specialized military and civilian heavy equipment transports and large cargo vehicles
- Big data interconnected logistics command information system; construction of a military transportation command platform linking the CMC, theater (services) and units; improve precision logistics capabilities to track and identify material; self-monitoring, diagnosis and repair of transportation equipment; intelligent delivery decision-making system and autonomous logistics systems; Beidou satellite and geographic information system to accelerate and perfect the construction of dynamic monitoring system of military transportation
- Improved civilian strategic maritime delivery with high-speed RO/RO ships, oil tankers, and increased modern civilian shipping built to military standards; increased number of navy comprehensive supply ships and tankers that can maintain speed with warships; deepen civil-military integration to modernize and enlarge civilian logistics and transport systems by creating a strategic transport system with the military transport as the main body, the national transport system in support, and civil transport system as a supplement to support the military's expanding overseas missions
- Improved strategic air delivery including unmanned platforms, precision airdrop technology and hypersonic transport aircraft; construction of a large fleet of heavy Air Force transport aircraft
- Logistics equipment capable of operating in special and extreme environments

The PLA has a complex organizational structure coordinating strategic delivery of forces and material. The PLA has examined US overseas logistics and strategic delivery, as well as Russian

⁸⁰ Liu Xiaobao (刘晓宝) et al, "让军事物流建设紧扣时代脉搏" ("Let the construction of military logistics keep pace with the pulse of the times"), available from <u>http://www.81.cn/ifjbmap/content/2019-</u> 11/28/content 248592.htm, accessed on January 29, 2020

⁸¹ Liu Jiasheng (刘嘉生) et al, "基于国家安全需求的战略投送载运工具建设" ("Development of Carriers for Strategic Projection in Response to National Security Needs"), 军事交通学院学报 (Journal of Military Transportation University), Vol. 21 No. 2 February 2019, pp. 10-13; Liu Baoxin (刘宝新) and Yuan Mu (袁沐), "基于 SWOT 分析的军事装备水路集装箱运输发展策略研究" ("Research on the Development Countermeasures of Military Equipment in Waterway Container Transportation Based on SWOT Analysis Method"), 物流科技 (Logistics Sci-Tech) No.7, 2018, pp. 134-136

support for expeditionary operations in Syria. PLA writers discuss the US Navy's Military Sealift Command, and the US Air Force's Military Airlift Command and Civil Reserve Air Fleet as examples of centralized command of strategic delivery resources. The PLA could empower greater command responsibilities for strategic delivery to the CMC's Logistic Support Department's Transport and Delivery Bureau and the Joint Logistic Support Force to improve centralized command and coordination.⁸²

Conclusions

The PLA considers an overseas logistics support and strategic delivery capability as a critical capability to conduct expeditionary operations. PLA strategist also view strategic delivery as a strategic deterrent; an important factor in determining the outcome of a war; and an important means for gaining global influence. Civil-military integration in the logistics field allows the PLA to leverage the business sector to enhance joint logistics capabilities, although identified problems in civilian support require rectification. The National Defense Transportation Law provides the legal basis for mobilization of civilian transportation and incorporation of military standards into civilian construction. However, civilian enterprises are not fully complying with the law, standards for civilian construction require updating, as well as revisions to improve the law.

Numerous PLA sources assess that the current logistics system, even with augmentation by civilian assets, is not adequate to meet future requirements to support expeditionary operations. PLA researchers are examining methods to address logistics deficiencies. It appears certain that China will establish additional military or logistics support bases; although it appears likely China will take a measured approach adding future bases. This is in part due to the financial and material costs in establishing and maintaining overseas bases, and to allow a thorough strategic assessment as to base locations to optimally support national interests and potential military operations. It appears certain that the PLA will include prepositioning of supplies and equipment employing multiple methods – ships, bases on land, artificial islands and floating bases - to enable the rapid deployment and sustainment of expeditionary forces. Construction of Navy fast supply ships and tankers, heavy transport aircraft, heavy equipment transporters, and integration of military standards into civilian construction could dramatically improve logistics support to overseas operations. While current logistics support capabilities for expeditionary operations are inadequate, it appears likely these capabilities will improve in the mid-term.

Implications for the United States

While the PLA currently assesses its strategic delivery and logistics capabilities as weak, the future growth of these capabilities will increase its capability to operate globally during nonwar and combat actions. Current non-war military operations provide opportunities for the US

⁸² "俄海外军事行动后勤保障新启示" ("New Enlightenment of Logistics Support for Russian Overseas Military Operations"), available from <u>http://news.sina.com.cn/o/2017-11-02/doc-ifynmvuq7839706.shtml</u>, accessed January 30, 2020; "中美舰船对峙事件让美军海上补给司令部曝光" ("Sino-U.S. Ship Confrontation Exposes US Marine Supply Command [Military Sealift Command"), available from https://mil.huangiu.com/article/9CaKrnJIGgp, accessed January 30, 2020

military to work with the PLA in areas of mutual benefit such as peacekeeping and humanitarian assistance.

As China's global interests, military and logistics capabilities expand, Beijing could become more inclined to use force as it becomes confident of success. The PLA's improvements in the joint and service logistics systems will increase its capability to conduct and sustain combat overseas posing a threat to US forces and allies.

The PLA and civilian research institutes are conducting research in emerging technologies as part of civil-military integration. Advancements in these technologies can significantly enhance military and civilian logistics support and provide China with an edge in a future war if the US does not successfully compete in this technological race.

The PLA's widespread use of overseas civilian infrastructure, resources, and transportation during a conflict can make identification of military forces and targeting difficult for an opponent. These overseas civilian assets can also provide valuable intelligence and targeting information on US and allied forces.

Recommendations

Military-to-military contacts in the logistics area could provide greater insight on the Joint Logistic Support Force, its activities, and capabilities. This is a sensitive issue and would have to be accomplished with circumspection and on a completely reciprocal basis. Continued military contact on issues such as logistics support for humanitarian assistance and disaster relief can provide some conclusions on logistics capabilities for other missions.

Special attention should be placed on reviewing sales, technology transfer, and business relationships with Chinese civilian shipping and airline companies, as they are part of the reserve force to augment PLA operations globally. China's investments and operations of foreign ports provide potential bases, temporary bases, or replenishment sites for expeditionary operations. The US should develop a strategy to include a coordinated influence campaign with allies and friendly nations to counter this expansion Beijing's soft and hard power. Given the PLA logistical focus on civil-military integration the Committee on Foreign Investment in the United States (CFIUS) process should strongly examine logistics and transportation dual-use technologies to include the following areas the PLA has identified for logistics modernization efforts:

- Robotics and automation for production, warehousing and transportation
- Rapid loading, self-loading, and unloading equipment and technologies, including palletization and containerization
- Floating platform technology
- Technologies such as big data, cloud computing and artificial intelligence applicable to logistics and strategic delivery
- Precision airdrop technology
- Hypersonic aircraft

- POL/oil pipelines technologies and software that improve distribution, management of large stocks, and efficiency during peacetime; and provide resiliency during wartime
- Rapid prototyping/additive and subtractive automated manufacturing techniques to produce end-use materials in both small and high-volume production runs, including computer numerical control (CNC) automation of machine tools by means of computers executing pre-programmed sequences of machine control commands
- Supervisory control and data acquisition (SCADA) control system architecture to provide high-level process supervisory management

There are several PLA joint logistics research areas requiring additional detailed analysis. Future research areas include the following:

- Strategic delivery (air, sea and ground) requirements to sustain a PLA expeditionary force from a brigade to multiple brigades
- Navy at sea replenishment capabilities including civilian shipping augmentation
- Prepositioning plans and requirements
- Capability of civilian air, maritime and ground assets to augment PLA strategic delivery and sustainment requirements; analysis to determine the size and capability of the military and civilian HET and motor transport force
- PLA combat logistics requirements
- Capability of Russia to provide key resources, ports or airfields during a conflict.
- Logistics support to air and maritime blockade operations against Taiwan, including joint logistics requirements, and ability of the JLSF to sustain blockade forces
- PLA logistics capabilities to support an island landing campaign