

Analysing China's Pursuit of Self-reliance in Defence Industry

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Against the backdrop of prevailing political and military challenges, the regimes in the People's Republic of China (PRC) have always underlined building defence production systems to make the country self-reliant in defence industry. The dominant idea has been to achieve the People's Liberation Army (PLA) military modernisation for fighting modern warfare. In its early days of establishment in the 1950s, the PRC lacked the necessary foundational infrastructure to advance in defence technologies and production. With crucial external assistance in defence technology, initially, from Soviet Union and then, Russia and Ukraine, China has been able to build a robust and self-reliant defence industry. Furthermore, the restructuring of ministries of defence production into defence corporation has been the main catalyst in the process of building Chinese defence industry.

Keywords: *China's Defence Industry; PLA Military Modernisation; Chinese arms sales; Chinese defence corporations*

INTRODUCTION

The People's Republic of China (PRC) has made significant improvement in defence production, particularly in the 21st century. For instance, from

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2021 to 2025, China accounted for 5.6 per cent of the global arms market. Self-reliance in defence production has been one of the aspirations of China since its independence in 1949. In the early 1950s, China initiated the development of its modern defence industries with the support of the Soviet Union. However, following the Sino-Soviet split in 1960, all forms of assistance were stopped immediately. This led to slower progress in defence production, with limited external technological support, in the 1960s, the 1970s and the 1980s.

The dissolution of the Soviet Union in 1991 proved to be a 'blessing in disguise' for the Chinese defence industry. China was able to procure useful and crucial defence technologies from Russia and Ukraine to boost its defence research and development (R&D) and manufacturing. Besides this, Chinese defence industries underwent several rounds of reforms and re-organisation for industrial integration. Over the years, China also managed to build a defence industry with a high degree of indigenous R&D capabilities. In fact, building of national defence to counter security challenges was a key concern of the Chinese regimes that led to the development of a robust defence industry system. An additional driving force since 1954 was the military modernisation of the PLA.¹

Over the years, China was able to procure defence technologies from several countries, such as the Soviet Union,² the United States (US),³ France, the United Kingdom (UK),⁴ Russia and Ukraine. These crucial defence technologies helped China to not only build a foundation for defence manufacturing but also overcome longstanding technological barriers. Moreover, the 1999 defence sector re-organisation in China transformed the state-run ministries of machine building into 10 major corporations. These integrated defence corporations, though directly under the central government, were made responsible for their own revenues.

Furthermore, for China, an important motivation for building the defence industries was arms export, as it could generate high revenue for the country. China's arms sales increased gradually from 1970 to 2010, and it suddenly spiked after 2010.⁵ Indeed, over the last five decades, China's arms export volume in global arms sale increased from 1.3 per cent (US\$ 787 million) in 1979 to 5.8 per cent (US\$ 2.432 billion) in 2023.⁶

This article focuses on key drivers of building a self-reliant defence industry in China. It analyses the military modernisation of the PLA, external assistances in defence technology and reforms in Chinese defence industry as the main factors in shaping its present defence industry.

OVERVIEW OF CHINESE DEFENCE INDUSTRY

The defence industry involves research, development, production and servicing of weaponry and equipment, as well as the development of related military technologies. It is a complex system with a large number of dynamically interacting variables with high-risk factors. It is also a highly competitive industry that seeks innovative approaches, creative ideas and new solutions, primarily dependent on skilled human talents and required resources.⁷ This industry generally encompasses both public and private entities, such as defence enterprises and R&D centres or institutes. It essentially serves the national defence construction to enhance national security; therefore, 'security of supply' has long been the major justification for states to develop domestic defence industries.⁸ Its spin-offs benefit the country's economy and technology. Most importantly, defence industry is a means by which a state can achieve autonomy in strategic capabilities.

In China, the defence industry refers to industries involved in R&D, production and support of weapons and equipment. The State Administration of Science, Technology and Industry for National Defense (SASTIND), under the Ministry of Industry and Information Technology (MIIT), is the agency that oversees the activities of the defence industry.⁹ This industry is composed of six sectors, namely, nuclear, aviation, aerospace, ordnance, shipbuilding and electronics. It primarily encompasses enterprises and institutions under 10 military industrial groups:¹⁰

1. China National Nuclear Corporation (CNNC): Responsible for nuclear military industry, nuclear power, nuclear fuel, etc.;
2. China Aerospace Science and Technology Corporation (CASC): Responsible for the development of launch vehicles, satellites, missile weapons, etc.;
3. China Aerospace Science and Industry Corporation (CASIC): Develops missile systems, information technology, aerospace products, etc.;
4. China State Shipbuilding Corporation Limited (CSSC): Specialises in constructing naval vessels, alongside marine engineering equipment;¹¹
5. China North Industries Group Corporation (NORINCO): Manufactures tanks, armoured vehicles, artillery and other army equipment;
6. China Electronics Technology Group Corporation (CETC): Develops military electronic information systems, radar, communication systems, etc.;
7. Aviation Industry Corporation of China (AVIC): Looks after fighter jets, helicopters, transport aircraft and other aviation weapons;

8. China Ordnance Equipment Group Corporation/China South Industries Group Corporation (CSGC): Responsible for light weapons, ammunition and special equipment;
9. Aero Engine Corporation of China (AECC): It is for aero engines and gas turbines; and
10. China Electronics Corporation (CEC): Looks after military electronic components, cybersecurity, etc.¹²

According to a report, by the end of 2025, China's defence industry ranked second in terms of revenue, however, the overall revenue declined by 10 per cent to US\$ 88.3 billion. Among the Chinese defence companies, AVIC, NORINCO and CASC experienced revenue decline, while CSIC and AECC achieved growth rates of 8.7 per cent and 9.8 per cent respectively.¹³ The present status of the Chinese defence industries is the result of reforms, reorganisation, external technological assistance and drives for military modernisation and arms exports. The six main Chinese defence sectors are discussed next.

Nuclear Industry

For the nuclear industry, CNNC is the representative enterprise. It is responsible for China's nuclear science and technology advancement—the core of state nuclear deterrence and the major force of nuclear power development. The CNNC was established in 1999, however, its predecessor, the Atomic Energy Department, was founded in 1956.¹⁴

Although China has built up its nuclear forces/armaments over the years, the foundation for nuclear studies as well as industry was laid with crucial Soviet support in the 1950s. The initial success in the nuclear sector was the detonation of atomic and hydrogen bombs in 1964 and 1967 respectively. Both these events took place after the Sino-Soviet split in 1960 and it is not clear how the Chinese carried out two nuclear bomb tests without the Soviet assistance. As per an agreement, the Soviet Union was supposed to send blueprints of an atomic bomb, but China claims that it never received it.¹⁵ Nevertheless, a few writings suggest that China did receive the blueprints of a nuclear bomb in initial form from the Soviet Union.¹⁶

In terms of nuclear research, China Institute of Atomic Energy (CIAE) is the country's leading institution, and is also known as the cradle of China's nuclear industry. Other institutions include: China Institute for Radiation Protection (CIRP); Beijing Research Institute of Uranium Geology (BRIUG); the Tsinghua University's Institute of Nuclear and New Energy Technology;

the Institute of Plasma Physics of the Chinese Academy of Sciences (CAS); CNNC's Southwest Institute of Physics; and the CIAE's Department of Radiochemistry.¹⁷

There are claims that China is expanding its nuclear arsenal, but there is little evidence to support this argument. China is also among the top three in the world in terms of nuclear weapons stockpiles. According to the Federation of Atomic Scientists' 'Status of the World Nuclear Forces' (2025), China stockpiles about 600 nuclear warheads.¹⁸ As per the US Department of Defense (DoD) annual report to the Congress, China will have around 1,000 nuclear warheads by 2030. Besides, the Stockholm International Peace Research Institute (SIPRI) claims that China is building 350 missile silos. All these claims have been refuted by China. However, the satellite images suggest that China has built nuclear silos. Moreover, there are other claims regarding the increasing production of plutonium through fast breeder reactors.¹⁹ As per an analysis, China's stockpile of plutonium has been estimated to be 2.9 ± 0.6 metric tonnes as of January 2024. Also, both the US DoD and the SIPRI estimates suggest that China has been increasing its nuclear arsenal at a pace of 60–100 warheads per year since 2022.²⁰

Aerospace Industry

China began its journey of aerospace sector in 1956 with the establishment of the Fifth Academy of the Ministry of National Defense. In the following years, this sector underwent several rounds of re-organisation before the establishment of CASC in 1999.²¹ Today, CASC is the representative enterprise of the Chinese aerospace industry. It mainly engages in research, design, production, testing and launch services for launch vehicles, satellites, manned spacecraft, cargo spacecraft, deep space probes, space stations and missiles. With total assets of 224.1 billion yuan (US\$ 31.2 billion), the corporation covers four businesses, namely, aerospace systems, missile weapons systems, aerospace technology application industries and aerospace services.²² Besides, China's aerospace industry has made notable progress in lunar exploration, manned spaceflight and global navigation system.²³

Given the fragile technological and industrial foundation of the PRC in the early 1950s, it was almost impossible to make progress in aerospace without external assistance.²⁴ To develop its aerospace industry, China thus relied on both external technological assistance and building its indigenous aerospace R&D capabilities. For the foundation of its aerospace sector, China procured technical assistance from the Soviet in the 1950s. Surprisingly, even after the Sino-Soviet split in 1960, the country was able to pursue its aerospace

projects. These projects were remarkable achievements in China's aerospace sector, such as the launch of biological rocket in 1964²⁵ and the launch of Dongfanghong-1 satellite in 1970.²⁶ It was the Chinese scientists who made a critical contribution, and still continue to do so, in developing aerospace projects. For instance, Chinese scientist Sun Jiadong, after graduating from Zhukovsky Air Force Engineering Academy in Moscow in 1958, has supervised 45 satellite missions for China. Jiadong is also the chief designer of China's lunar exploration mission, which was initiated in 2004, and is popularly known as the 'father of BeiDou'.²⁷ Under his guidance, China has made several advances in space exploration programmes, such as space entry, space applications, manned space flight, deep space exploration, aerospace industrial bases and strategic missiles.²⁸

Since the 1990s, much of the technological assistance for the aerospace sector has been procured from Russia and the US. For instance, two of China's major aerospace programmes, namely, BeiDou Navigation Satellite System and Chang'e Lunar Exploration Programme, have utilised and expanded through international collaboration and foreign assistance. Although China claims that the BeiDou system has been developed independently,²⁹ there is substantial evidence that the programme has made use of external assistance. Furthermore, since 1994, the BeiDou system has been compatible with the Global Navigation Satellite System (GNSS).³⁰ China has spent about US\$ 9.37 billion on the BeiDou programme from 1994 to 2020, and its services include navigation, positioning, timing and short message. Despite being one of the largest space programmes of China, with a huge investment, experts have pointed out flaws in BeiDou positioning accuracy.³¹

Similarly, in the case of Chang'e Lunar Exploration Programme initiated in 2004, China has been engaging in extensive international cooperation. For instance, Chang'e-4 probe carried payloads from Germany, Sweden and the Netherlands in 2019.³² Also, in June 2024, the Chang'e-6 mission carried payloads from the European Space Agency's lunar surface ion analyser, France's radon detection instrument, Italy's laser corner reflector and CubeSat from Pakistan.³³ Another example is China's Tiangong space station, where much of the related technology was procured from Russia in the 1990s: the Chinese Docking Mechanism used in Tiangong is based on the Russian Androgynous Peripheral Attack System (APAS-89/APAS-95 system).³⁴

It is thus evident that although China has made significant progress in the aerospace sector in the last seven decades, it was assisted by various countries. The industry has better prospects trajectory to remain a world-

class aerospace industry, nonetheless, it involves international cooperation for better results.

Shipbuilding Industry

In 2010, China became the world's largest shipbuilding power. By 2024, the country had captured 53.3 per cent of global shipping,³⁵ with an eye-watering rise from just 5 per cent in 1999. A host of factors were responsible for China's rise to the top in shipbuilding industry, including: initial foundational support from the Soviet Union throughout the 1950s;³⁶ gradual building of R&D centres and shipyards;³⁷ inculcating young talents as shipbuilding experts;³⁸ much-needed reforms and re-organisation for industrial integration;³⁹ and China's 1978 reforms and opening up.⁴⁰ Apart from the Soviet Union, China also procured initial shipbuilding assistance from East Germany, Czechoslovakia, Poland and Yugoslavia in the early 1950s.⁴¹

According to a Chinese author, He Wenlong, China's shipbuilding industry was built in two phases after independence. The first phase, from 1949 to 1978, was the foundational development of Chinese shipbuilding that transformed it into a self-sufficient industry. By the end of 1978, China shipbuilding tonnage reached 861,000 tonnes, amounting to 5.6 per cent of the global shipbuilding output.⁴² The second phase, from 1978 to 2019, was the revitalisation development phase of the industry that transformed it into a dominant shipbuilder. By 2019, China's annual shipbuilding volume reached 36.72 million deadweight tonnes, with 33.53 million deadweight tonnes as ship export volume.⁴³

In the early 1950s, China's shipyards were incapable of designing ship; also, at times, they were unable to address the technical issues of imported warships. In 1955, with the Soviet support, China set up its shipbuilding unit for warships.⁴⁴ Under the guidance of Soviet experts, the country built four warships (frigates) in 1958. A modern shipbuilding foundation was thus already established before the Sino-Soviet split in 1960. Hence, even without Soviet assistance in the 1960s, China was able to develop and produce conventional submarines, torpedoes and missile boats. Later on, it also designed anti-submarine patrol boats, gunboats, destroyers and nuclear submarines.⁴⁵ By the late 1970s, a complete shipbuilding industrial system had been established, encompassing research and design, production, ship design and weaponry, testing and maintenance and material and equipment. This completed the development of China's first generation of warships and weaponry.⁴⁶

The shipbuilding industry was improved through several rounds of reforms and re-organisation, in particular the 1999 re-organisation, which led to a more effective, efficient and profit-making Chinese shipbuilding system.⁴⁷ Furthermore, timely implemented plans and policies revitalised the shipbuilding industry. For instance, the 2009 'Plan on the Adjustment and Revitalization of the Shipbuilding Industry' was implemented to check declining demand; promote mergers, acquisitions and restructuring; and encourage indigenous innovation and R&D.⁴⁸ The plan addressed several underlying issues, but failed to address the problem of overcapacity. In order to check shipbuilding overcapacity, China implemented the 2014 'White List' plan that shut down all underperforming shipyards or enterprises. Following its implementation, only 71 shipyards figured in the 'White List', and all others were closed by 2017.⁴⁹ Consequently, 90 per cent of Chinese vessel deliveries were completed on time.⁵⁰

Nonetheless, China's existing production capacity is still dominated by low-value added and low-tech ships. The bulk carriers or bulkers account for 50 per cent of total deliveries from Chinese shipyards; and three mainstream cargo vessels—bulkers, tankers and container ships—together account for more than 90 per cent of the deliveries. China is the world's largest shipbuilder, but it is South Korea that leads in high-end shipbuilding.⁵¹ In order to close this gap, China has implemented certain policy measures: for instance, 'Made in China 2025' stipulates the objective to become a high-end shipbuilder; and the 'Shipbuilding Industry Deepening Structural Adjustment, Accelerating Transformation, and Upgrading Action Plan (2016–2020)', released by MIIT, proposes to eliminate low-end shipbuilding production.⁵² However, despite the policies in place, it is going to take time to transform China into high-end shipbuilding as it requires better R&D and innovation.

Aviation Industry

How did China evolve into a major aircraft manufacturing nation with almost negligible technological know-how in the 1950s? There are no specific reasons but a combination of factors responsible for this. These factors include: external assistance, primarily from the Soviet Union,⁵³ Russia and Ukraine; building of domestic R&D centres and academic institutions;⁵⁴ reforms and restructuring of the aviation sector,⁵⁵ and creating aircraft markets.

For the aviation industry, AVIC is the representative entity responsible for defence R&D and manufacturing aircraft. It oversees 33 scientific research institutes, nine key laboratories, 30 aviation technology laboratories

and several technology centres. Its predecessor, Bureau of Aviation Industry, was founded in 1951, and was reorganised into AVIC in 2008. Since 1951, China has produced more than 20,000 aircraft and helicopters.⁵⁶ The AVIC is currently China's largest defence company and its defence business accounts for 25 per cent of the corporation's total revenue.⁵⁷

The foundational infrastructure of aircraft manufacturing was set up in China in 1959 with Soviet support, starting in July 1951. The aviation factories in Mukden, set up by the State of Manchuria, Japan, in 1938, were refurbished with Soviet assistance.⁵⁸ As per Sino-Soviet agreements of 1952 and 1954, China was permitted to manufacture Soviet aircraft. However, the Chinese aviation factories could only assemble and produce limited aircraft, and were largely dependent on the Soviet Union for aircraft kits or parts. The country's R&D of aircraft was still at a nascent stage in the late 1950s, and the Sino-Soviet split in 1960 was a sudden setback for the industry. Nevertheless, China set up Shenyang Aircraft Design and Research Institute in 1961 to resume and make further progress in aircraft making.⁵⁹ This institution, later on, became the base for fighter design and research, and is credited for developing more than 30 models of fighter jets.

Without the support of Soviet Union, it took China a much longer time to make further advances in the aviation sector. Indeed, progress was rather slow throughout the 1960s, 1970s and the 1980s, as the country could secure very little external technological assistance to develop aircraft. It was only in 1991, after the dissolution of the Soviet Union, that China could boost its aviation industry with Russia's technological assistance. The setting up of production line of Su-27 fighter jet in China marked a new beginning for its aircraft making. In fact, all the J-series of fighter jets developed by China during the 1990s and the 2000s were based on Russian technology.

China also procured some amount of technical assistance from the West. For instance, China's aviation industry started collaborating with the US' GE Aerospace aircraft engine manufacturer in the mid-1980s. As of 2011, China had procured 2,500 jet engines from GE and CFM International for its aircraft. Moreover, in January 2011, an AVIC and GE joint venture company was set up to develop avionics systems. As per the agreement, the GE Aerospace was to provide facilities for technical training, manufacturing, spare parts distribution and engine maintenance and overhaul to China.⁶⁰

By 2010, China's aviation industry began to modernise rapidly due to Russia's increased desire to build relations with China under prevailing conditions of Western sanctions. Subsequently, Russia chose to sell its

advanced arms, such as S-400 and Su-35 fighter, to China. Nevertheless, Russia has continued to maintain a technological gap with China, particularly in terms of aero-engines. China is still relying on Russian-origin aero-engines, such as the Saturn AL-31F and AL-31FN, as well as the Aviadvigatel PD-30KP engines, for its aircraft.⁶¹ It has been buying Russian jet engines as a stop-gap measure to meet its current needs, while developing domestic replacements in parallel. Besides, the aircraft engines that China has designed and developed, such as WS-10, WS-15 and CJ-1000A, are not at par with global standards in terms of key parameters.⁶² To address the issue, a memorandum of understanding (MoU) has been signed between China Aero Engine Research Institute and Russia's Central Institute of Aviation Motors, in 2017, for aero-engine R&D.⁶³

Looking back, the PLA parade at the foundation day ceremony of the PRC on 1 October 1949 displayed only 17 aircraft, in five models, with foreign origins.⁶⁴ In contrast, as per the 2024 *China Military Power Report* by the US Pentagon, Chinese military is now equipped with more than 1,900 active military aircraft of various models. China has thus made notable progress in aviation defence industry. This is attested by the fact that, in 2025, AVIC was listed as the world's eighth-ranked defence company.⁶⁵

Ordnance Industry

Traditionally, China was not a major arms maker, but today, it is one of the major arms-exporting nation. The evolution of the Chinese ordnance industry has been gradual but exemplary. There are a host of factors responsible for the development of Chinese ordnance industry, such as: initial foundational refurbishment of ordnance industry with external assistance;⁶⁶ promoting indigenous R&D;⁶⁷ reforms and re-organisation of existing firms; and building a profitable ordnance corporation.

China's ordnance industry was re-structured to establish NORINCO in 1993 and CSGC in 1999.⁶⁸ The gradual progress made by the two corporations over a period of three decades has made China a major arms exporter, covering 5.8 per cent of the global arms market.⁶⁹ The progress is reflected in the increase of operating revenue of the ordnance industry groups of China, from 100 billion yuan (US\$ 12.54 billion as per 2006 exchange rate) to 556.2 billion yuan (US\$ 82.67 billion as per 2022 exchange rate).⁷⁰

Unlike the aviation industry, China's ordnance industry had a relatively smooth progress in the last seven decades. The foundation for modern ordnance factories in China was, again, laid with Soviet support. China set

up its first production line for Soviet T-54A tanks in late 1956.⁷¹ By 1959, it began manufacturing Soviet's T-54A tanks without external assistance. Based upon the T-54A tank, China built its first indigenous tank, Type 60, in 1974. For the second generation of tank, that is, Type 80, China sought technical assistance from the West, finally producing it in the late 1980s. However, by the early 1990s, Type 80 tank was rendered obsolete. The government ordered NORINCO to develop third-generation tanks for the Chinese military; consequently, Type 90 tank was developed based on Type 80 in 1992. Before the Type 80 tank was rendered obsolete, NORINCO developed an upgraded version, Type 99 tank, in late 1998, with engine technology borrowed from the German tank.⁷² In 1999, NORINCO developed its first long-range artillery system.⁷³

By 2010, NORINCO had made major progress. Consequently, in 2013, China overtook France to become the fourth-largest arms exporter in the world. Besides NORINCO and CSGC, the other arms makers include AVIC and Poly Technologies. However, NORINCO is the biggest in the bunch. Moreover, with a focus on intelligentisation of weapon, NORINCO is also developing and producing advanced weapons based on emerging technologies, such as robot dogs, fixed-wing drones and unmanned vehicles.⁷⁴ Furthermore, NORINCO has developed sophisticated defence technologies in precision-strike systems, amphibious assault weapons and equipment, long-range suppression weapon systems, anti-aircraft and anti-missile systems, etc.⁷⁵

In an article, NORINCO clarified: 'Artificial intelligence [AI] will leverage its self-learning capabilities in the development of weapons and equipment, serving as an advisory tool that provides recommendations.' While pointing out that AI can be used to evaluate the combat performance of weapons and equipment, the article confirmed that AI has already been used in the development of Chinese weapons,⁷⁶ such as NORINCO P60 military vehicle⁷⁷ and Sharp Claw I unmanned ground vehicle.⁷⁸ Besides, CSGC has designed weaponised 'robot wolves' to be deployed in concert with aerial swarms and foot soldiers.⁷⁹

Electronic Industry

A relatively new sector in China's defence industry, electronic industry has gained significance due to its application in advanced weapons and equipment with new emerging technologies. Officially, the electronic sector of defence industry evolved from 2002, but it has made rapid progress due to the demand for advanced weapons and equipment. One of the key reasons

for the development of electronic industry in Chinese defence sector has been 'civil-military integration'.⁸⁰

The defence electronics include product systems, such as airbase early warning, integrated electronic information, radar, communication and navigation, electronic warfare, unmanned aerial vehicle (UAV) electronic equipment and IFF, and the field of security of electronics and information.⁸¹ The CETC, founded in 2002, is the representative enterprise for China's electronic industry. The corporation layout covers: (i) core industries, namely, public security and network information security, software and information services, integrated circuits and components and new energy; and (ii) cultivating industries, such as equipment manufacturing, marine electronics, communication networks and navigation, transportation electronics, automotive electronics, sensors and sensor networks.⁸² Besides, the corporation develops advanced materials, high-end chips and core components. It is also involved in other fields, such as unmanned intelligence and third-generation semiconductors.⁸³

With an operating income of 397 billion yuan (US\$ 55.28 billion as per 2024 exchange rate of 1 US\$ = 11.66 yuan), CETC has established 12 specialised entrepreneurship and innovation centres in several areas, such as big data, artificial intelligence, public security and the Internet of Things, incubating over 100 innovative and entrepreneurial projects. It has helped China build its national digital infrastructure by making advances in cloud computing, new-generation information networks, smart terminals and network security. Furthermore, the corporation's tasks have been aligned with the PLA's centenary goals, such as improving the capabilities of electronic equipment, constructing network information system and developing unmanned and intelligent future warfare capabilities.⁸⁴

The CETC, which follows civil-military integration, has joint ventures with some of the world's largest electronics companies, such as IBM, Sun, HP, Cisco, Oracle and Huawei. The corporation acts as a middleman in arranging business between private companies and the PLA. Besides, CETC has established partnership with Western military technology firms through its subsidiaries to bring their products to the Chinese market. For instance, CETC's subsidiary, Hebei Far East, has partnered with a US defence contractor, Harris Corporation, to manufacture military-grade communication products. The CETC, by means of its subsidiary CETC International, also facilitates Chinese arms export.⁸⁵

In addition, CETC is supporting China's military intelligentisation. The corporation is focused on developing intelligent weapons and equipment

based on AI and quantum technology. For instance, it is leading in swarm intelligence and is developing AI-enabled drone swarms designed for reconnaissance, surveillance and target acquisition. The CETC is also focused on embedding AI into defence products for faster decision making, such as AI-driven combat aerial vehicles and ‘fire-and-forget’ modes for missiles. Besides, CETC is facilitating China’s aim to lead in quantum technologies by 2035. These quantum technologies include quantum sensors/radar to detect stealth aircraft and submarines and quantum cryptography for secure communication. Moreover, it has been given the responsibility to develop intelligent, biomimetic or humanoid robots designated for various military tasks.⁸⁶

KEY DRIVERS FOR BUILDING DEFENCE INDUSTRY

Military Modernisation

A driving factor for building Chinese defence industry was the military modernisation of the PLA. Unprecedented challenges to national security were a crucial factor for pursuing this modernisation. In fact, a sense of urgency for military modernisation was felt among the top leadership due to certain alarming military incidents, such as: the intervention of two US aircraft carrier battle groups during the ‘1996 Taiwan Contingency’; the ‘accidental bombing’ of the Chinese Embassy in Yugoslavia in 1999; and the death of a Chinese pilot due to plane collision with the US reconnaissance plane in the South China Sea in 2001.⁸⁷

The earliest proposal for military modernisation of the PLA was made at the National Conference of Senior Party Cadres in Military in December 1952.⁸⁸ Later on, in December 1954, at the First National People’s Congress (NPC), modernisation of national defence was proposed as one of the ‘Four Modernisations’.⁸⁹ The significance of military modernisation was re-emphasised and reiterated at the Third NPC in December 1964. In the post-Mao era, under the leadership of Deng Xiaoping, building a modernised and regularised army was re-proposed at the Third Plenary Session of the 11th Central Committee of the Communist Party of China (CPC).⁹⁰ More substantive measures were taken after the Chinese economy improved in the late 1990s, in the form of a ‘three-step’ strategy of 1997, for the modernisation of national defence and military.⁹¹ The strategy set goals, and their deadlines, to be achieved in the next 50 years:

1. Lay a solid foundation for the modernisation of national defence and the PLA by 2010.

2. Quality construction of the PLA by developing high-tech weapons and equipment by 2020.
3. Realise the modernisation of national defence and armed forces by 2050.⁹²

Time and again, the same set of goals were reiterated: for instance, China's 2006 National Defense White Paper also mentioned the 'three-step' strategy. However, the White Paper elaborated the third goal by stating that an informationised armed forces capable of winning informationised wars had to be built by 2050.⁹³ Under Xi Jinping's rule, the 'three-step' strategy of military modernisation was re-proposed with renewed goals at the 19th National Congress of the CPC in October 2017.

1. By 2020, achieve the goal of mechanisation of the PLA with major progress in informatisation.
2. By 2035, achieve the goal of modernisation of national defence and armed forces.
3. By 2050, transform the PLA into a world-class army.⁹⁴

In 2019, the 'three-step' strategy of military modernisation was reframed in the National Defense White Paper. It said that mechanisation will be achieved by 2020, with significantly enhanced informationisation; modernisation of national defence and the military will be completed by 2035; and the PLA will be transformed into a world-class force by 2049.⁹⁵ A new component of integrated development of mechanisation, informatisation and intelligentisation was added in military modernisation at the Fifth Plenary Session of the 19th Central Committee of the CPC in October 2020.⁹⁶ The resetting of goals in the 'three-step' strategy has thus been focused at fighting and winning informationised modern warfare.

Defence Industry and the PLA Military Modernisation

Chinese defence industry has played a crucial role in the expansion as well as modernisation of the PLA in all its services/arms. In terms of weaponry and equipment, all services of the PLA match global standards both in quality and quantity.⁹⁷

Chinese shipbuilding has transformed the PLA Navy (PLAN) into one of the largest naval forces in the world, with a large number of warships.⁹⁸ There is however no official confirmation about the number of warships in the PLAN; also, the figures estimated by various research think tanks and authors varies. For instance, as per the Center for Strategic and International

Studies (CSIS) estimates, the PLAN operates 234 warships.⁹⁹ Similarly, as per the *Beijing Gazette*, the PLAN is equipped with 425 combat vessels of various kinds.¹⁰⁰ Table 1 lists the 281 identified warships in service with the PLAN.

Table 1 List of PLAN Warships

1.	Aircraft Carriers: 3 ¹⁰¹ • Liaoning Type 001 • Shandong Type 002 • Fujian Type 003
2.	Amphibious Assault Ships: 5 ¹⁰² • Type 075 (4) • Type 076 (1)
3.	Destroyers: 38 ¹⁰³ • Type 052 (2) • Type 051B (1) • Type 956 (4) • Type 052B (2) • Type 052C (6) • Type 051C (2) • Type 052D (18) • Type 055 (3)
4.	Frigates: 102 ¹⁰⁴ • Type 054A (40) • Type 054 (2) • Type 056A (50) • Type 053H3 (8) • Type 053H1G (2)
5.	Landing Ships: 48 • Type 071 (8)¹⁰⁵ • Type 072A (15) • Type 072 & Type 073 (25)

6.	Conventional Submarines: 54 ¹⁰⁶ • Type 039G (13) • Type 035B (4) • Type 035G (7) • Type 039B (14) • Type 039C (1) • Type 039A (4) • Type 636 (10) • Type 032 (1)
7.	Nuclear Submarines: 16 ¹⁰⁷ • Type 093 (6–9) • Type 091 (2) • Type 094 (2) • Type 094A (4)
8.	Comprehensive Supply Ships: 15 ¹⁰⁸ • Type 901 (2) • Type 903/903A (9) • Type 904 (1) • Type 904A (1) • Type 904B (2)
Total	281

Source: Compiled by the author.

Notable progress has also been made in transforming the PLA Air Force (PLAAF) by improving defence production. According to the World Directory of Modern Military Aircraft (WDMMA), in 2025, China had 3,259 aircraft in the PLAAF and the PLA Naval Aviation Force.¹⁰⁹ Among them, there are 1,578 fighter jets, 112 special operation aircraft, 10 aerial refuelling aircraft, 913 armed helicopters, 289 transport aircraft and 402 general-purpose helicopters.¹¹⁰ Table 2 gives the list of PLAAF equipment and aircraft.

Table 2 List of PLAAF Equipment and Aircraft

Air Defence System	HQ-7; HQ-9; HQ-12; HQ-19; HQ-22; S-300; and S-400.
Bombers	H-6 series.
Fighter Jets	J-8; J-10; J-11; J-16; J-20; J-35; JH-7; Su-27; Su-30; and Su-35.
C4ISR	BZK-005; GJ-1; GJ-2; GJ-11; KJ-200; KJ-500; KJ-2000; Model-35A; TB-001; WZ-7; WZ-8; WZ-10; Y-8; and Y-9.
Aerial Refuelling Aircraft	H-6; IL-78; and Yun-20
Transport Aircraft	A31CJ; Boeing 737; CRJ series; IL-76; Y-5; Y-7; Y-8; Y-9; Y-12; and Y-20.
Helicopters	AS332; EX332; Mi-171; Z-8; Z-9; Z-10; and Z-20.
Trainer Aircraft	CJ-6; Y-7; JL-8; JL-9; and JL-10.

Source: ‘Chinese People’s Liberation Army Air Force’ (中国人民解放军空军), *Baidu*, 2025.
Note: C4ISR: Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance.

Regarding the PLA Rocket Force, China is strengthening its nuclear arsenal and missile reserves through significant progress made in the nuclear industry. According to a 2024 Pentagon report, China possesses approximately 600 nuclear warheads and is the fastest-growing country in nuclear arsenal among the nine nuclear-armed states.¹¹¹ The Pentagon estimates that China’s nuclear arsenal will surpass 1,000 warheads by 2030.¹¹² Furthermore, as per SIPRI data of January 2024, China’s nuclear stockpiles includes 442 launchers/missiles and 500 warheads; in January 2019, the number of warheads was 290; in 2015, it was 260; and in 2010, it was 200. Since 2010, the number of nuclear warheads has increased more than twofold.¹¹³ Table 3 enumerates the various missiles developed by China over a period of time.

Table 3 List of Missiles Developed by China

Year	Aircraft-based Missiles	Land-based Missiles	Sea-based Missiles	Cruise Missiles
2000	H-6; Q-5	DF-3A; DF-4; DF-5A; DF-21A	JL-1	
2010	H-6	DF-3A; DF-4; DF-5A; DF-21; DF-31; DF-31A	JL-1; JL-2	DH-10
2015	H-6	DF-3A; DF-4; DF-5A; DF-5A (Mod 2); DF-15; DF-21; DF-31; DF-31A; DF-41	JL-1; JL-2	DH-10

2019	H-6; H-20	DF-4; DF-5A; DF-5B; DF-5C; DF-15; DF-21; DF-26; DF-31; DF-31A; DF-41	JL-2	CJ-20
2024	H-6K; H-6N; H-20	DF-5A; DF-5B; DF-5C; DF-21A; DF-26; DF-27; DF-31; DF-31A	JL-2; JL-3	

Source: SIPRI yearbook for various years.

External Assistance

In order to build its defence industries, China implemented a 'two-legged' policy that included: first, purchase of advanced foreign weapons and equipment; and second, introducing foreign technologies to support indigenous defence R&D.¹¹⁴ Since 1950, China has received weapons and defence technologies from the Soviet Union, the US, France, Russia and Ukraine in three phases.

1. In the period 1950–1970, China procured technologies from the Soviet Union and Eastern European countries.
2. From 1970 to 1990, China procured defence technologies from the West.
3. From the 1990s onwards, Russia and Ukraine have been assisting China to build its defence industry.¹¹⁵

Soviet Assistance

In 1949, China began the reconstruction of its existing defence industry with merely 94 small weapon factories.¹¹⁶ The newly established Sino-Soviet ties in October 1949 guaranteed limited military assistance to China. However, the outbreak of Korean War in June 1950 drastically increased the flow of Soviet weapons, technologies, as well as experts. Though the Soviet assistance was significant for a new, isolated China, the Chinese leadership was not satisfied by the outdated weapons.¹¹⁷

According to July 2002 report, China, with Soviet assistance, developed and produced a total of 268 weapons and equipment from 1958 to 1963, of which 158 were copied, 102 were independently developed and eight were improved designs.¹¹⁸ The first batch of domestically produced light weapons, artillery, tanks, armoured vehicles and other army equipment was delivered to the PLA in 1963. Gradually, the proportion of self-developed weapons and equipment increased year by year. In 1964, China manufactured a total of 95 weapons and equipment, of which 52 were independently designed and 43 were copied.¹¹⁹

Following the political breach in 1960, all forms of assistance from the Soviets stopped, including technological assistance in defence. Still, the Soviet-supported defence production infrastructures of the 1950s were strong enough for China to make further progress in building its defence industry. A few notable advances made by China in the 1960s were: self-developed a surface-to-surface missile in 1960; detonated an atomic bomb in 1964; tested hydrogen bomb in 1967; and launched the artificial earth satellite, Dongfanghong-1, in 1970.¹²⁰ Most of these projects were initiated with Soviet support.¹²¹

Table 4 Sino-Soviet Agreements on Defence Industry

S. No.	Memorandum of Understanding	Year	Remarks
1.	Agreement on the Acquisition of the Special Right for Chinese Factories to Manufacture Soviet-type Firearms, Artillery and Ammunition, and the Delivery of Soviet-type Firearms, Artillery and Ammunition Samples, Production Technical Data and the Dispatch of Soviet Experts for Technical Assistance when Necessary ¹²²	May 1951	• For light weapons only. • Permitted to manufacture Soviet weapons and equipment. • Sharing of production technical data. • Assistance of Soviet experts. • Soviets supplied technical data and drawings for light weapons in 1951.
2.	Agreement on the Supply of Naval Equipment and Technical Assistance to China in Warship Manufacturing (abbreviated as the 'June 4 Agreement') ¹²³	June 1953	• For naval equipment only. • Received 81 combat ships from the Soviet Union.
3.	Agreement on Technical Assistance to the People's Republic of China in the Manufacturing of Ships for the Chinese Navy	February 1959	• For manufacturing ships in China.
4.	Sino-Soviet New Defence Technology Agreement ¹²⁴	September 1957	• Provided missile samples and manufacturing equipment. • Assisted in setting nuclear factories and test bases. • Supplied the latest MiG-21 fighters and air defence and anti-ship missiles.

Source: Compiled by the author.

After the Sino-Soviet split in 1960, China's defence industry suffered a setback and the country started looking for external technological assistance elsewhere. Eventually, in the mid-1970s, China sought the US' support to improve its defence industry.

American Assistance

In the 1970s, with no external technological assistance, the PLA's weaponry lagged at least one or two generations behind the US and the Soviet Union. Following Richard Nixon's visit to China in February 1972, the US assisted the country to procure defence technologies from the West; for instance, China procured Rolls-Royce Spey aircraft engine from the UK in 1975.¹²⁵

With the establishment of Sino-US diplomatic ties in 1979, China procured non-lethal equipment from the US, including satellite imagery, helicopters, radars and satellite ground stations. Besides, the US sent experts and intelligence technology to set up a series of signal intelligence stations in Xinjiang in 1981. With the further deepening of ties, in 1983, the US supplied to China a total of 400 non-lethal weapons and equipment, including transport aircraft, communication equipment, military helicopters, tactical air defence radars, early warning radar antennas and so on.¹²⁶

A rapid progression in Sino-US defence cooperation was seen after a joint communiqué was signed in 1984.¹²⁷ First, the US supplied technology to China to develop anti-tank artillery ammunition, air defence radar and missiles and anti-submarine warfare shallow water craft. Second, the US Grumman Aerospace Corporation assisted China in upgrading the avionics and radar system of J-8II fighter jet.¹²⁸ Third, the US sold 24 S-70C-2 'Black Hawk' helicopters at a unit price of US\$ 6 million to China. Fourth, China received AN/TPQ-37 artillery radar, an advanced anti-artillery radar system and PL2500 series gas turbines for power system of naval destroyers.¹²⁹

Nonetheless, following the 1989 Tiananmen Square incident, the US imposed an arms embargo against China.¹³⁰ Still, China received crucial defence technologies from the US for nearly two decades (1972–1989) to fill the gaps created in their defence industry in the 1960s.¹³¹

British Assistance

China secured a little but crucial technological assistance from the UK. As mentioned earlier, in 1975, with the US support, China purchased the UK's Rolls-Royce Spey aircraft engine. This deal was crucial for the progress in China's R&D in aircraft engine. Following the reforms and opening up in 1978, a contract was signed between the UK's Marconi Company and

China's AVIC in 1983 to modify and improve J-7 fighter jet.¹³² However, all forms of bilateral military cooperation stalled after the 1989 Tiananmen Square incident.

French Assistance

Among the Western powers, France is the only country which has maintained defence technology cooperation with China since 1978. The key areas of cooperation include aerospace, nuclear and military helicopters. For instance, the Chinese Z-8 helicopter has been upgraded on the basis of France's 'Super Hornet' helicopter and Z-9 helicopter has been upgraded based on French 'Dolphin' helicopter and Turbomeca Arriel helicopter engine. Besides, the two sides have been jointly working on a Sino-French Ocean Satellite since 2018.¹³³

Russian Assistance

Following the dissolution of the Soviet Union in 1991, the new Sino-Russian ties saw cautious rapprochement and strategic partnership. Consequently, the two sides formed China–Russia military technology cooperation committee that facilitated the supply of large quantities of Russian weapons and military equipment in the fields of aviation, naval equipment and air defence.¹³⁴ Besides, the Chinese technicians were trained under Russian experts.¹³⁵

China mainly targeted the procurement of Russian aircraft technology because its aircraft making was lagging behind since the Sino-Soviet split in 1960. China procured 178 Su-27/Su-30 fighter jets from 1991 to 2012. Besides, it secured the licence to produce 200 Russian Su-27SK fighter jets. Moreover, in 2015, China purchased 24 Russian Su-35 fighters and procured Russian aero-engines, such as PD-93, D-30KP-2, AL-31F and AL-3FN.¹³⁶ With these crucial technological assistances, China developed a global standard aviation industry, with AVIC figuring among the top global defence companies. Other than fighter aircraft, China procured Russian defence system, warships, missile and helicopters in the 1990s and the 2000s. Major military equipment purchased from Russia included: S-300PMU air defence system; Kilo-class submarines; Sovremenny-class destroyers; Ka-28 helicopters; and Ka-31 radar patrol helicopters.¹³⁷

Ukrainian Assistance

Following the establishment of Sino-Ukraine diplomatic ties in 1992, the two sides signed a number of defence deals in aviation and shipbuilding technologies. As a result, more than 2,000 military technology projects in

30 categories were procured from Ukraine.¹³⁸ Besides, China secured crucial aviation technologies from Ukraine to develop its J-15 carrier-based fighter jet. Using key shipbuilding technologies from Ukraine, China developed its Type 052 destroyers; engines for its two aircraft carriers; ship-based close defence system and missile system; and amphibious hovercraft. Among the major Ukrainian defence support to China was the supply of Varyag aircraft carrier, Su-33 carrier-based aircraft, An-225 large aircraft, 6TD 1200 horsepower diesel engines for tanks, A1-222-25F engines for trainer aircraft and counter-stealth radar.¹³⁹

With crucial assistance in shipbuilding technologies from Ukraine in the 1990s, China managed to build its shipbuilding industry. Specifically, China improved marine gas turbine and marine propulsion system (ship's engine) based on the technologies supplied by Ukraine. For instance, China used the UGT-25000 gas turbines as well as engine technologies in the PLAN's Type 052 destroyers. Later on, the engines of the two aircraft carriers were developed by China based on engine technologies supplied by Ukraine.

Reforms and Re-organisation

Organisational reforms of the defence industry in China began with the establishment of Ministry of Heavy Industry in 1949 that incorporated both civilian and military production.¹⁴⁰ With further reforms in 1952, separate entities were formed for building defence industries in China (see Table 5).

Table 5 List of Ministries of Machine Building in the 1950s and the 1960s

1.	In 1952, the Second Ministry of Machine Building was set up to oversee the nuclear industry of China. ¹⁴¹
2.	The Third Ministry of Machine Building of the PRC was set up to oversee the aviation industry. ¹⁴²
3.	The Fifth Ministry of Machine Industry of the PRC was set up in September 1963 to oversee the production of tank equipment and artillery. ¹⁴³
4.	The Sixth Ministry of Machine Building of the PRC was set up in September 1963 to oversee the shipbuilding industry. ¹⁴⁴
5.	The Seventh Ministry of Machine Building was set up in November 1964 to look after the space industry. ¹⁴⁵
6.	The Eighth Ministry of Machine Building of the PRC was set up in 1964 to oversee missiles. ¹⁴⁶

Source: Compiled by the author.

The aforementioned arrangement of ministries prevailed for almost five decades before the government planned to transform them into respective corporations. Following this decision in 1999, 10 major large-scale defence corporations in five sectors, including aviation, aerospace, ordnance, nuclear and shipbuilding, were formed. Ministries had their own limitations, but the corporations enjoyed the liberty to deal with private enterprises, any state or foreign enterprises directly under the supervision of the central government.¹⁴⁷

Arms Sale

It is well-known that more the revenue generated by selling arms and equipment, more the respective defence industries will expand. As mentioned earlier, in China, arms exports increased gradually from 1970 to 2010, with export volume spiking after 2010. In 2009, China's global arms export share was 2.6 per cent, which spiked to 5.4 per cent in 2014.¹⁴⁸ According to various studies, the major reasons are: large quantity of defence technology transferred from Russia and Ukraine from 1991 onwards that boosted the Chinese defence industries, primarily in aviation and shipbuilding; and the aforementioned reforms and restructuring of the defence industry.

A comparison of past and present Chinese arms sales figures shows a drastic change. For instance, over the last five decades, China's arms export volume in global arms sale increased from 1.3 per cent (US\$ 787 million) in 1979 to 5.8 per cent (US\$ 2.432 billion) in 2023.¹⁴⁹ In 2022, eight Chinese arms companies were listed among the top 100 and three were listed among the top 10, including NORINCO at seventh position and AVIC at eighth position.¹⁵⁰ In 2010, China became the ninth-largest global arms exporter; and in 2023, it secured the fourth position in global arms export. Categories of arms supplied by China in recent years include: 25 per cent combat aircraft; 26 per cent warships; 12 per cent missiles; 19 per cent armoured vehicles; 2.9 per cent artillery; 3 per cent air defence system; 1.6 per cent sensors; and 0.2 per cent engines.¹⁵¹

China's arms export is, however, limited to a few regions and countries: for instance, 61 per cent of Chinese arms are exported only to Pakistan.¹⁵² From 2019 to 2023, the bulk of Chinese arms export of about 85 per cent went to Asia and Oceania, but well over half of its arms export was to Pakistan (61 per cent), Bangladesh (11 per cent) and Myanmar (6.7 per cent).¹⁵³ This is because China exports low-end and low-value arms with cheaper price.¹⁵⁴ China has yet to penetrate the arms markets in developed countries. Since 2023, China's arms export has been affected by the anti-corruption drive in the defence industries, leading to a decline of revenues of defence companies

by 10 per cent. However, this decline in revenues has not affected China's position as a major arms exporter.¹⁵⁵

CONCLUSION

In 1949, the Chinese defence industry was almost zero and the newly founded PRC had to begin from a scratch. Nonetheless, by 2019, China had become the world's second-largest arms producer, after the US.¹⁵⁶ The value of arms import for China from 1950 to 2017 was US\$ 77.30 billion, making it the third-largest importer of arms after India and Germany in the given period.¹⁵⁷ In two decades, China was able to transform itself from a major arms importer to a major arms exporter, becoming the fourth-largest arms supplier after the US, France and Russia.¹⁵⁸

The key drivers of building a self-reliant defence industry were: the PLA military modernisation; external assistance in defence technologies; reforms and re-organisation of the defence industry; and arms export. Large-scale transfer of weapons and military technology from the Soviet Union laid a solid foundation for China to further build a strong and self-reliant defence industry. Over the years, the determined objective of national defence building and military modernisation aligned all forces as well as resources. The contribution of scientists, researchers, enterprises, officials and leaders was crucial in building the industry.

There are some underlying issues in the Chinese defence industry, namely, corruption, lack of high-end production and limited buyers of Chinese arms. China is addressing the underlying corruption with a heavy hand and, at the same time, initiatives have been taken to produce high-end products. If China is able to address these issues, it will become world's largest arms manufacturer in terms of both quality and value. Presently, despite the obstacles, China has become a dominant defence industry nation.

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