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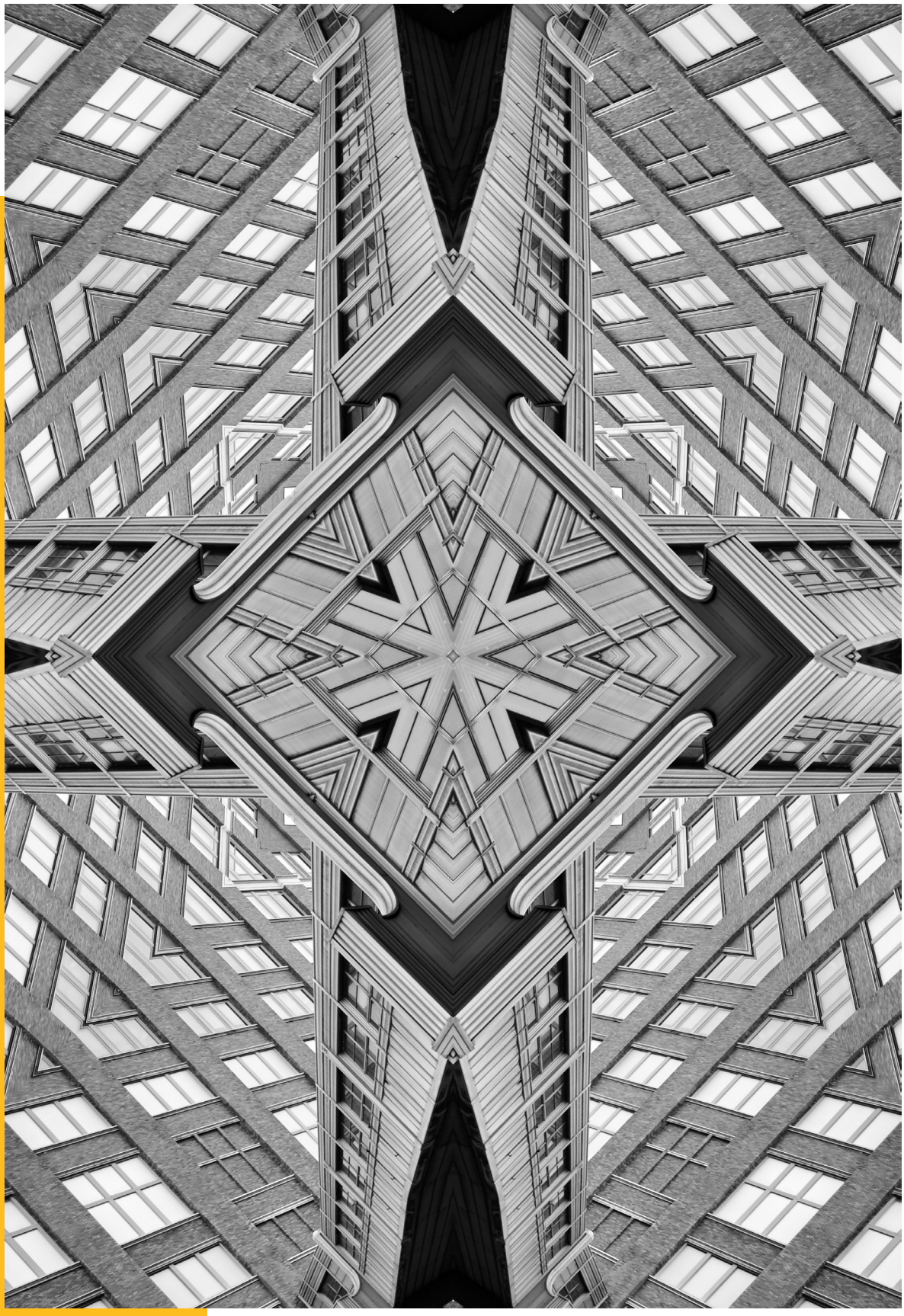

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China's Military Modernisation: Recent Trends

Kartik Bommakanti and Harris Amjad

Abstract

China's People's Liberation Army (PLA) has undergone many changes since Xi Jinping became general secretary of the Communist Party of China (CPC) in 2013. Efforts at modernising the PLA have been conducted in earnest for the past 10 years through the overhaul of the organisation and the introduction of latest technologies to make it battle-ready. This paper describes these capability-related and institutional changes in China's military, which have also led to the PLA coming firmly under the control of the CPC. This paper updates an earlier version published by ORF in 2021.

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Introduction

The People's Liberation Army (PLA) of China has undergone dramatic changes since its first push for modernisation in the 1980s and 1990s. The modernisation has involved both constant updates of doctrine, as well as improvement of equipment and organisational structure to better reflect the changing demands of warfare. Doctrinally, the PLA has moved away from the ideals espoused by the republic's founding father Mao Zedong—whose main concern was a major conflict with the erstwhile Soviet Union—to one where the military would be more heavily involved in localised conflicts.[1] The former Chinese Defence Minister Zhang Aiping observed in 1983, seven years after Mao's death: "The principle of war is to achieve the greatest victory at the smallest cost. To achieve this we should depend not only on political factors, but also on the correct strategy and tactics of the war's commander, the sophisticated nature of our military equipment, the quality of our personnel who use the equipment etcetera."[2] The implementation of this strategy is apparent in the ongoing stand-off between India's and China's forces in Ladakh, along the Line of Actual Control (LAC).

Drawing lessons from China's war against Vietnam in early 1979, the PLA took serious steps in reorganisation.[3] Recognising the diminishing likelihood of a total war,[4] the Central Military Commission (CMC) under Deng Xiaoping instituted crucial changes between 1985 and 1995—in doctrine, organisation, and equipment, while keeping in mind local yet intensive wars.[5] Some of these changes included greater emphasis on joint operations, production of indigenous equipment, and converting the PLA into a leaner and more efficient fighting force, reducing its total personnel from 13.3 million in 1985 to 5.4 million in 1995 (See Table 1).

Table 1:
PLA Personnel, 1980–2022 (in million)

Year	1980	1985	1990	1995	2000	2005	2010	2015	2020	2022
PLA Army	3.6	3.16	2.3	2.2	1.7	1.6	1.6	1.6	0.965	0.965
PLA Navy	0.63	0.35	0.26	0.26	0.22	0.255	0.255	0.235	0.260	0.260
PLA Air Force	0.4	0.49	0.47	0.47	0.42	0.4	0.33	0.398	0.395	0.395
Strategic Forces/Coast Guard	0	0	0.09	0.09	0.1	0.1	0.1	0.1	0.145	0.145
Strategic missile forces									0.120	0.120
Reserves	0	5	4	1.2	0.55	0.8	0.51	0.51	0.51	0.51
Paramilitary	7	4.3	12	1.2	1.1	1.5	0.66	0.66	0.50	0.50
Others									0.15	0.15
Total number of PLA personnel	11.63	13.3	16.32	5.42	4.49	4.665	3.455	3.503	3.045	3.045

Source: International Institute for Strategic Studies (IISS) Military Balance, 1985-2015 in Cordesman, A.H., Colley, S., "Chinese Strategy and Military Modernization in 2015: A Comparative Analysis" in Centre for Strategic and International Studies, Washington, D.C., 2015, p. 167.[6]*; International Institute for Strategic Studies (IISS), The Military Balance 2021, p. 249.*[7]*; International Institute for Strategic Studies (IISS), The Military Balance 2023, p. 237.*[8]

The Gulf War of 1990–1991 further changed China's perceptions on the nature of warfare. Seeing the decentralised command structure of the US military, alongside its extensive use of technologies such as the Global Positioning System (GPS),[9] the PLA altered its command structure to ensure that it was technologically adept, capable of merging existing and new technologies to keep itself on top of an ever-evolving battlefield. Technology applications within the PLA changed, resulting in the overall

improvement of its joint operational capacity as well as the availability of latest equipment to ground troops.

The four core areas of capability development and deployment are the PLA's land, air, naval, and nuclear-cum-ballistic missile forces. The phases of modernisation were first doctrinal, then organisational: the PLA was entirely restructured in the late 1980s and began making equipment acquisitions in the early 1990s. Since then, its force planners and strategists have recognised the importance of developing and deploying capabilities for theatre-level military contingencies. Indeed, the PLA's capabilities are potent today largely because they are geared towards managing potential conflicts around China's periphery, such as a cross-straits conflict with Taiwan,[10] or along the Sino-Indian border. However, China is yet to develop the kind of unlimited force projection capabilities that the US possesses, at least for the medium-term.

Table 2: Defence Budget Share of China's GDP and Government Expenditure

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Share of GDP	1.7%	1.7%	1.7%	1.7%	1.7%	1.8%	1.8%	1.7%	1.7%	1.7%	1.8%	1.7%	1.2%
Share of Government Expenditure	7.6%	6.8%	6.6%	6.5%	6.6%	6.1%	6.0%	5.9%	5.6%	5.4%	5.1%	5.4%	5.4%

Sources: Nan Tian and Fei Su, "A New Estimate of China's Military Expenditure," Stockholm International Peace Research Institute (SIPRI), Solna, 2021, P. 19;[11] *Stockholm International Peace Research Institute (SIPRI) Military Expenditure Data Base, "Data for All Countries 1949-2021", Stockholm;*[12] *Matthew P. Funaiole, Brian Hart, and Bonnie S. Glaser, "Breaking Down China's 2020 Defense Budget," Centre for Strategic & International Studies (CSIS);*[13] *Matthew P. Funaiole et al., "Understanding China's 2021 Defense Budget," Centre for Strategic & International Studies (CSIS), March 5, 2021;*[14] *International Institute for Strategic Studies (IISS), The Military Balance 2023, p. 225.*[15]

Underlying China's enhancement of its military capabilities is the massive growth of its economy since the beginning of the 21st century. China's military expenditure over the last decade has stayed at around 1.7 percent of its gross domestic product (GDP), while there has been a gradual decrease in its share of government expenditure, from 7.6 percent in 2010 to 5.4 percent in 2021 (See Table 2). These figures indicate that the growth in China's military capabilities has remained in healthy proportion to its GDP (See Table 3). However, there is a lack of transparency in China's defence budgets and expenditures; in absolute terms, China's defence expenditure has seen a meteoric rise over the last decade (See Table 3).

Table 3: China's Defence Budget, 2010–2022

Year	China's Official Announcements (Nominal US$)	IISS Estimates (Current US$)	SIPRI Estimates (Current US$)	Growth in China's GDP
2010	76.53 billion	136.3 billion	105.5 billion	10.6%
2011	90.25 billion	142.9 billion	125.3 billion	9.5%
2012	103.06 billion	146.2 billion	145.1billion	7.9%
2013	116.28 billion	161.4 billion	164.1 billion	7.8%
2014	131.12 billion	180.7 billion	182.1 billion	7.3%
2015	142.39 billion	192.7 billion	196.6billion	6.9%
2016	143.68 billion	197.2 billion	198.5billion	6.8%
2017	151.49 billion	208.6 billion	210.4 billion	6.9%
2018	167.37 billion	223.6 billion	233.1 billion	6.7%
2019	177.52 billion	234 billion	240.3billion	6.1%
2020	178.61 billion	256 billion	258 billion	1.2%
2021	209.16 billion	285 billion	293.3 billion	8.1%
2022	242.4 billion	319 billion	-	3.2%

Sources: China Power Team, "What does China really spend on its military?" China Power Project: Centre for Strategic and International Studies, Washington;[16] *2010-2017 accessed from International Institute for Strategic Studies Military Balance in Lucie Béraud-Sudreau, "China's 2019 Defence White Paper: the Long Road to Transparency in Defence Spending",*

IISS: Military Balance Blog Stockholm, August 2019;[17] *2018 (without including new items) accessed from M. Nouwens and L. Béraud-Sudreau, "Assessing Chinese Defence Spending: Proposals for New Methodologies", in International Institute for Strategic Studies (IISS), Stockholm, 31 March, 2020;*[18] *International Institute for Strategic Studies (IISS), "Military Capabilities- People's Republic of China," in The Military Balance 2021, ed. John Chipman (London: Routledge, 2021), P 249;*[19] *Nan Tian and Fei Su, "A New Estimate of China's Military Expenditure," Stockholm International Peace Research Institute (SIPRI), Solna, 2021, P. 22-23;*[20] *"Country Data: People's Republic of China", International Monetary Fund, Washington, 2020;*[21] *Funaiole et al., "Understanding China's 2021 Defense Budget;*[22] *Stockholm International Peace Research Institute (SIPRI) Military Expenditure Data Base, "Data for All Countries 1949-2021", Stockholm;*[23] *International Institute for Strategic Studies (IISS), The Military Balance 2023, p. 237.*[24]

According to China's official announcements, its total defence expenditure in absolute terms has increased significantly, from US$76.53 billion in 2010 to US$242.4 billion in 2022. Institutions such as the International Institute for Strategic Studies (IISS) and the Stockholm International Peace Research Institution (SIPRI) have reported higher estimates of China's military expenditures.

> "The PLA has moved away from the ideals espoused by Mao Zedong—whose main concern was a conflict with the erstwhile Soviet Union—to one where the military would be more involved in localised conflicts."

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The People's Liberation Army (PLA)

China's 1979 military campaign against Vietnam exposed critical weaknesses in the PLA's domains of command, logistics, and communications.[25] The absence of close air support for China's land offensives against Vietnam forced the PLA to rely more on artillery fire support as a substitute and laid bare a crucial gap in its effective prosecution of joint operations.[26] Taking lessons from this military failure, the CMC under Deng Xiaoping instituted far-reaching reforms.

First, the operational structure of the PLA was altered and China's defence ministry was reorganised. The seven military regions in China reorganised into five theatre commands—North, South, East, West, and Central Theatre Command.[27] This reorganisation was accompanied by the reorganisation of forces at the division level; division-sized forces gave way to brigades with combined arms' capabilities, with each brigade being assigned artillery units, along with air defence and combat support as well as infantry units.[28] To ensure that there are no problems in supporting this change in organisation on the ground, the PLA also made improvements in its teeth-to-tail ratio (TTR).[29] Within this TTR, the PLA has undergone extensive modernisation in its support and logistics capabilities, using latest technologies such as unmanned aerial vehicles (UAVs) in its efforts to provide rapid critical air support.

The PLA, in keeping with the need for more indigenous material, has ensured that its army is given the best equipment, from service pistols to tanks. This has resulted in the production of indigenous weapons[30] such as the QBZ-95-1 rifle and the QBZ-95B-1 5.8mm carbine assault rifle, along with the Type 05 Suppressed Submachine Gun. Also in service in the PLA's armoured corps are two tanks, ZTZ-99A and ZTZ-96A, with the latter being an upgraded second-generation version of the first. Another important addition is the ZBD-04,[31] the latest in the PLA infantry fighting vehicle range, which has the capability to operate both as an independent vehicle and with other tanks in the PLA arsenal.

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The PLA deployed its Type-15 tank, along with the new 155-MM vehicle-mounted howitzer, for the first time in the PLA's high altitude military exercise held in Tibet in early January 2020.[32] Since then, the Sino-Indian border standoff, which began in early May 2020,[a] confirmed the presence of the new Type-15 tanks on the Tibetan Plateau as part of the PLA's 75th Group Army.[33] The 4th Division, which has one armoured regiment, inducted this third generation modern light tank, replacing the ZTZ-88 first-generation tanks in service.[34] In fact, China's state-run *Global Times*, alluding to the ongoing standoff, alleged that the new Type-15 tank, along with the Z-20 helicopter and GJ-2 drone, "should give China the advantage in high-altitude conflicts should they arise."[35] Fire control systems of Type 96 A, a second-generation tank, operated by the 6th Division have also been upgraded.[36] In December 2022, the PLA commissioned new rocket launchers, howitzers, and anti-aircraft guns for the 75th Group Army, which included the FN-16/Hongying-6B anti-aircraft missiles, which is a mobile, long-range weapon that boasts a comprehensive firepower coverage.[37]

2021 also marked the first public appearances of the PLZ-07 122-MM self-propelled howitzer in the PLA exercises organised by the Xinjiang Military Command and the Tibet Military Command. The armoured, caterpillar-tracked chassis of the PLZ-07 has much higher survivability and mobility in special terrains, potentially making it China's most powerful howitzer in its calibre category.[38] The Tibet Military Command also received a new batch of third-generation Dongfeng Mengshi (DM) assault vehicles that are designed with thicker armours and higher-powered engines, for use in border defence missions at high altitudes.[39] Near the LAC, two mechanised brigades that operate wheeled armoured personnel carriers (APCs) have been upgraded to the latest ZTL-11 APCs. They have also inducted the CSK series of assault vehicles, which are comparable to the US Army

a The current Sino-Indian stand-off along the Line of Actual Control (LaC) erupted when Indian forces detected the presence of Chinese forces on the India side of the LaC in early May 2020. The PLAA controls tactical heights that Indian forces used to patrol at the Panggong Tso in Ladakh, which is part of the Western sector of the two countries' contested boundary. China seized some territory in the Galwan River Valley and another called Hot Springs in the Western sector. The PLAA has also made a minor ingress into the Naku La in the Indian state of Sikkim in the central sector, which has a mutually recognized boundary between India and China. In addition, Chinese and Indian militaries are deploying and amassing forces against each other across the entire stretch of the LAC. Negotiations are currently underway to put an end to the stand-off at the military and diplomatic levels.

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Humvees.[40] Media reports also state that the PLA will continue deploying the Type 05 amphibious armoured fighting vehicles in 2020 and 2021 to enhance the PLA's amphibious capabilities.[41] Further, the Western Theatre Command (WTC), tasked with military operations against India along the LAC, is deploying weapons such as the PCL-181 laser-guided vehicle mounted howitzer, the Z-20 medium utility rotary wing aircraft, and GJ-2 attack drone adapted to the harsh conditions of mountain warfare under the operational use of the People's Liberation Army Ground Forces (PLAGF).[42]

An important feature of the PLA is its emphasis on using the latest technologies. It has begun research and invested large sums on next-generation weaponry and technologies, such as quantum computing and artificial intelligence (AI). Some of this weaponry includes microwave energy weapons[43] and railgun technology on their naval vessels.[44] This investment in high-tech weaponry is indicative of China's overall doctrinal aim of gaining the maximum advantage in any wartime situation. The PLA continued modernising its existing artillery and vehicle systems in 2022. By 2022, roughly 70 percent of the PLA's 5,400 main battle tanks listed in service could be classified as modern; the ZTQ-15 light tank has now also been fielded with at least four combined-arms regiments and brigades in southern and western China. By mid-2022, over 60 percent of the PLA's heavy and medium combined-arms brigades had also been equipped with modern tracked or wheeled infantry fighting vehicles (IFVs).[45] The army was also provided with the new wheeled version of the HQ-17 (CH-SA15) surface-to-air missile system and wheeled self-propelled anti-aircraft guns.[46]

The PLA has also made significant investments in unmanned vehicles, both aerial and land. In 2020, it launched a course on drone technology and border security for its service members.[47] Drones are also being used to train the infantry to conduct beyond vision-sight targeting.[48] The past year also witnessed the development of the Desert Wolf series of unmanned ground vehicles, which will be used to transport goods and injured soldiers.[49] The PLA also developed a high-altitude and high-speed armed drone, the WJ-700, in 2021.[50] In 2020, it introduced armed robots[51] and, in 2021, reconnaissance robots, in its military exercises.[52] These automated

machines will help the PLA conduct small-scale missions against infiltration and supplementary firepower on China's borders. A significant increase in the use of unmanned aerial vehicles by the PLA has been reported in Tibet and along the LAC. China also released videos of swarms of quadcopter drones being used to supply rations and other essential items to personnel deployed close on the border. Satellite imagery from October 2021 also showed the deployment of UAVs, likely the armed CH-4, at the Ngari Gunsa airbase, roughly 200 km from Pangong Lake.[53] The highly sophisticated AI-enabled WZ-7 Soaring Dragon UAV was also spotted at the Shigatse base in December 2022. These developments indicate a significant enhancement in the PLA's intelligence-surveillance-reconnaissance (ISR), electronic warfare (EW), and limited strike capabilities along the border.[54]

Another aspect of the PLA is the focus on quality over quantity, seen in its modernisation drives and emphasis on next-generation technology such as quantum computing in the fields of communications and radar technology. In June 2019, China announced the successful development of a new high-frequency surface-wave radar system specifically designed to locate stealth aircrafts and said to be immune from anti-radiation missiles.[55] This emphasis can also be seen in the reorganisation of the PLA into a more effective fighting force equipped with the latest tracking technologies fully integrated with its indigenous navigational system Beidou.[56] Since the PLA does not have a lot of combat experience, it uses various simulations, mostly anti-NATO operations,[57] for training purposes. This reorganisation also ensures that each brigade of the PLA is equipped with combat-ready forces and units to provide logistical support.

Downsizing the PLA

Notwithstanding the gradual decrease in the size of the PLA's army (PLAA) from 3.46 million in 2010 to 3.21 million in 2020 (see Table 1), the focus over the last decade has been to downsize and modernise the overall PLA into a more efficient force. A coherent blueprint for doing so emerged under President Xi Jinping. The reference to "optimising" the PLA's scale and structure to construct a "modern military force," though adopted much earlier, began to be openly espoused from 2015.[58] In 2016, the CMC established an outline for military reform till 2020, emphasising

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the transformation of the PLA from a 'quantitative' to a 'qualitative' force, essentially creating an 'optimisation of ratios' between its services.[59] At the 19th National Congress of the Communist Party of China in 2017, Xi succinctly put forth a two-stage plan for the country's future: The first was to complete a "socialist modernisation"[60] by 2035 and the second was to become a "global leader in terms of composite national strength and international influence"[61] by 2049. For these reasons, the downsizing and the efficient optimisation of the remaining personnel of the PLA has remained of prime importance.

The change in focus from the PLAA to its allied services like the People's Liberation Army Navy (PLAN), the People's Liberation Army Air Force (PLAAF), the People's Liberation Army Rocket Force (PLARF), and the People's Liberation Army Strategic Support Force (PLASSF) has necessitated a downsizing of the army and a redistribution of its resources. The four services are vital to providing the PLA with the ability to securitise its logistical geographies to protect 'socialist modernisation' and expand its military capabilities in more distant places to increase its 'international influence' and emerge as a 'global leader.' This transfer of resources has been taking place over the last decade, with 2018 being the first time since 1949 that the PLAA's share in the military dropped below 50 percent, while that of the other services expanded.[62] This shift in focus comes under what a white paper issued by China in 2019 calls the new "Revolution in Military Affairs" through "mechanisation" and "informationisation,"[63] which is based on non-contact warfare through cyber, electronic, and other means is making manpower increasingly redundant.

Table 4: Number of College Students Recruited by the PLA in China (2001–2014)

Year	College Students Recruited	Year	College Students Recruited
2001	> 2,000	2008	38,000
2002	3,000	2009	130,000
2003	~ 2,000	2010	> 100,000
2004	~ 2,000	2011	> 100,000
2005	~ 2,000	2012	> 100,000
2006	Not Released	2013	~ 140,000
2007	Not Released	2014	~ 150,000

Sources: PLA Daily and the NetEase News Centre in W. Shumei, "The PLA and Student Recruits: Reforming China's Conscription System", in Asia Paper: Institute for Security and Development Policy, Sweden, 2015.[64] *(Update)*

Since 2001, the PLA has been aiming to reduce the recruitment of high school students and increasing that of college graduates into its various services. This has achieved a certain degree of success, with the number of college graduates increasing from a mere 38,000 in 2008 to around 150,000 in 2014 (see Table 4). However, high school students continue to comprise a significant share of the recruits.[65] Part of the problem of recruiting college graduates is that the PLA not only faces an ageing national demographic profile but also has to compete with the more lucrative private and public sectors, which has proven to be exceedingly difficult.[66] To counter these difficulties, in January 2020, the PLA changed its recruitment process from yearly to biannually from April 2021.[67,68]

China has also passed laws to provide and prioritise living allowances, employment, and educational and healthcare services for PLA veterans.[69] Media reports suggest that there has been a rise in the salaries of PLA officers by 40 percent from 2021.[70] With these incentives, the CMC is attempting to attract college graduates and youngsters to join the PLA, which has been its priority alongside military modernisation.

The People's Liberation Army Navy

Among the most crucial areas of China's military modernisation is the expansion of its naval capabilities. The Gulf War of 1991 and the Taiwan Strait Crisis of 1995–1996 changed China's perceptions on the need for a competent navy to promote the country's maritime defence. The naval expansion was conducted in three phases. The first was boosting coastal defence—a "brown water defensive capability" of the immediate shoreline; the second was to dominate areas up to the First Island Chain; and the third was a blue water navy going beyond the second island chain.[71] The PLAN is currently in the third phase of its expansion, even as it continues to further strengthen its anti-access and area denial capabilities.[72]

The PLAN has made progress in both the surface and subsurface segments of its fleet. Modernising its submarine force is a priority for PLAN, according to a US Department of Defense report.[73] At present, PLAN operates six nuclear-powered ballistic missile submarines (SSBN), six nuclear-powered attack submarines (SSN), and 44 diesel-powered/air-independent powered attack submarines (SS/SSP). It is estimated that the PLAN will maintain between 65 and 70 submarines through the 2020s, replacing older units with more capable units on a near one-to-one basis.[74]

The PRC's conventional submarine force, capable of firing advanced anti-ship cruise missiles (ASCMs), has also continued to expand. It includes the indigenously produced 13 SONG class SS units (Type 039) and 17 YUAN class diesel-electric air-independent propulsion attack submarines (SSP) (Type 039A/B), along with the 12 Russian-built KILO class SS units purchased by the PLAN between the mid-1990s and mid-2000s.[75] By 2025, the PRC is expected to produce a total of 25 or more YUAN class submarines.[76]

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The PLAN's 12 nuclear submarines include two SHANG I class SSNs (Type 093), four SHANG II class SSNs (Type 093A), and six JIN class SSBNs (Type 094). Each of its JIN class submarines are equipped with the 7,400-km range JL-2 submarine-launched ballistic missiles and represent the PRC's first credible sea-based nuclear deterrent.[77] In April 2020, the PLAN put two new upgraded Type 094A SSBNs into service with upgraded radar, sonar, and torpedo systems.[78] A new SHANG class variant (Type 093B)—a guided-missile nuclear-powered attack submarine (SSGN)—is expected to be built by the PRC by the mid-2020s. This new variant will enhance PLAN's anti-surface warfare capabilities and can also provide a covert land-attack option if equipped with land-attack cruise missiles (LACM).[79]

Notably, China's gains in the submarine domain are the by-product of Russia's designs.[80] After initial rumours of China's Unmanned Underwater Vehicles (UUVs) being capable of anti-submarine surveillance and intelligence gathering in distant waters (amongst other capabilities),[81] China showcased its cutting-edge capabilities in UUVs at its military parade in October 2019.[82] Reports of three Chinese UUVs being detected in the waters around Indonesia's Selayar Island in December 2020 indicate that these UUVs are now in action.[83] The same year, China's *Xiangyanghong 06* deployed a fleet of underwater drones in the Indian Ocean to gather oceanographic data.[84]

China's expertise in building medium-to-large UUVs can be gauged through the world records broken by its unmanned submersibles. Most notably, their achievements include diving to a depth of 10,908 metres while conducting scientific explorations[85] and their Haiyan glider setting a new endurance record.[86] While these underwater technologies are predominantly used for marine research, they can also be deployed for military activities such as intelligence, surveillance, and reconnaissance (ISR) missions. However, there remains a crucial weakness in China's subsurface fleet in that it is dependent on Russia for critical subsystems and design engineering, if not entire platforms.

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The PLAN's surface fleet has also improved. At the close of 2021, it was building an aircraft carrier, a new batch of guided-missile destroyers (DDG), and a new batch of guided missile frigates (FFG).[87] In February 2021, it commissioned the 72nd JIANGDAO class FFL (Type 056 and Type 056A), completing the production run. The 056A FFLs are capable anti-submarine warfare (ASW) ships equipped with a towed-array sonar.[88] Two programmes within PLAN's large surface combatants also witnessed growth—the LUYANG III class DDG and the RENHAI class guided-missile cruise (CG). By late-2020, the PRC had launched 25 LUYANG III class DDGs (including 12 lengthened LUYANG III MOD DDGs) with 19 of the new hulls being commissioned by the end of 2021. Both of these variants boast a 64-cell multipurpose vertical launch system (VLS) capable of launching cruise missiles, surface-to-air missiles, and anti-submarine missiles.[89]

In December 2021, China commissioned its fourth RENHAI class guided-missile cruiser,[90] with three more joining the fleet since then.[91] These CGs contain 112 VLS cells and can carry a large load out of weapons, including ASCMs, SAMs, torpedoes, and anti–submarine weapons. The LUYANG III class DDGs and the RENHAI class CGs will be fitted with a variant of China's newest ASCM, the YJ-18A, which has a range of 537 km.[92] China also commissioned its third YUSHEN class (Type 075) amphibious assault ship in October 2022.[93] The Type 075 is estimated to be the third largest amphibious assault ship in the world, capable of carrying 30 helicopters, armoured vehicles, jet boats, amphibious tanks, and hundreds of marine troops, amongst others.[94]

The new multi-role medium-lift helicopter Z-20 is likely to be used for amphibious warfare by PLAN.[95] In addition to these, PLAN also possesses eight large YUZHAO class amphibious transport docks (LPDs) (Type 071).[96] Further, PLAN launched its third (second indigenously produced) aircraft carrier in June 2022,[97] which is projected to be operational by 2024. This larger design will enable it to support additional fighter aircrafts, fixed-wing early-warning aircrafts, and more rapid flight operations, therefore extending the reach and effectiveness of PLAN's carrier-based strike aircrafts. The new carrier will also be equipped with the PLA's advanced electromagnetic catapult launch system.[98]

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In addition, the PLAN has been developing its air power over the last few years. It has carried out intensive training for the manning of its new warplanes, such as the H-6G and H-6J bombers.[99] PLAN has also fielded a variant of the new Y-9 aircraft for anti-submarine warfare and maritime patrol. The aircraft is equipped with a magnetic anomaly detector boom, a surface-search radar mounted under the nose, as well as multiple-blade antennas on the fuselage for electronic warfare.[100] Apart from these, China is developing a carrier-capable variant of its fifth-generation J-31 fighter and refining the design of its carrier-borne airborne early warning (AEW) aircraft KJ-600. The PLAN is also developing the advanced Z-20F helicopters intended for their RENHAI cruisers, LUYANG III MOD destroyers, and the YUSHEN LHAs.[101] It has also started a new course to build specialists in carrier-based fighter jets, special mission aircrafts, and helicopters.[102] These developments are expected to play a key role in possible conflicts with the United States (US) and its aircraft carrier strike groups in maritime conflict.

China is also planning to develop its next-generation SSBN, the Type 096, which will be capable of carrying 24 JL-3s and is estimated to have a range of over 10,000 km.[103] The JL-3, which was successfully test-fired in May 2020, is said to be capable of reaching the US if launched from China's coast.[104] PLAN's long-term ambitions include the acquisition of nuclear-powered carriers, following which it will have two carrier strike groups operating in the Western Pacific and an additional two groups in the Indian Ocean.[105] These nuclear-powered carriers will inevitably use electromagnetic catapult systems to launch their aircraft.[106] Notwithstanding an absence of experience in operating carriers, PLAN's introduction of aircraft carriers will provide additional weight to the Chinese navy's surface warfare capabilities.

The PLAN has now become a valuable asset to display China's assertive foreign policy and has continued to gain more attention as it undergoes modernisation. A notable incident in this regard was the deployment of the space and missile-tracking ship Yuan Wang 5 into the Indian Ocean, including a port visit to Hambantota in Sri Lanka. These attempts to modernise will continue to supplement China's assertive foreign policy against its rivals and neighbours.

The People's Liberation Army Air Force

The PLAAF has also witnessed significant improvements in its capabilities. Changes in the PLAAF's fighter fleet have been evident since the 1990s, when it began acquiring a small number of fourth-generation fighters in 1996. However, its weaknesses are also evident through the internal assessments of some platforms of its fighter fleet.

By the mid-1990s, PLAAF's fighters had expanded to constitute 30 percent of the force. By 2015, fourth-generation fighters comprised roughly 51 percent of its fighter fleet.[107] It is estimated that their numbers increased from 383 to 736 jets between 2010 and 2015—a 92 percent jump in air combat power.[108] Today, over 800 of the total 1,800 fighters are fourth-generation aircraft, and the PLAAF will become a majority-fourth-generation force within the next several years.[109]

Today, China operates an aviation force with over 2,800 total aircraft (not including trainer variants or UASs), of which approximately 2,250 are combat aircraft.[110] The PLAAF has a large fleet of J-7 fighters, which are reasonably efficient aircraft, but their numbers are decreasing, being replaced, as noted earlier, with the more advanced fourth-generation jets.

The PLAAF is also developing stealth capabilities for a segment of its fighter fleet. The testing of its much-awaited J-20 fighters began in July 2014[111] and were briefly showcased in 2018[112] and 2019.[113] These fighters are now operationally deployed in all five theatre commands of the PLA.[114] It is speculated that two-seater J-20s were being developed in 2021.[115] Earlier, the engine of the J-20, the AL-31, was Russian-built, but recent reports suggest that the J-20s have switched to a 'Chinese Heart'—a common industry term for the switch to domestically produced engines.[116] China's exhibition of a turbofan engine with a 2D thrust vectoring control nozzle at the Zhuhai Air show in 2022 indicates that it is making efforts towards closing the gap between its J-20 stealth fighters and the US's F-22 Raptors.[117]

Consequently, China is undertaking developmental tests for another engine, dubbed the WS-15, as an indigenous replacement for the AL-

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31.[118] The development of a credible engine that powers the J-20 is still years away, notwithstanding optimism about the performance of the WS-15 engine, which China's media had claimed would be ready by 2020 but remains unmet.[119] The WS-15 is at the final stage of development and is the PLAAF's equivalent of the Pratt and Whitney (P&W) F119 engine that powers the F-22 Raptor of the US Air Force (USAF).[120]

There has also been significant progress in the research and development of sixth-generation fighter aircrafts within the PLAAF.[121] These will come equipped with their own auxiliary drones and AI integration, while providing the PLAAF with across-the-board developments in its basic systems.[122] This generation of fighter aircrafts is likely to be inducted into the PLAAF by 2035. These jets are emblematic of the PLA's emphasis on the role of technology in future conflicts and its importance not only as a force multiplier but also an instrument to ensure decisive victory at the lowest cost.

The PLAAF has also considerably indigenised its air force. It is continuing to replace Russian-made Mi-17 transport helicopters with domestically developed Z-20 and Z-8G helicopters; the Z-20 has also been upgraded for high-altitude flying.[123] In 2021, PLAAF added at least six heavy lift Z-8 transport helicopters and 12 medium lift Z-20 helicopters. Y-20U tankers also entered service in 2021. Additionally, the PLAAF's Y-20 transport aircraft and the YY-20A tanker variant are now starting to be fitted with the domestically developed WS-20 engine rather than the Russian power engine.[124] China's new version of a gyroplane was commissioned and deployed in the Tibetan Autonomous Region (TAR) in February 2020,[125] and its first domestically developed surveillance aircraft, KJ-600, also completed its test flight in November.[126] The PLAAF has also domestically developed a multipurpose airborne munitions dispenser that can carry out air-to-ground, guided, and dispersing sub-munitions bombings.[127] Media reports have also speculated that the domestically developed Z-11 WB armed helicopter will enter service in 2021.[128] More than the size of China's air force, its strength lies in its establishment of a dense air defence network.[129]

The PLAAF continues to enhance modernisation. In November 2020, it conducted intense trainings for drone and helicopter controllers in launching beyond visual range aerial strikes.[130] Similarly, the L15 Falcon trainer jet, introduced in 2020, will now use an advanced virtual training system and AI[131] to train recruits. In the last three years, China has achieved several milestones in Uncrewed Aerial Systems (UASs), including air show display and operational appearance of the Xianglong jet-powered UAS, unveiling both the supersonic WZ-8 UAS and a redesigned version of the GJ-11 stealth unscrewed combat aerial vehicle (UCAV).[132]

The People's Liberation Army Rocket Force

The PLARF (formerly, the PLA Second Artillery Force) is the custodian and end-user of China's nuclear and missile forces. When it was started, the PLARF was tasked primarily with operating nuclear tipped missiles. For several years, China's nuclear missile arsenal faced a range of problems such as poor accuracy, protracted launch schedules, and a relaxed alert posture. However, they were compatible with Beijing's declared No-First Use (NFU) policy and the doctrine of Credible Minimum Deterrence (CMD).[133] A combined CMD-NFU policy calls for only a small missile force capable of surviving a first strike and retaliating against the enemy's counter-value targets. However, the same restrictions are not applicable to conventional strike missions—a role the PLARF was later ordered to take over.

Recent technological advances have improved the PLARF's survivability and accuracy and provided invigorated capability to China's conventional missiles. Experts in India also agree that China is developing a strong second-strike nuclear capability, particularly vis-à-vis the US,[134] despite the limited size of China's arsenal. Consequently, China conducted a nuclear survival and counterattack exercise in January 2020[135] and a low-level nuclear test in April 2020.[136] Still, some analysts acknowledge that China's adherence to No First Use (NFU) and a limited arsenal remains "intact".[137] China's focus is entirely on security, accuracy, reliability, and assured delivery. However, important changes are taking place in these areas as well. In 2021, the discovery by non-government analysts of three intercontinental ballistic missile (ICBM) silo fields in northern China was

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seen to indicate a significant change in China's nuclear-force structure and posture.[138] According to the US's annual military report on China, the PLARF is projected to increase the number of warheads it possesses from around 400 to 1,500 by 2035 and increase its deployed strategic-range launchers by at least 300.[139] Statements from Xi Jinping at the 20th Party Conference of the Communist Party of China directing the establishment of "a strong system of strategic deterrence" indicate the will for slowly shifting away from deploying a small nuclear force, particularly as Sino–US relations worsen.[140]

In addition to these developments, the PLARF continues to expand, improve, and modernise its conventional missile capabilities. In 2021, the PLARF launched approximately 135 ballistic missiles for testing and training—which is more than the rest of the world combined, excluding ballistic missile employment in conflict zones.[141] China has also expanded the number of brigades operating medium- and intermediate-range ballistic missiles (MRBM and IRBM). The DF-26 has become China's primary IRBM, with at least six brigades being equipped with this missile system. It must be noted that, while the DF-26 is a dual-capable system—i.e., it can be equipped with either a nuclear or conventional warhead—most of these systems are conventional.[142] China has also begun deployment of its new DF-17 medium-range hypersonic boost-glide vehicle, which was initially unveiled in 2019. At least two brigades have been identified as being equipped with the DF-17 system. Additionally, the PLARF operates several types of ground launched cruise missiles (GLCM), including the CJ-100.[143]

The deployment of China's nuclear-armed ballistic missiles continues apace to enable Beijing to maintain regional nuclear deterrence. In the long term, its conventionally armed, medium-range ballistic missile forces are undergoing rapid change for the conduct of high-intensity regional military operations. To sustain this effort, the missile component of China's regional military nuclear deterrent posture includes land-based nuclear-armed CSS-6 Mod 2 missiles.[144] Its conventional medium-range ballistic missiles consist of CSS-5 missiles.[145] Beijing's conventional missile capabilities are primarily directed against adversary logistical nodes, communication links, facilities, and regional military sites such as air and naval bases.[146]

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Complementing the modernised expansion of its nuclear and missile forces, China's space military capabilities are also being augmented. Today, China deploys and operates a proven kinetic anti-satellite (ASAT) capability. It is also making significant investments in ballistic missile capabilities to destroy satellites in geosynchronous orbit, and its satellite navigation system—Beidou, whose last satellite was launched on 23 June 2020[147]—has made the country independent of the American Global Positioning Satellite (GPS) navigation constellation. It also forms an integral part of China's military planning.[148] The ground nodes of its space segment have also been expanded, with China establishing satellite tracking stations within the mainland and in states such as Pakistan, Namibia, and Chile.[149] In December 2015, following CMC reforms, the PLA reached a milestone, converting its Second Artillery Corps into the PLARF and complementing it with the creation of the PLASSF, which blends electronic, space, and computer network war-fighting capabilities into a single service.[150] Integrating weapons and developing a networked capability into a single service represents progress. However, the question remains whether the PLA is capable of inflicting quick and decisive blows on any potential adversary through the joint operations of the PLARF and the PLASSF.

The PLARF has also been researching and developing newer delivery vehicles for its missile arsenal, investing heavily in hypersonic glide vehicles (HGVs) as a faster means of delivery. In July 2021, China conducted the first fractional orbital launch of an ICBM with an HGV. The HGV flew around the world and impacted inside China. This demonstrated the greatest distance flown (~40,000 km) and longest flight time (~100+ minutes) of any PRC land-attack weapons system to date.[151] Reports also indicate that a 'long range' Dong Feng-27 (DF-27) ballistic missile is in development by the PLA. [152]

The PLARF has also conducted DF-26, DF-16, DF-21D, and 'aircraft-carrier killer' tests in 2020, as China's tensions with India and the US escalated.[153] The PLARF continued replacing its DF-31A ICBM launchers with DF-31AG launchers and fielding the DF-41 ICBM missiles through 2020.[154] It further continued deploying its dual-capable DF-26 missile launchers in its eastern and western areas, threatening India's Ladakh and US's Yokosuka naval base.[155] It also conducted a midcourse anti-ballistic

missile intercept test in 2021.[156] Further, it is speculated that the PLARF is equipping its 656th brigade with the long-distance DF-100 (CJ-100) missiles. This missile was first displayed in the 2019 exhibition and is expected to be used by the PLARF 623rd or 635th brigades.[157]

These efforts are being supplemented with China's indigenous innovations. One such example is that of Phytium Technology's chips that use American software to power the PLA's hypersonic weapons.[158] The successful development of these improved delivery systems is cause for concern for many of China's adversaries, such as the US or India. These delivery systems also signal China's move towards next-generation weaponry and quality over quantity.

Evaluation of the PLA Doctrine and Combined Arms Warfare Capabilities

How do these Chinese capabilities fit into assessments (whether those of China, India, or any other) of the PLA's emerging doctrine and operational posture? What possibilities exist for closer coordination of the PLA and its supporting arms? India's assessments of China's emerging order of battle correlate strongly with measuring China's military strength in terms of actual military capabilities. From India's standpoint, China's modernisation since the initiation of military reforms has been concentrated in two areas.

Despite improvements in its TTR, the PLA continues to face challenges in the areas of coordination and efficiency. Optimising the fighting force to undertake combined arms warfare is a hurdle and remains a critical weakness. Command and Control (C2) for the conduct of joint operations is a universal problem in modern warfare.[159] A change in the PLA's war doctrine stands in contradiction to the structures within which it is being operationalised.[160] The doctrine stresses decentralisation, whereas the operational culture of the PLA focuses on centralisation. Two factors of vulnerability undermine the PLA's C2 structure. First, the narrow or individual service interests of the PLA's fighting arms reduce effective coordination and cooperation in joint operations.[161] Second is primacy of ground-based officers assigned to critical command billets,[162] who could potentially constrain effective coordination and synchronisation in joint operations.

Compounding these woes is the absence of joint command and personnel as well as the necessary means for the training, planning, and execution of combined arms warfare.[163] These deficiencies were addressed by Xi in what can be called one of the greatest overhauls of the PLA force. This reorganisation of the PLA into five theatre commands, each with its own political commissar, is one of the methods by which the CPC is overtly reasserting its control over the PLA. This ensures that no decision-making process takes place without a party member present, in line with Xi's need to ensure that the PLA remains loyal to the party and none of its actions is to the detriment of the latter. While this reorganisation streamlines the command structure of the PLA, the CPC has also addressed the problem of coordination in operations through the appointment of naval officers to

command the theatres of the mainland. As the only naval commander in the newly organised PLA was Vice Admiral Yuan Yubai[164] (commander of the Southern Theatre), which signaled an increasing effort from the CMC in ensuring that coordination in command and operations is achieved and PLAA does not dominate control of the TCs. However, following Yubai's retirement in July 2021, his replacement is General Wang Xiubin from the PLAA. [165]

It is clear that the CMC is ensuring that the PLA incorporates a joint command structure to better integrate the different services within the PLA into a single operational fighting force. The CMC even issued a classified operational doctrine on the PLA's joint operations, which came into effect on November 2020.[166] Further, in January 2021, the CMC signed a mobilisation order that called on the armed forces to improve joint operations in training and combat.[167] These improvements can spell danger for the Central Asian Republics, which border China, and strengthen Beijing's power projection capabilities into the Indian Ocean region.[168]

A second perspective of India assesses that China's military modernisation dovetails Beijing's increasingly assertive foreign policy—a pattern that has been evident since 2008.[169] The PLA is gearing its forces towards new military missions and goals. Modernisation also serves the purpose of safeguarding China's interests and protecting Chinese expatriates living and working in countries that are part of the Belt and Road Initiative (BRI).[170] Stretching from the Eurasian region to the Western Pacific, China, through military exchange programmes, is increasing interoperability with the BRI countries, which field China's weapons systems.[171] China has also modernised its forces to win informationised local wars. For this brand of warfare, the PLA emphasises the network centricity of all weapons systems in sea, air, and land connected in real time for the effective use of its weapons to service mission objectives and protect its military assets.[172]

The thrust of the PLA's modernisation is on non-contact wars that rely on psychological operations that compel the enemy into submission without *actual* military engagement. The PLAA territorial seizures in Ladakh at Hot Springs, Pangong Tso, and Galwan—which preceded the bloody clashes

between Indian and China's forces on 15 June 2020—exemplify this form of warfare. This is reinforced by the PLA's development of a strong navy, air force, and army, and the prosecution of special warfare operations in the far seas.[173]

Accordingly, the Western Theatre Command (WTC) is also undergoing significant modernisation and infrastructure development, following its ongoing confrontation with Indian forces. The WTC has continued developing villages[174] and posts[175] across strategic locations bordering India. It is developing multiple heliports in Tibet[176] while furthering the integration of the army and rocket forces with the aviation, radar, electronic countermeasure, and communication forces.[177] It is also expected that the PLA will complete building 20 new border airports by 2025.[178] It is also aiming for easy mobilisation and deployment of its soldiers along the border with India by extending and upgrading the G219, G331, and G318 national highways and completing the Siachun-Tibet (Chengdu-Lhasa) railway link.[179] A military logistic hub is also currently under construction in Tibet.[180]

The PLA has also significantly invested in long-term military presence near Pangong Tso lake. Notable developments include the construction of a new division-level headquarters and garrison to support troops, a new radome on a nearby mountain peak, and the construction of a bridge across the lake.[181] The PLA has also equipped the WTC with modern and informationised technologies on the Indian border, such as unmanned equipment, vehicles, and drones,[182] and a panoramic, high-precision spatial datum that covers the uncharted border regions of Tibet.[183] All these developments would pose a severe threat to India in case of future flare-ups.

There is also evidence that the PLA is deliberating the creation of a strategic support force to sustain out-of-area operations and missions. Joint command at the highest combat level is mandatory for the PLA.[184] A corollary to this assessment of the PLA's order of battle is the separation between its conventional and nuclear chain of command. Of particular relevance to India is the PLA's establishment of the Tibetan Military Command (TMC).[185] Beijing also seeks to engage in non-contact conflict,

which places a premium on the political and psychological dimensions of warfare.[186] Fighting a war and subduing the enemy without incurring steep losses is one of the aims of the PLA, and it has focused on doing so by introducing advanced technologies such as ASAT weaponry[187] to target space assets and instituting the SFF to conduct operations in non-traditional domains such as space and cyber-space.[188] These will provide the PLA with the necessary force multipliers to wage any type of non-contact warfare. The targeted malware and cyber-attacks against the power stations of Mumbai and Telangana and the IT systems of Bharat Biotech and Serum Institute of India (SII) by Chinese-backed hacking groups[189] reinforces the application of the PLA's cyber warfare strategy.

A third Indian perspective since China's CMC reforms is that there will be a flattening of higher military command to make it more streamlined, with greater leeway to delegate to lower echelon commanders in the PLA's newly instituted combat zones.[190] This is consistent with recent non-Indian assessments as well as internal Chinese reports that there is an ongoing effort at improving the PLA command performance in joint operations through training courses.[191] This implies that proficiency in C2 operations remains a work in progress. It is a critical requirement, and emulating the successful American conduct of joint operations in the 1991 Persian Gulf War remains a benchmark for the PLA.

Yet, this perspective on the ultimate goal of Chinese foreign policy diverges from the preceding two. The thrust of Chinese foreign policy will be on increasing its political influence,[192] presumably also those with whom it has disputatious relations, such as India and other states around the Chinese rim land. In contrast with the second perspective, China will progressively move from informationised war to a war driven by AI.[193] To sustain the latter, China has been making ceaseless efforts to develop AI which surpasses even that of the US.[194] It is possible that China is planning and pursuing a combination of both informationised and AI-based wars for the successful prosecution and conduct of C2 operations.

All of this brings into question the need for rapid restructuring of the PLA. The evolution of the PLA doctrine and of China as a whole has included moving from Deng's doctrine of "hide your strength, bide your

time" to the more contemporary form, where Xi's determination to make China the centre of world trade has placed a lot of pressure on the CPC to ensure that China does not appear as a nation with a weak military. To that end, as part of Xi's reforms, each of the theatre commands has both a military official and a CPC commissar within its command structure. The institution of commissars in the PLA theatre commands showcases Xi's need to project the PLA as the military wing of the CPC, leaving no questions on where its loyalties lie. Additionally, projects such as the BRI, already seeing massive amounts of infrastructure construction, pose a problem of security. This, along with Xi's ideal of having a military that can fight and win wars,[195] the uncertain nature of international systems and its possible consequences, and the fear of the CPC's legitimacy being questioned has led to him asserting greater control over the CMC and the CPC while simultaneously ensuring that the uncertainties around the globe do not hamper China's progress.

Xi does not want to leave anything to chance when it comes to securing his grip over the party and the military, ensuring that these elements will serve his larger and more ambitious goal of making China an economic powerhouse. Thus, through 2020–2021, the CMC continued to issue various circulars and guidelines for the PLA. This included educating the Chinese military on party history,[196] ideology, polity,[197]and Xi Jinping thought.[198] The CMC also took over the jurisdiction of reserved forces in July 2020.[199] In addition, it will formulate the country's military policy through the National Defence Law of 2020,[200] ensuring that the PLA remains loyal to Xi, the CPC, and their idea of making China a global power.

Conclusion

Since Xi's rise to the position of General Secretary of the CPC, the PLA has become a better force qualitatively—one that is capable of fighting any battle on any terrain at a moment's notice. The PLA has undergone significant changes in its structuring and technological developments to make it a leaner and more efficient fighting force. Perhaps no other branch of the PLA has been more significantly upgraded than the PLA Navy. The once-neglected PLAN is now on track to becoming the dominant naval force in China's near and far seas. The PLAN's quantitative strength exceeds that of any other navy in the world. Indigenous production has been one of the cornerstones of PLA's modernisation drive, and nothing else drives this point home better than PLAN's first indigenously produced aircraft carrier.

Technology has also played a crucial role in the development of the PLAAF and PLARF through the introduction of drones and UAVs as well as research into the integration of AI in next-generation aircraft and weaponry. Their emphasis on quality has also led them to focus more on the delivery of their warheads rather than the warheads themselves.

The modernisation drives discussed in this paper help underscore an important point in the machinery of the CPC since Xi became general secretary. Xi has emerged as another version of Mao Zedong, with some of the same aspirations and fears as his predecessors. His ambitions of making China the centre of contemporary world economy have driven his vision of a modern and battle-ready PLA capable of taking the fight to the enemy if needed. Specifically, China has progressively created a favourable asymmetry in military strength to pose serious capability-related, operational, and logistical challenges for its immediate neighbours, including India. Through this modernisation, Xi also hopes to show the rest of the world that China is a force to reckon with in the post-pandemic world, that it has learnt from past failures, and that it is stronger today than it has been in many years.ORF

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