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China's Military-Civil Fusion Strategy and Implications for India

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Key Points

- China's erstwhile Civil Military Integration (CMI) focussing merely on defence industries has transited to Civil Military Fusion (CMF) with much wider scope and seeks to fuse the economic & social development strategies with the security strategies.
- Post Xi accession to power, CMF has received major boost and has been upgraded as a national strategy.
- The organisation structures as also regulatory and legal frameworks have been streamlined to facilitate seamless coordination between various agencies.
- The roadmap includes acquiring state of art foreign technology, both by legal and illegal means, with technological espionage often sponsored by Chinese state.
- Besides widening military capability gap, the strategy has manifested opposite India in TAR by way of dual use infrastructure with operational implications.
- India's ongoing efforts to integrate civil and defence sectors need major boost and should especially focus on developing disruptive technologies and non-contact warfare capabilities.

The exploitation of civil sector resources to support and boost the capabilities of People's Liberation Army (PLA) is not a new practice. Instead, it is now a streamlined procedure and part of China's recent and pivotal national strategy, named as *Military-Civil Fusion* (MCF). The role of private companies supporting PLA mobilisation and subsequently sustaining troops in harsh conditions during the ongoing standoff in Eastern Ladakh has been widely publicised by China's state media. The same is also frequently evident in China's military-industrial complex. Recently, China conducted an exercise in which the workers in Chinese car factories were mobilised by the PLA. The exercise simulated a requisition order for large platform trailers. Car factories temporarily reoriented their equipment and staff towards converting 20-tonne semi-trailer trucks into larger and sturdier vehicles, capable of transporting a 40-tonne Type 59 main battle tank within eight hours for deployment of heavy armoured vehicles in border areas[1]. As part of the strategy, China has been employing its civil sector industries to develop enormous

amount of dual-use infrastructure in border areas with India near the Line of Actual Control (LAC) with an aim of serving the purpose of national defence in case of a war.

India also has to start pursuing the integration of its civil and defence sectors more aggressively. In a recent statement made by the Chief of Defence Staff, General Bipin Rawat called for integrating civil and defence ecosystems to optimise resource utilisation, stating that the examination of concepts of integrating civil and military sectors is underway and the overall integrated structure and processes may take two to three years to become stabilised.[2]Given the long-term gains associated with it, civil-military integration (CMI) in various forms is soon expected to be the key concept across the world. China has evolved the concept of MCF over time and the study of the same has relevance and some lessons for India.

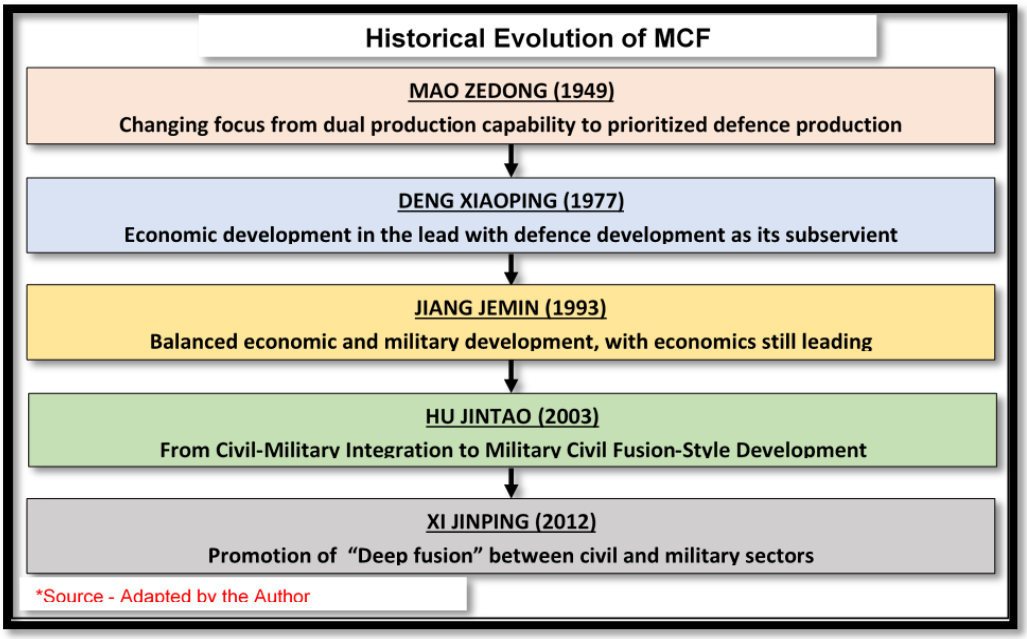
Historical Context

• ***20th Century (Mao, Deng and Jiang Era) - Evolution of CMI.*** Since the founding of the People's Republic of China (PRC), the strategists and leaders have constantly sought a balance between competing goals of security and economic development. Post Korean War and consequently reduced threat levels, Mao in 1956 put forward the concept of *handling military and civilian affairs together* and encouraged the defence industries "to build dual-use production lines".[3] Post the Soviet withdrawal of aid to both civil and defence development programmes, the focus was shifted to indigenous production of defence equipment.[4] In early 1980s, the focus of the Chinese Communist Party (CCP) was again shifted towards economic development with national defence build-up as its subservient. In 1982, Deng Xiaoping stated the often referenced *16 letter guiding principle*, translated as "CMI, peacetime and wartime integration, giving predominance to military products, using civilians to support the military".[5] As per Deng, the modernisation of military equipment was only possible when the country's economy had established a strong foundation and thus the "military must exercise patience".

Jiang Zemin's ascendance in 1990s brought the next generation CMI policies with focus on "Locating military within the civilians". The Tiananmen Massacre in 1989, the US victory in Gulf war and especially the use of sophisticated weapons by the US changed the focus of China towards military modernisation. The new strategic guideline of winning wars under modern high-technology conditions given by Jiang Zemin, necessitated focussed defence modernization while also continuing economic development. So, in this period, the scope of

CMI expanded beyond the defence industrial base to include infrastructure, logistics, education etc.[6]

Figure 1: Historical Evolution of MCF



Source : Adapted by the Author

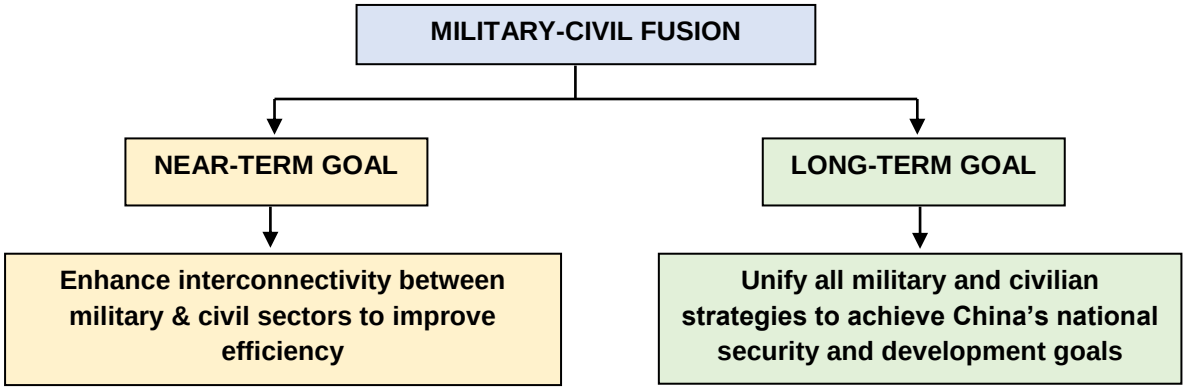
- ***21st Century (Hu Jintao and Xi Jinping era):Transition from CMI to MCF.*** Hu Jintao refined Jiang's vision for CMI and proposed to pursue a Military-Civil Fusion (MCF) style development path with Chinese characteristics, marking a shift in terminology from CMI to MCF, which broadened the scope from primarily defence science and technology (S&T) focused CMI to much larger coordination. MCF was included in the 12th Five Year Plan as an integral part of national strategic planning. It was also recognised that transition from "integration" to "fusion" was not merely cosmetic, but represented a "theoretical 'great leap' following a long period of trial and error". In 2012, Hu's 18th Party Congress report called for formulating the strategies, management structure and legal framework to guide MCF development.[7] With Xi's ascension to power in 2012 and onwards, MCF has evolved into a holistic strategic concept and reaches beyond the defence industry. Presently, MCF development strategy seeks to fuse the economic and social developmental strategies with the security strategies to build an integrated national strategic system to support China's rejuvenation goals. The discussions in two publications of Science of Military Strategy (SMS) published in 2001 and then in 2013 by authoritative Academy of Military Sciences (AMS) highlight evolving focus on CMI/MCF. The SMS 2001 lays emphasis only on role of "masses", militia and reserve units as also other civilian inputs for S&T developments as civil

contributor to military needs. In comparison, the SMS 2013 version widened the breadth of activities for the integration by including other non-military organisations/assets assisting either military personnel, logistics or mobilisation.[8] In 2016, Xi Jinping called for the transition of MCF development from “early-state fusion” to “deep fusion”. As a follow up, the CCP Central Committee released the *2016 Opinion*, which is believed to be the only authoritative document available in public domain on MCF development till date which explains all the different sectors where the interdependence between the civilian and the military aspects could take place.

Goals of MCF Development Strategy

The figure below illustrates the goals of MCF development strategy as interpreted by the PLA National Defence University (NDU) researchers.[9]

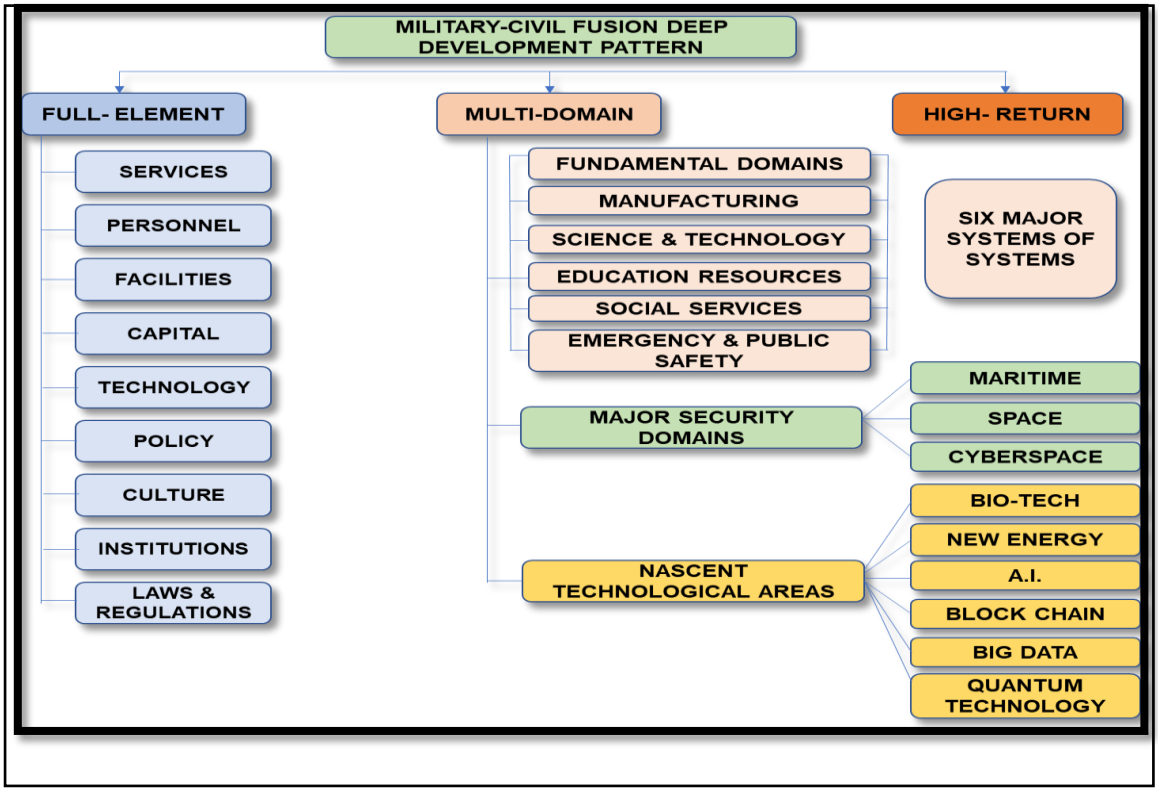
Figure 2: Goals of MCF Development Strategy



Source: Prepared by the Author

As evident from the above, in long-term the MCF strategy ultimately aims to unify various military and civilian strategies to facilitate achieving both security and development goals set by the PRC. The near-term goal of development of “MCF Deep Development Pattern,” can be well understood by the graphics below which illustrates the core components of the MCF deep development pattern.

Figure 3: MCF Deep Development Pattern



Source: Adapted by the Author from Alex Stone, Peter Wood, "China's Military-Civil Fusion Strategy", CASI report, 2020

The three core components as depicted are, "full-element," "multi-domain," and "high-return." The "full-element" component defines the resources that the military and civil sectors share. The "multi-domain" component includes the domains prioritised for MCF development, the major security domains, the emerging domains of nascent technologies and the global aspects of Chinese MCF. Taken together, these two components provide a roadmap for MCF development. The last component, "high return," describes the dividends which are expected to be derived from MCF development.

•***Domains Prioritised for MCF and Related Systems of Systems.*** The CASI report also describes six traditional domains prioritized for MCF development and the related six Systems of Systems (SoS), which have been formed by the fusion of defence and civil ecosystems and which are meant to evolve simultaneously as the MCF gets promoted in these domains. As per the report, the traditional domains are relatively static while these SoS are dynamic ecosystems that operate across the domains to achieve the desired

operational effects and form the backbone of the MCF strategy. The six SoS are briefly explained in the table below.

Table 1: The Six Systems of Systems

The Six Systems of Systems			
Defence System	**Civil System**	**Systems of Systems**	**Tasks/Purpose**
Defence Infrastructure	Civil Infrastructure	Fundamental Domain Resource Sharing SoS	• Construction of military/dual-use infrastructure by leveraging civil construction capabilities. • Extends to dual-use domains such as space and undersea.
Defence Technology Industrial Base	Civil Technology Industrial Base	Advanced Defence Science, Technology & Industrial SoS	• Facilitates technology transfer amongst both sectors. • Establish China's Self-Reliance in development of key industrial technologies.
Defence Innovation System	Civil Innovation System	Military-Civil Coordinated Technology Innovation SoS	• Integrates Research & Development carried out across civil and military domain. • Facilitates military use of latest innovations in civil sector. • Encourages sharing of scientific resources and research findings.
Military Personnel Cultivation System	National Education System	Military Personnel (Talent) Cultivation SoS	• Develop technical expertise of personnel in both sectors. • Create a pool of S&T Experts, including foreign experts, who can work in both sectors.
Military Logistics System	State Social Service System	Socialized Support and Sustainment for the PLA SoS	• Streamline and modernize PLA's logistics & basic support services. • Integrate PLA's Joint Logistics Support Force with advanced civilian logistics set-up.
National Defence Mobilization System	State Emergency Management System	National Defence Mobilization SoS	• Achieve well-coordinated military-civilian response during war/emergency. • Incorporates PLA's reserves, militia, provincial military districts etc

Source: Prepared by the Author

Roadmap for Implementation

To implement the MCF strategy, China's government has streamlined regulatory frameworks to facilitate coordination between civil and defence sectors. An organizational structure has also been created that would be responsible to supervise, implement, and coordinate the MCF strategy.

Organisational Structure

To provide required impetus post Xi's advent to power and consequent upgradation of MCF as a national strategy, a national level MCF Leading Small Group was created in 2014 which was soon followed up with similar leading small groups at local government and industry

levels. In Jan 2017, an organisation for highest-level decision making and coordination was established known as “CCP Central Commission for Military Civilian Fusion Development” (CCMCFD), led by President Xi himself. The empowered organisation besides ensuring seamless coordination between military and civil serves as “Top level Design for MCF”. By 2018, in 31 province level divisions and some prefectures, MCF Development committees were set up.[10] In addition to the central party organizations, a number of state-level organisations and pre-existing State Council organs have also been playing important roles in the implementation of MCF.

Various leading organisations at State and CMC levels responsible for implementation of MCF have developed required interface and interaction procedures for long-term communication mechanisms to ensure success of scientific programs. At CMC level, Equipment Development Department (EDD), S&T Committee (rough equivalent of DARPA in the US) and Strategic Planning Office, have a focussed approach to plan and implement MCF strategy. Similarly, the State Council organs like the National Development & Reform Commission (NDRC), Ministry of Science & Technology (MOST) and Ministry of Industry & Information Technology (MIIT) and its subordinate State Administration for Science, Technology, and Industry for National Defence (SASTIND) are proactively aligned to the MCF strategy. MIIT is the primary State Council organ responsible for defence industrial policies along with its key subordinate, SASTIND, which plays an assertive role in implementing MCF directives and constructing an expanding infrastructure for integration of civil and military research and development (R&D) and acquisition communities. SASTIND also coordinates MCF work with provincial and municipal leaders, defence enterprises, and the PLA.

Amongst the three main institutions under the CMC, there has been major realignment of functions in AMS and some changes to the NDU and the National University of Defense Technology (NUDT). The AMS has established Military-Civil Fusion Research Center in 2011 and NDU has followed suit in 2015 with both now having been established close working relationships with concerned State and Military organizations to provide fillip to MCF strategy. The AMS which till now had niche on doctrinal issues including publication of Defence White Papers etc has received fresh S&T focus after recent merger of six research institutes in the Academy, earlier subordinate to the PLA’s former general departments.[11] This is aimed for closer alignment of S&T progress with doctrinal development. The AMS, once the sole preserve of uniformed personnel, has in recent past, increased civilian

personnel recruitment into its *National Innovation Institute of Defence Technology* (NIIDT) by at least five-fold since 2019, to give boost to MCF.[12] Incidentally, NIIDT develops operational applications of innovative frontier technologies, such as artificial intelligence, unmanned systems and bio-electromagnetics specifically to meet PLA requirements.

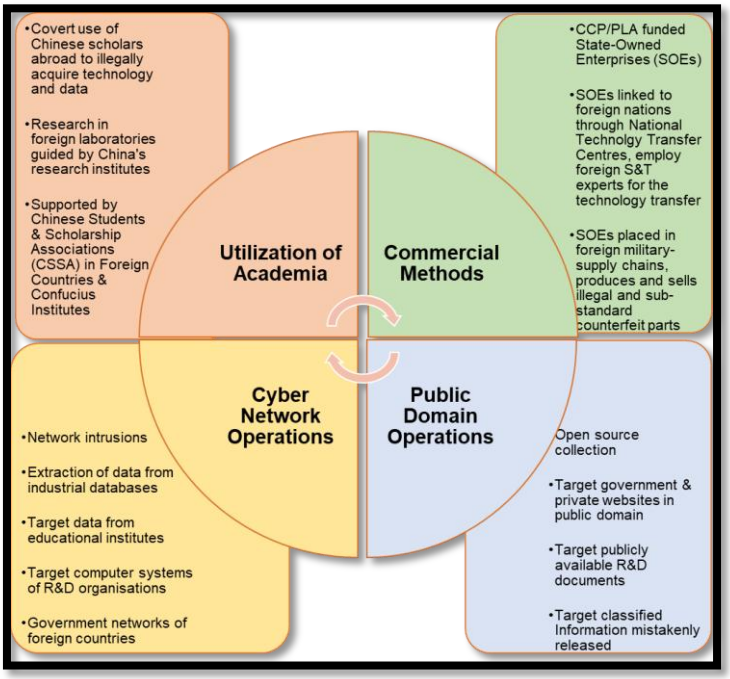
• ***Legal Framework to Facilitate MCF Implementation.*** PRC's certain controversial laws, passed in order to gain competitive advantage and achieve "leapfrog" development in China's pursuit to dual-use technology through both legal and illicit manner, are under international scrutiny. The National Security Law passed in 2015 requires "citizens and organization" to "provide necessary support and assistance to national security bodies, public security bodies and relevant security bodies". Article 7 of National Intelligence Law implemented in 2017 specifies, "any organization or citizen shall support, assist and cooperate with state intelligence work" and another article of the same law authorizes "state intelligence work organs, when legally carrying forth intelligence work, may demand that concerned organs, organisation or citizens provide needed support, intelligence and cooperation"[13]. Sweeping power provided by these laws would further facilitate dual-use acquisition efforts which was being done earlier also through state directed overt or covert means. In addition, many authoritative guiding documents have been released in recent past or under preparation to provide overall development of MCF. The "2016 Opinion" clarifies the roadmap to various agencies for execution of MCF strategy. The PRC Military-Civil Fusion Development Law is under preparation and is likely to be released soon.

•***Made in China 2025.*** In 2015, three years after Xi's ascent to power, the CCP issued a national strategic plan to further develop the manufacturing sector of China, called "Made in China 2025" (MIC 2025). The MIC 2025 and other top-down directives designed to capitalise on Fourth Industrial Revolution technologies will have salutary effect on the involvement of private sector entities in the development and manufacturing of China's defence capability. MIC 2025 identifies "ten core sectors" in which China seeks to become a global leader. The dual-use nature of the key technologies targeted under MIC 2025, for example AI, quantum communications, new materials, new energy, robotics etc, will immensely help PLA accomplish its technological goals. China has already started incorporating AI into military robotics programme, autonomous military equipment and military command decision-making. The technological advances in other sectors, such as Space, Aviation and Maritime under MIC 2025 will have a long-term implication in the nature of next-generation warfare. With this strategy, China has also progressed ahead in the field of high-speed railways

which will provide PLA the required capability to mobilise its troops and equipment faster to ensure effective build-up and sustenance of logistics of the fighting forces. The world-class innovation system being built under MIC 2025 will facilitate the latest innovations being carried out in civil R&D sector, to be utilized for military applications. It will enable the civil R&D entities to innovate based on military's requirements and vice-versa.

•***Illicit Means of Foreign Technology Acquisition***. The implementation of MCF not only involves indigenous production, research and development, but also acquiring foreign technology, both by legal and illegal means. China has been employing covert means to acquire foreign equipment, technology & know-how required to fill critical capability gaps in its domestic manufacturing set-up. It leverages foreign investments, commercial joint ventures, academic exchanges, the experience of Chinese students & researchers abroad, manipulation of export control for the illegal diversion of dual-use technologies & most importantly, industrial & technological espionage often sponsored by Chinese state.[14] The four commonly used illicit methods for acquiring foreign technology by China is depicted in the info graphics below.

Figure 4: Commonly used illicit methods for acquiring foreign technology by China



Source: Prepared by the author with consultation from Military Review (2020)

Complementing all the methods as mentioned in the previous paragraph, the CCP also uses talent-recruitment programs to gain technology from abroad through illegal or non-transparent means. One of the best-known and successful Talent Recruitment Programs ever conducted by PRC is the Thousand Talents Program (TTP), 2008 which was initially

launched to address the brain-drain issues of PRC scientists. It later developed another objective to encourage & reward overseas study by PRC experts & to lure foreign experts to work in China. Talent recruitments are also regularly held by local government around China at which overseas scientists are signed up to various schemes & funding initiatives. The PLA also directly carries out talent recruitment activities. For example, the NUDT, PLA's premier science & Technology University, has recruited at least four professors from abroad, including one supercomputer expert from the University of New South Wales, using the TTP. Outside of formal talent recruitment programs, NUDT has given guest professorships to numerous overseas scientists.

Major Milestones as Part of MCF Strategy in Strategic Domains

Joint military-civil breakthroughs as part of 12th and 13th Five Year Plan have led to the successful implementation of a number of major MCF projects in the S&T field, including manned spaceflight and lunar exploration projects, the BeiDou Navigation Satellite System, high-resolution earth observation systems, the Tianhe-2 supercomputer, the Kuaizhou satellite launch system, and Quantum Experiments at Space Scale (QUESS; Micius).[15]

- ***Space***. Till recently, space has been primarily a military domain for China. However, President Xi in 2017 highlighted major role of MCF in China's future space ambitions. China Aerospace Science and Technology Corporation (CASC), one of China's largest state-owned defence conglomerates in the space domain, has aimed to make China a 'Space Great Power' by 2030. In 2014, Beijing opened the space industry to the non-state-owned sector, allowing the commercial companies to build and launch satellites for the first time, although the PLA still retains a monopoly on approving launches. Most of these new companies are, in fact, connected in some way to the Chinese defence-industrial base, or state-owned R&D institutions.[16] In Jun 2019, Beijing released new regulations outlining guidelines for commercial launch vehicle development under MCF, mandating among other things that companies obtain official government permission before engaging in R&D or testing of launch vehicles.[17] In addition to MCF efforts to support the space great power strategy, Chinese planners see the satellite industry as an economic bonanza that will provide space-based communication and television services across Asia and Europe to complement its infrastructure and investment projects that are part of the BRI as also create immense employment opportunity within China.

- ***Maritime Domain.*** China wishes to become a Maritime Great Power having strong comprehensive strength in the management, control, exploitation and protection of oceans include oceanic resources. In his 19th Party Congress report, Xi called for the coordinated

development of land and maritime domains to accelerate the Maritime Great Power development linking the Maritime Great Power strategy to the Belt Road Initiative (BRI), which consists of an overland component and a sea route component. The MCF efforts in the maritime domain includes strengthening of Maritime Rights Protection Force to include PLA Navy, the Chinese PAPF Coast Guard Corps also known as Maritime Police, the Maritime Militia and the Civil Fleets, establishment of Maritime Information Infrastructure as also maritime comprehensive support system beside other measures.[18]

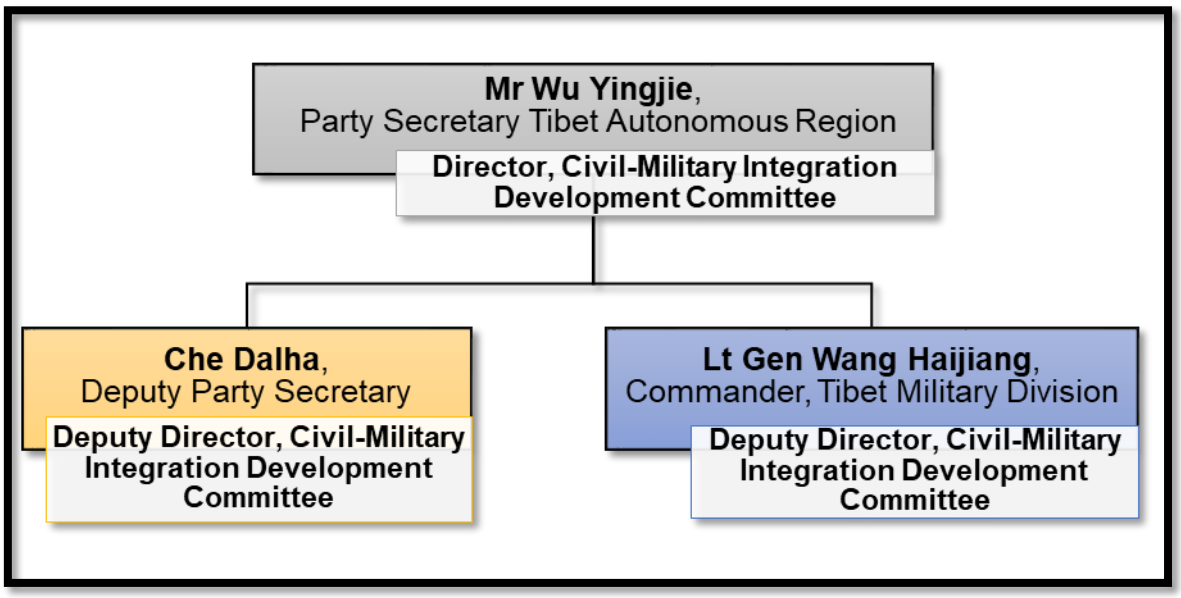
- ***Cyberspace Domain.*** Xi's Cyber Great Power strategy consistently includes three important components to include cyberspace governance, cyber-security and informatisation. In December 2016, the PLA Army signed an MCF strategy agreement with China Mobile that enables cooperation in seven areas including joint construction of info infrastructure, emergency communication support, command and dispatch, "smart" military camps, information system and resource development and utilization, information security, and informatisation talent training. The agreement is expected to facilitate the integration of the PLA's information network system into the joint operations system, significantly advancing the PLA's informatisation drive.[19]

As part of reorganisation of military Institutes of Higher Education (IHE), the officer academic institutions have reduced from 63 to 34 since 2016.[20] In addition to direct recruitment of college graduates to PLA, 118 civilian IHEs have some form of standing talent cultivation agreement with the PLA. The Chinese SOEs have signed memorandum with private academic institutions so as to remain abreast with the latest research.

CMI/MCF in Tibet

During speech by Xi in the recently organised 7th Tibet Work Forum in August 2020, which decides fate of Tibet for next five to 10 years, emphasised The Ten Must (or the ten points programme) for effectively governing Tibet. Many of the programs relate to CMI projects.Due to lack of industrialization & modernization as compared to other provinces of China, the CMI in Tibet is primarily focused on development of Dual Use Infrastructure with its overt intent as poverty alleviation albeit with strong military contours to it. The present organisation of CMI Development Committee in TAR as shown below highlights levels of coordination at various levels between military and civil:-

Figure 5: CMI Developed Committee in TAR



Source: Prepared by the author

•***Dual Use Connectivity Projects.*** As on 2017, China has total of 64 military-civilian airports. Post elevation of MCF as a national strategy, Civil Aviation Administration of China (CAAC) has established joint working mechanism with PLA. In June 2017, Xinhua announced the construction of 10 new airports to be built in Xinjiang by 2020. On 09 June 2018, the CAAC and the TAR government announced that Tibet will soon have three new airports.[21] By law, these new airports, all above 3,900 meters, will be for 'dual-use', to suit both the Civilian and Military standards. The Lhasa Gonggar Airport, a critical strategic supplies transport hub in TAR, along with Wuxi Shoufang Airport other than TAR, were selected as a pilot project for "deep MCF development" for effectively meeting peacetime and wartime requirements.[22]The status of road communication in TAR is being upgraded at a rapid pace. The length of rural roads has increased from 53224 km in 2012 to 60214 km in 2018 as per state media. A total of 34 townships and 533 villages gained access to asphalt or concrete roads. By early 2021, highways are expected to reach all townships and administrative villages in TAR. The free expressway opened in Jul 2018, linking Lhasa with Nyingchi, close to Arunachal Pradesh cuts Lhasa-Nyingchi travel time from eight to five hours. In addition to enhancing tourism and eventually the economy of local population, construction of such highways and expressways in TAR are primarily aimed at making them compatible for use by heavy military equipment, thereby rendering easier and faster induction of troops.[23] China is constructing the Sichuan-Tibet Railway (STR), which after the Qinghai-Tibet Railway (QTR), will be the second railway into TAR. After its completion, STR

is expected to greatly boost local tourism all along the line. On completion, the travel time by train from Chengdu to Lhasa will be reduced from 48 hours to about 13 hours.[24] China has also extended the QTR to Xigatse in 2014, which is expected to be further extended to Zhangmu (opposite Nepal) and Yadong (close to India's Nathula). The Lhasa- Nyingchi line is expected to be completed by 2021.[25] There is an offshoot from this line planned to be extended upto Tsona Dzong which is only approx 30 km from the LAC in Kameng sector. The reach of the newly developed or planned railway networks is till locations close to the LAC and would ultimately facilitate faster mobilisation of troops and equipment, and especially the side-stepping of forces from different theatre commands to the border areas opposite India.

•***Smart Logistics Parks.*** As part of MCF, TAR administration has been carrying out systematic construction of 'International Smart Logistics Parks'[26] to meet the rising needs of merchants for storage of goods, logistics sorting, processing areas and other such facilities. Towards this, 'Tibet Lingfeng Smart Logistics Park' has been constructed in Lhasa City which has various facilities like intelligent storage robots, electronic label picking equipment and automated assembly lines. Another project by the name 'Lhasa Comprehensive Bonded Transition Zone' which is close to the Lhasa freight hub along QTR and the Sichuan-Tibet Expressway has been established in a similar manner. It is assessed that these smart logistics parks which are akin to 'Special Economic Zones (SEZ)', with their connectivity to airport, railway lines and expressways entering TAR will be utilized as logistics hub in case of a conflict and will facilitate quicker movement and induction of PLA into TAR.

• ***Border Villages.*** Tibet government has accelerated the construction of "Border Defence Villages" this year as part of the far-reaching agenda of Xi Jinping that "*[t]o govern the country well, we must first govern the frontiers well, and to govern the frontiers well, we must first ensure stability in Tibet*." 628 'Moderately Well off' villages along the border, also called the Xiakong villages, are being developed with the stated objective of lifting them out of poverty and enhance their living and working conditions. China is developing these integrated 'Model Villages' along the LAC with all associated facilities, that could be dual-use and would enable co-existence of military and civil population along the frontiers. As part of drive to promoting tourism in border villages, some of Tibet's border villages like Tsona County in Shannan city have been developed for rural tourism.[27]

The 1962 War Memorial near Lepo, and the headquarters at Marmang village of Gen Zhang Guohua (who commanded PLA operations in 1962) has been reconstituted and is opened to visitors,[28] as part of military tourism. The large scale infrastructure so created can be readily used for military purpose.

•***Dual-Use Surveillance Architecture.*** With an aim to step-up monitoring of Tibetans in rural areas of Shannan Prefecture, TAR is implementing Xue Liang or Sharp Eyes project which will later be replicated in other places.[29] The project involves installation of state of the art surveillance technology including AI-enabled cameras, with face recognition and live tracking facilities. This surveillance network will be integrated with National Surveillance Grid, through which, the government will enable select residents to access the public surveillance videos through their phones and mobiles, keep an eye out for any "suspicious activity" and then report it to authorities. PLA surveillance architecture may ride on the Xue Liang infrastructure enabling them to provide real-time surveillance feed to higher headquarters.

Implications and India's Response

A common saying often mentioned in recent Chinese writing regarding MCF is that it asks for "*one portion of investment and two portions of return*" implying high efficiency accrued by the strategy. As a result of procurement of indigenous high-end technology at a reasonable cost and wide gap in the defence budgets between India and China (as per Stockholm International Peace Research Institute (SIPRI), in 2019, China's defence budget was US$261 billion as compared to US$71.1 billion of India), the existing military capability gap is likely to further widen.

Despite recognising the issue and taking some incremental steps, India's approach to indigenisation has not been yielding the desired results. The basic flaw of limited participation of private sector in defence may be partly addressed by new edition of DPP 2020. However, the document is more focused on procurement procedures rather than need of the hour to involve private industry in manufacturing as well as for R&D. To overcome the serious shortcoming, a clause of 'Strategic Partnership' to bridge the technology gap scheme has been included in the document, so that private sector can leapfrog to better technology by collaborating with the best Original Equipment Manufacturers (OEMs) of the world. A new category of 'Buy (Global-Manufacture in India)' introduced in DPP 2020 would

encourage foreign OEMs to setup “manufacturing or maintenance entities through its subsidiary in India". Along with this initiative, the latest relaxation in FDI norms should facilitate strategic alliances between foreign defence firms and Indian private companies. With new policy of “*Atmanirbhar Bharat*”, the government seeks to ensure self-reliance in defence manufacturing by increasing private participation and thereby increase defence production by many folds by year 2025.

Many developed countries like US, UK and Australia have a dynamic public private partnership (PPP) model for private sector participation in defence sector. India’s model needs to be mix of various approaches including the PPP model which has had various degree of success in India in areas other than defence sector. The successful models of ISRO in Space (satellites are mostly dual-use platforms) can be replicated and further modified for achieving the required levels of integration. In low-tech defence manufacturing, India may adopt more of a joint venture (JV) approach with foreign manufacturers and private industries, similar to latest JV model between ordnance factory and Kalashnikov for manufacture of rifles. Public-private partnership between ISRO and Godrej is also an example to learn from. Since Directorate of Naval Design was set up by Navy in sixties, ship building has again been a success story. Recently established Army Design Bureau on similar lines would take some time to mature. There is ample scope of improvements in the Aviation sector as some of the major Public Sector Organisation of aviation industry, namely Hindustan Aeronautics Limited (HAL), Aeronautical Development Agency (ADA) and Gas Turbine Research Agency (GTRE) has limited coordination and very limited user interface.[30] The corporatisation of ordnance factories, making defence PSUs competitive, implementing the PPP models like Government Owned Company Operated (GOCO**)** and optimising the huge public sector is the need of the hour.

While India has a decent commercial technological base, it lags in development and fielding of disruptive technology in the military applications like Artificial Intelligence (AI), unmanned systems (including UAVs/UCAVs and also counter-drone systems), Directed Energy Weapons (DEWs) and cyber capabilities, Nano technology and Robotics to name a few. It is therefore vital for the government to create an environment conducive to such innovation, because a majority of these technologies grow out of commercial pursuits and then due to its dual-use nature, can be transferred and applied to the evolving military needs. Consequently, a civil-military synergy is critical for indigenous innovation and realistic technological enhancement.[31]

•***Border Area Development Including Tourism.*** India needs to effectively counter China's huge dual use infrastructure development along the LAC (with psychological warfare undertones) by enhancing connectivity and creating model villages in remote areas with employment opportunities so as to encourage people to stay in these border areas along the LAC. The infrastructure so created should also aim to boost tourism (including adventure tourism) as also cater for operational needs. As many as 27 districts in four states and Union Territory of Ladakh abutting China have been earmarked as part of the Centre's Border Area Development Plan 2020-21 by the MHA and 190 crore rupees[32] would be spent as per the priority laid by border guarding forces under the MHA. In addition, other agencies like BRO and state government has been undertaking various development projects in the same areas. A more coordinated approach akin to CMI development committees at various levels with holistic participation from others would ensure better utilisation of meagre funds and monitoring of these projects.

Conclusion

Military-Civil Fusion adopted as a national strategy by the Chinese Communist Party (CCP) to develop the PLA into a "world class military" by 2049, has received major boost under the Xi Jinping who personally oversees its execution. While implementing the strategy, China has deviated from established global norms thereby making significant headway to acquire and infuse advanced disruptive technologies into its military. Consequently, with enhanced military capabilities by leapfrogging, China aims to pave the way to be the first country to transition to "intelligent warfare," which it perceives as critical to achieve its regional and global ambitions. To offset the increasing gap in military capabilities with China, India needs to develop its non-contact warfare capabilities as also focus on various disruptive technologies. In order to harness already available know how within the country (including AI) as also acquire cutting edge technologies globally, India should constantly review existing models to make it more effective and efficient, as suggested.

End Notes

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