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ABSTRACT

There are inherent structural difficulties encountered in the beating of swords into ploughshares. China sought to resolve problems associated with its defence-conversion programme with grand strategic planning involving concerted efforts from all three pillars of power -- the party, the state and the army. A review of the defence-conversion programme suggests that the role of the military can be extended to encompass non-traditional missions during peacetime in order to reduce the burden on the national economy of defence spending, not only by diversification out of defence production but also by integration of the armed forces into more development-oriented activities.

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Swords to Ploughshares: China's Defence-Conversion Policy

Along with its economic reform in the early 1980s, the Chinese authorities consistently implemented a defence-conversion policy on a massive scale. Deng Xiaoping and his close supporters ordered the People's Liberation Army (PLA) and defence industries to enhance its involvement in civilian economic activities. During the process, the central authority reinforced the Commission of Science, Technology, and Industry for National Defence (COSTIND), which became responsible for expediting research and development in defence industries and the defence-conversion policy. Although there have been mixed assessments of the results of the defence-conversion policy, it is important to note that;

> In the mid-1990s, 70 per cent of all taxicabs, 20 per cent of all cameras, and two-thirds of all motorcycles produced in China came out of former weapons factories. By the late 1990s, 80–90 per cent of the value of defence industry output was estimated to be non-military.[1]

There have been both failures and successes. Some defence plants have successfully converted their military production systems into multi-national corporations,[2] raising the important question: What explains China's smooth defence-conversion programme? The question concerns the structural mechanisms in place to make the conversion programme possible. It asks what factors allowed both the military and defence enterprises to engage in the civilian economy. To answer this question, it is necessary to examine the general difficulties of a defence-conversion programme in comparative perspective, and then see how the approach was different in China. Arguably, there are two types of hurdles to smooth defence conversion: (i) technology transfer barriers, and (ii) management and leadership barriers. The former represents the physical hardware aspect of barriers between military and civilian technologies, as it is a cumbersome process. The latter refers to the difficulties of steering the armed forces and defence sectors to actively participate competently in the programme.

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[1] "PRC Defense Industry Turning Swords into Ploughshares", *Xinhua*, 29 September 1997; John Frankenstein, "China's Defense Industries: A New Course?" in James C. Mulvenon and Richard H. Yang (Eds.), *The People's Liberation Army in the Information Age* (Santa Monica, CA: RAND, 1999), p. 190.

[2] Multi-national firms such as Huawei Technologies, China's largest manufacturer of telecommunications equipment, Poly Technologies and Sanjiu (999) biotechnology all came to life as a result of the commercialization of defence technologies. Huawei was established in 1988 by Ren Zhengfei, a former officer of the PLA who started out as a technician.

In China, there are two types of military-related enterprises that were deeply involved in *junzhuanmin*, or putting military into civilian. The PLA's direct economic units are known as *jundui qiye*, or "military enterprises", while the enterprises subordinate to defence-industrial ministries are known as *jungong qiye*, the defence enterprises.[3] The military enterprises function directly under the PLA internal economic units, while other defence enterprises are subordinate to the defence-industrial ministries. Both the military enterprises and defence enterprises were heavily involved in the production of civilian goods. Although the defence enterprises are not directly under the Chinese military, they have been administered both under the ministries in the State Council and the Chinese Military Commission (CMC). For this reason, this article treats the defence-conversion efforts by both enterprises as the same. The defence-conversion efforts by the military enterprises continued until the point of the divestiture of the PLA's business holdings in 1998 and the defence-conversion effort by the defence enterprises continues to operate.[4] One cannot deny the Janus-faced aspect of the military's involvement in economic activities. However, "for the past twenty odd years, after the full-fledged defence conversion efforts, the six core national strategic industries, namely nuclear, aviation, electronics, ordnance, shipbuilding, and aerospace industries, all successfully developed their own competitive civilian goods".[5]

The term defence conversion "at least as used in the West, encompasses many concepts: the use of military production assets to produce for the civilian market".[6] Although this article accepts the conventional narrow focus on defence diversification as the "uses of

[3] James Mulvenon, *Soldiers of Fortune: The Rise and Fall of the Chinese Military-Business Complex, 1978–1998* (M.E. Sharpe, Inc., 2001), p. 78.

[4] Although the defence conversion effort by the military enterprises officially ended with the implementation of divestiture act in 1998, the conversion diversification by the defence enterprises continues to operate following the "civilianization" of the defence enterprises during the defence reform in 1998. In the post-divestiture period, defence enterprises are no longer considered as "semi-military units" since they are detached from direct control of the former COSTIND that used to report to the CMC. The military function of the former COSTIND has been transferred to the newly established General Armaments Department (GAD), and the new COSTIND, now renamed SASTIND under the guidance of the Ministry of Information and Technology in State Council manages the weapon development and conversion programme. For more information, See Dongmin Lee, "Chinese Civil-Military Relations: The Divestiture of People's Liberation Army Business Holdings", *Armed Forces & Society*, 32:3 (April 2006), pp. 437–453; Also see Zhang Nanzeng, *Dangdai Guofang Jingji Lilun: Qianyan Wenti Yanjiu [Theory of Contemporary Defense Economics: Study of Future Problems]*, Guofang Daxue Chubanshe [National Defense University Press, 2003] p. 107.

[5] An Erfeng, Chen Pengwan et al., "*Jun Zhuanmin: Kexue Jishu shi Hexin Jingzhengli*" [Defense Conversion: Scientific Technology is the Core Competitiveness], *China Academic Journal Electronic*. Source <http://www.cnki.net> p. 61.

[6] John Frankenstein, "China's Defense Industries: A New Course?", *Peace Economics, Peace Science and Public Policy*, Vol. 5 No. 1 (1999), p. 203.

the military's production capacity to pump up civilian production",[7] it broadens the scope of analysis by including a Chinese notion known as *junzhuanmin*, or putting military into civilian. The Chinese case shows that the role of the military can be extended to include non-traditional missions during peacetime, seeking to reduce their defence burden, not only by diversifying out of defence production, but also by integrating the armed forces into more development-oriented activities.

In this context, this article adds a theoretical dimension to the existing conventional wisdom that the role of the military should be confined to the "management of violence".[8] It begins with a brief overview of the historical background of the Chinese defence-conversion programme prior to outlining the structural difficulties of the policy. The article illustrates its arguments with empirical examples from the Chinese case that the military can be utilized in non-traditional missions. This article suggests that the Chinese case is unique in the sense that it sought to resolve problems associated with defence conversion with concerted efforts of all three pillars of power, namely, the party, the state and the army. Therefore, empirical developments need to be analyzed in the broader dynamics of civil-military relations and socio-economic changes. The utilization of the armed forces in non-traditional missions entails huge policy ramifications that may require a new direction of thinking.

Historical Background

Defence conversion first started in 1982, when Deng issued the well-known 16-characteristics decree of *junmin jiehe*, *ping-zhan jiehe*, *junpin jiehe*, *yi-min yangjun* [combine the military and civilian, combine peace and war, give priority to military products, and let the civilian support the military].[9] At this time, the government established an institutional apparatus, the COSTIND, to conduct tasks that included the conversion of defence technology for civilian use, signalling an extended policy of "defence conversion".[10] Under the policy, the military began producing civilian products in its defence factories, which had

[7] Jacques S. Gansler, *Defense Conversion: Transforming the Arsenal of Democracy* (Cambridge, MA: The MIT Press, 1996).
[8] Samuel P. Huntington, *The Soldier and the State: The Theory and Politics of Civil-Military Relations* (Cambridge, MA.: Harvard University Press, 1957), pp. 80–89.
[9] David Shambaugh, *Modernizing China's Military: Progress, Problems, and Prospects* (Berkeley: University of California Press, 2002), p. 251.
[10] Mel Gurtov, "Swords into Market Shares: China's Conversion of Military Industry to Civilian Production", *China Quarterly*, No. 134 (June 1993).

been pumping out weaponry and defence-related goods exclusively. This development is best explained in terms of the government's wish to pull the military into the process of national macro-economic adjustment, when it said that "defence plants have been forced to switch most of their production to civilian goods".[11]

Although defence conversion was a troubled process for most Chinese firms,[12] the effort began to bear fruit with governmental support. The percentage of civilian production from both military and defence enterprises increased dramatically. In the midst of the economic reform in 1979, only 8.1 per cent of civilian goods were produced by defence enterprises. In 1982, civilian production increased to 21 per cent. With official governmental support and the 1982 decree, civilian production from these enterprises rose sharply to 43 per cent in 1985. At its peak in 1994, it reached 80 per cent.[13] The PLA enterprises produced goods such as vehicles, pharmaceuticals, textiles and metals, as well as limited amounts of building materials, machinery and chemicals. For commercial gain, both the military and defence enterprises diversified into tertiary industries with their infrastructural advantages. Figure 1 shows the importance of commercial activities of the defence enterprises.

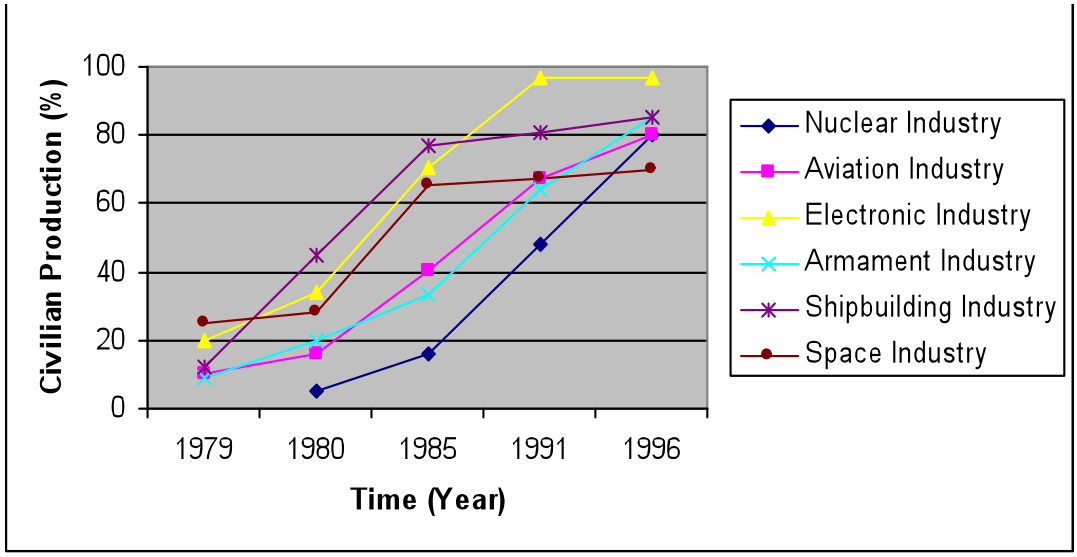

Figure 1: The ratio of civilian production from defence industries by sector. The figure is drawn from Shigeo Hiramatsu, *Chugokugun Gendaika to KokuhoKeizai* [*Chinese Military Modernization and Defense Economics]*, (Keiso Shobo, 2000), p. 121.

[11] Wang Shaoguang, "Estimating China's Defense Expenditure: Some Evidence from Chinese Sources", *The China Quarterly*, No. 147 (September 1996).
[12] Keith Crane and Roger Cliff et al., *Modernizing China's Military: Opportunities and Constraints*, p. 138.
[13] Wang Shaoguang, "Estimating China's Defense Expenditure".

As illustrated in Figure 1, conversion accelerated in the early 1980s. For example, the aviation industry produced only 16.3 per cent of civilian-oriented products in 1980, but then increased dramatically to 40.1 per cent in 1985, and to 80 per cent in 1996, shortly before divestiture. The percentage of the military nuclear sector devoted to civil production increased from five per cent in 1980, to 80 per cent in 1996. The civilian-production efforts were national projects that required collaboration. The most robust growth in civilian production was in electronics. In the initial stage of conversion, the industry produced only 20 per cent civilian goods but had achieved a stunning 97 per cent by 1996.[14]

The nuclear, armaments, shipbuilding and aerospace industries all began to pump out products for civilian use. The foreign-trading units of Poly-technologies of the General Staff Department took a leading role in exporting end products. The PLA also worked with semi-military defence enterprises to convert its technologies for civilian consumption. This new military and defence commercialism contributed significantly to the growth of the economy in a number of ways. The commercial undertakings of defence industries and the PLA provided breathing space for the government to concentrate on modernization in areas other than defence. The state's expenditures could go elsewhere instead of mostly into the military, as it had during the Maoist era.

Explaining the defence-conversion process

After the world's military regimes withdrew from politics, the global political map changed remarkably. For instance, in the mid-1980s, all but four Latin American countries had civilian governments.[15] As a consequence, the literature on the military as a modernizing agent also tilted in a new direction. Research questions deviated from asking whether the military as an institution could bring about modernization, inquiring instead into the causal linkages between high levels of defence spending and economic growth. Recent literature examines the conversion of defence technologies into civilian, and vice versa. This particular

[14] Shigeo Hiramatsu, *Chugokugun Gendaika to KokuhoKeizai* [*Chinese Military Modernization and Defense Economics]* (Keiso Shobo, 2000), p. 121.

[15] J. Samuel Fitch, "Armies and Politics in Latin America: 1975–1985", in Abraham F. Lowenthal and J. Samuel Fitch (Eds.), *Armies and Politics in Latin America* (New York: Holmes & Meier Publishers, 1986), p. 26.

vein of literature is important in examining the Chinese case, since the PLA has been deeply involved in the process of conversion as part of its institutional involvement in non-traditional missions.

Such a new analytic framework may not appear directly related to the literature on the military as a modernizing agent. Nonetheless, the areas of focus share the same root as they both observe a causal linkage between the military and modernization in general. One must look at the defence-conversion issue from a different angle to determine whether defence spending has ramifications beyond primary national security objectives as a built-in mechanism to increase the international competitiveness of civilian industrial capacity.

Therefore, an accurate assessment of empirical practices is important for the implementation of policy. If it can be assumed that there will be no beneficial spin-off, then policymakers are left with a dilemma: either leave conversion to market forces or face the danger of dislocation in major military industries.[16] The idea of supporting both defence industries and defence conversion as a "disguised industrial policy"[17] may be intriguing for statists who argue that the role of the state is important in generating internationally competitive industries.[18]

Nonetheless, defence-conversion policy is viable only when there is sufficient infrastructure of defence-related industries that allows implementation. Therefore, the empirical analyses have been focused mainly on instances in the United States and the Soviet Union, where there are huge functioning defence sectors. In contrast, Japan and Germany have transformed their defence sectors into industrial manufacturing miracles.[19] For this reason, this section reviews aspects of defence conversion in order to illustrate the problems and implications of such a policy. In addition, it is important to conjecture about hindrances that may prevent policymakers from implementing policy and achieving successful outcomes.

Changes in military doctrine and institutional support have accelerated the conversion of technologies from military to civilian, and vice versa. In the defence-conversion programme, there are generally two major areas of difficulty in policy implementation: (i)

[16] J. Davidson Alexander, "Military Conversion Policies in the USA: 1940s and 1990s", *Journal of Peace Research*, Vol. 31 No. 1 (February 1994), p. 25.
[17] For more information of the terminology, see Steve Chan, "Grasping the Peace Dividend: Some Propositions on the Conversion of Swords into Plowshares", *Mershon International Studies Review*, Vol. 39 No. 1 (April 1995), pp. 53–95.
[18] Rueschemeryer and Skocpol et al., *Bring the State Back In* (Cambridge University Press, 1995).
[19] Samuelson, Richard J., Rich Nation, Strong Army: National Security and the Technological Transformation of Japan (Ithaca and London: Cornell University Press, 1994).

technology transfer barriers, the physical transfer of technologies from military to civilian sectors; and (ii) management leadership barriers related to steering defence enterprises and the military to participate in the process.

Hardware issues: Technology transfer barriers

In general, one of the major hurdles encountered in defence conversion has been the difficulty of gauging technological change. When evaluating overall policy, planners have to consider not only the beating of swords into ploughshares but also the reverse. In the evaluation of defence conversion in general, certain conditional factors must be taken into consideration.

There are salient physical difficulties in converting military technologies and marketing saleable civilian products. In the cases of the United States and the Soviet Union, there are problematic patterns of conversion and barriers between military and civilian technologies. For instance, in the United States, the flow of technology from the military to the civilian sector is of relatively minor importance due to the fact that "civilian technology, especially in such growth industries as electronics and computers, is more advanced than military technology in many fields".[20] In other words, in a highly competitive industrial environment, the insistence on the production of "spin-off" technologies is likely to lead to failure. In formulating defence-conversion policy, it was also necessary to consider the dual-use technology aspects of conversion policy from "spin-on" technologies. At the end of World War II, it may have been relatively easier to transfer technology from highly developed military industries to less developed civilian industries.

Nevertheless, in the post-War era, there were similar structural problems in the conversion policies of both the United States and the Soviet Union. There were underlying structural factors that may have hindered the successful performance of the conversion policies. Thus, it is essential to understand the importance and the power of new civilian technology in modern warfare, and the importance of dual-use technology due to the changing character of military technology.[21] Unlike in the 1960s and 1970s, the production of

[20] Gurtov, M., and Hwang, B. M., *China's Security: The New Roles of the Military* (Boulder, CO.: Lynne Rienner Publishers, 1998), p. 134.
[21] Russell Bova, "The Soviet Military and Economic Reform", *Soviet Studies*, Vol. 40 No. 3 (July 1988), pp. 385–405.

steel and other products of the traditional smokestack sector of an industrial economy is no longer the key determinant of a nation's relative military capability. Technologies such as microelectronics, computers and biotechnology are more accurate barometers of a nation's military capability. Defence conversion and dual-use technology policy must therefore be designed to support such new civilian technologies in order to benefit both the civilian and military sectors to create a mutually reinforcing cycle.

Therefore, in both the United States and the Soviet Union, there were limited flows of technology transfer from traditional heavy industry to high-tech industries that are required to wage modern warfare and generate competitive civilian technology. The pre-condition for successful defence conversion is an effective dual-use technology policy that requires strong state intervention to oversee both the implementation of the policy and the performance of the industries involved.

Human resource management also poses a challenging aspect of defence-conversion policy. Civilian defence enterprises are naturally disinclined to produce civilian goods that require a cumbersome conversion process. Due to difficulties in the exchange of human and material resources between the military and civilian sectors, conversion outcomes have been less impressive despite the fact that both the United States and the Soviet Union possessed the largest defence sectors and also the means to accomplish conversion.

Brauer and Marlin diagnose the factors leading to the failure of conversion attempts. They emphasize "barriers-to-exit", indicating the difficulty of training workers who are equipped to be versatile with both military and civilian technologies. In other words, overspecialization of staff "combined with lack of knowledge of how to scout commercial markets and locate potential customers" appears to be the principal problems in adapting to the civilian sector.[22] This is also related to incentivizing the defence-industry cartel to convert its own technologies for civilian application. Without intentional effort, there is no direct material incentive to convert technology.

Software issues: Management leadership barriers

[22] Jurgen Brauer and John Tepper Marlin, "Converting Resources from Military to Non-Military Uses", *Journal of Economic Perspectives*, Vol. 6 No. 4 (Fall, 1992), p. 149.

Besides the physical-hardware issues, as discussed above, there are also software difficulties that interfered with smooth conversion. One of the main challenges is the problem of civilian control over the defence industry and the armed forces. In the Soviet Union, despite the strong institutional support and initiatives to foster conversion programmes, the relatively high social status of military leaders as well as factory managers thwarted such a transition. On the other hand, maintenance of the professionalism of the armed forces in the United States and widely shared neo-liberal ideas seem to have contributed to sceptical views of defence enterprises, and of the armed forces taking part in industrial endeavours.

Structural weaknesses of defence-related enterprises can hinder effective implementation of conversion policy. Defence-related enterprises are generally reluctant to convert to civilian production regardless of their financial situation. Rather than marketing their products, these enterprises often depend on lobbying for continued defence budget increases.[23] From such observations, financial incentives must be provided for defence-related enterprises to follow a conversion programme. Otherwise, a direct "top-to-bottom" approach to the policy may not bear a fruitful outcome. In addition, the strong dependence of defence enterprises on the national defence budget as their only source of revenue may prevent them from making the necessary conversion efforts.

As with the case of the United States, the defence industry of the Soviet Union faced similar problems. Cooper argues that due to the lack of a market-oriented management model in defence enterprises, the conversion policy was bound to fail.[24] He points out that elements of the socialist economic policy may have brought about the failure of the *Konversiya*:

> The civilian goods to be produced were those identified by the planners as socially necessary … Considerations of profitability and competitiveness played virtually no role, and there was often scant regard for the actual production possibilities of individual enterprises.

This lack of market-oriented competition and the meritocratic awarding of arms production contracts hindered conversion as well. From the analysis of both cases, we can assume that

[23] J. Davidson Alexander, "Military Conversion Policies in the USA: 1940s and 1990s", *Journal of Peace Research*, Vol. 31 No. 1 (1994), pp. 19–33.
[24] Julian Cooper, "Conversion is Dead, Long Live Conversion!", *Journal of Peace Research*, Vol. 32 No. 2 (1995), pp. 129–132.

defence enterprises never felt a sense of urgency to convert their military technology into civilian to generate extra financial revenue. Therefore, it may not be too concept-stretching to presume that non-market-oriented elements of defence procurement programmes in both the United States and the Soviet Union made conversion ineffective.

The Soviet case questions whether armed forces were serving the best interests of the state. In the conversion effort launched by Gorbachev in 1989, orders were given to some 400 military enterprises to convert to civilian production. The government created additional civilian bureaus to facilitate the process. However, the "conversion by command" approach resulted in failure because "the enterprises were reluctant to convert, as the managers still relied upon their military privileges and resources".[25] Therefore, institutional support of the conversion programme without the military's blessing will not succeed.

If the military continues to function discretely outside the industrial policy, then any institutional support of conversion will be ineffective. In the same vein, it can be argued that a rigid military doctrine will hamper conversion in spite of aggressive governmental institutional support. In an effort to support its conversion programme in 1992, the U.S. Congress passed a law endowing the Defense Advanced Research Projects Agency (DARPA) with the task of upgrading U.S. manufacturing. However, "some Pentagon officials were not enthusiastic about the idea of a new industrial role for the Department of Defense, that of supporting industrial projects".[26]

The present trend of U.S. industry is generally disinclined to support national industrial policy, because "any government planning is inefficient or dangerous and should be avoided".[27] Such an economic philosophy, combined with a rigid military doctrine, created an impermeable barrier that prevents both the private industry and the military from adopting more flexible conversion alternatives.

From an objective civilian control perspective, the armed forces are a professional body specializing in the management of violence, thus implicitly are not involved in any non-military missions. Under such a doctrine, any direct military involvement in a defence-conversion programme is improper. Some critics, both military and civilian, are "critical of

[25] Tarja Cronberg, "Civil Reconstructions of Military Technology: The United States and Russia", *Journal of Peace Research*, Vol. 31 No. 2 (May 1994), p. 209.
[26] Ibid., p. 211.
[27] J. Davidson Alexander, "Military Conversion Policies in the USA", p. 30.

the role that DARPA and the military may play 'as venture capitalists' in science and technology with military and economic competitiveness as their only goal".[28]

What explains Chinese defence conversion?

The above-mentioned structural difficulties were addressed differently in China. The PLA, with its advanced technologies, weapon producing capability know-how and logistic skills, participated in conversion efforts during the heart of the structural-adjustment period. Like the United States and the Soviet Union, there were limited flows of technology transfer from traditional military heavy industry to high-tech industries. In China, however, due to the overall relative backwardness of the civilian industries as a whole at the time of the conversion efforts in the early 1980s, the central authority was able to put great emphasis on diversifying industry from the traditional concentration on heavy industry to create more light industries.

[28] Yudken and Black (1991), cited in Tarja Cronberg.

Institutional support and defence-development strategy

The disproportionate outgrowth of heavy industry relative to other industries during the Maoist era was a result of Mao's obsessive emphasis on building heavy industry that would be converted into military might.[29] For this reason, the PLA and the defence enterprises inevitably monopolized scientific research and technology. This peculiar Chinese model made the spin-off process much easier than in the cases of the United States or the Soviet Union. As soon as China opened its market and began to pursue a more liberal market economy, its central authority began to realize that China needed extensive light industries to increase civilian production. The Chinese political scientist, Yang Guangbin, saw this change as it was happening.

> In China's relatively closed economic system, most investment was in heavy industry, and rarely in consumer products … an amazingly large amount of investment (around 61–73 per cent) was going into the new heavy industry sectors.[30]

Yang's observation reveals how and why the civilian authorities were seeking to utilize the armed forces in various non-military missions. The aggressive state interventionist policy with strategic and nationalistic science and technology plans also contributed to the positive outcome. Simply put, the elite authorities took a major initiative and played the leading role while the PLA took the role of assisting in implementing the initiatives.

In addition, from the onset of the policy's implementation, institutional efforts were made to carry on both the "spin-off" and the "spin-on" processes. Thus, from the perspective of institutional support, we can infer that the Chinese government made intentional efforts to overcome the physical difficulties of defence conversion. In this context, the PLA has been a labour force as well as a combat force, supporting civilian production.[31] The first major

[29] I wish to thank Professor Yang Guangbin at People's University for this insight.
[30] Guangbin Yang, "An Institutional Analysis of China's State Power Structure and Its Operations", *Journal of Contemporary China*, Vol. 15 No. 46 (February 2006), p. 48.
[31] Ralph L. Powell, "Soldiers in the Chinese Economy", *Asian Survey* (1971), p. 746.

institutional support laid out was the establishment of the COSTIND in 1982.[32] This military entity was under the control of the party's military commission and the state council. In 1986, the government allowed the organization to oversee the production of military goods. With this governmental research and production organization, China was able to proceed with its rapid defence-conversion efforts. Second, the central authority implemented a "defence strategy development plan" that consisted of a reduction of military forces—the 863 Plan—and the establishment of science parks throughout China. Therefore, ideal conditions were achieved for both the organization of research and the foundational apparatus for the commercialization of science and technology.

The commercialization of China's defence industry during the 1980s was a fundamental departure from earlier policy. More importantly, perhaps, Deng shifted emphasis to economic reform and pushed to integrate military and civilian production.[33] Thus, in 1979, the Chinese leadership inaugurated a major re-orientation of its military-industrial complex, and military resources were used to a significant degree for civilian production.[34] As conversion efforts took place in a strategic context, the new role of military industries in the economy was a rational choice. One of the main objectives of the commercial enterprises established under the state ministries and the PLA in the 1980s was to achieve independence from foreign technology and capital as soon as possible. More importantly, such practices were viewed as a way to acquire foreign technology with dual military and civilian applications.[35] This strategic thinking was actualized though the establishment of the COSTIND.[36]

> [The COSTIND] organizes and oversees all advanced conventional and nuclear weapons-related research, testing, development and technical applications, defense production, conversion, space technology research and [is the] main contact for all foreign military technology transfers and other

[32] John Frankenstein and Bates Gill, "Current and Future Challenges Facing Chinese Defense Industries", *China Quarterly* (June 1996); also see John W. Lewis and Hua Di, "China's Ballistic Missile Programs: Technologies, Strategies, Goals", *International Security* (Fall 1992), pp. 5–40.
[33] Eric Hyer, "China's Arms Merchants: Profits in Command", *China Quarterly*, No. 132 (December 1992), p. 1107.
[34] Mel Gurtov, "Swords into Market Shares: China's Conversion of Military Industry to Civilian Production", *China Quarterly*, No. 134 (June 1993).
[35] Mel Gurtov, "Swords into Market Shares".
[36] Nan Li, "Organizational Changes of the PLA, 1985–1997", *China Quarterly*, No. 158 (June 1999), p. 327.

> defense industry exchange. It also has a role in the import and export of military arms and technology and is the primary bureaucracy charged with technical intelligence gathering overseas.[37]

Therefore, the COSTIND functioned to procure foreign science and technology, and, more importantly, to coordinate conversion efforts. Among other things, the Chinese defence industry made considerable advances in its manufacturing capabilities due to the continued reliance on transfers of military technology from Russia and the adoption of dual-use technologies from the West.[38] The COSTIND was the key factor in its process of technology transfer and was the chief body responsible for coordinating military R&D and the production of weapons in the nation.[39]

In addition to governmental institutional support, in order to expedite the conversion, the Chinese civilian authority also pursued a new "defence-development strategy" aggressively. The term refers to the integration of the civilian and national-defence sectors. This strategy required a reduction of military forces as well as the institution of a science- and technology-related policy, the 863 Plan, which affected not only the immediate reform of the military as an organization but also as part of a holistic national economic strategy that included reform in defence research and industry. In other words, reforms entailed the fundamental transformation of the nature of the armed forces from quantity to higher quality.[40] Likewise, there was a change of thinking within the military towards the view that the defence reforms initiated by Deng were not limited to the army. Military reform signalled national reform.

During the critical period, 1986-7, when a reduction of military forces by one million soldiers was undertaken, the debate on defence-development strategy pervaded all levels of the PLA.[41] Deng discharged large numbers of soldiers so that they could serve as workers in civilian and government organizations. It was an effective and swift method of implementing the military-civilian integrative policy.

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[37] Michael D. Swaine, "The PLA and Chinese National Security Policy: Leaderships, Structures, Processes", *China Quarterly*, No. 146 (June 1996), p. 390.
[38] Richard A. Bitzinger, "Reforming China's Defense Industry: Progress in Spite of Itself?" *Korean Journal of Defense Analysis* (Fall, 2007).
[39] Wang Shaoguang, "Estimating China's Defense Expenditure".
[40] Hiramatsu Shigeo, *Jiang Zhemin to Chugokugun* [Jiang Zhemin and the Chinese Military]. Keiso Press, 1999, p. 95.
[41] Hiramatsu Shigeo, *Jiang Zhemin to Chugokugun,* p. 94.

As mentioned, along with such a steep reduction of military forces, the central authority was working to set up a systematic and strategic scientific-development project, the 863 Program. The plan was named after the date on which the policy was officially implemented in March 1986. In 1986, as the worldwide revolution in new technology gained a foothold in China, four senior scientists who had contributed to China's strategic weapons programme suggested to Deng that China must follow the world trend and develop its own hi-tech defence industry.[42] Two days later, on 5 March 1986, Deng ordered the politburo to take action, emphasizing that the plan must not be delayed by even a minute. In accordance with Deng's decree, the government brought together 200 experts on dual-use technology to establish an organization to develop a "high-technology development plan".[43] For the purpose of effective defence conversion and the production of civilian goods by the national defence scientific enterprises, the Chinese government also convened a meeting in August 1983 on the subject of "civil-military integrative development, and industrial-civilian production" with the various government agencies, including the COSTIND, and a few state planning agencies. The meeting also included representatives from 28 provinces as well as representatives of the 220 enterprise units, a group that comprised 450 people.[44]

In addition, the central authority established "science parks" throughout the nation to foster localization of technological development. If the establishment of the COSTIND laid the foundation for obtaining high technology, the purpose of launching the science parks was to accelerate the practical applications of science and technology in civilian production. Some observers pointed out that the Zhongguancun Science Park in Beijing won special support of the central government and claimed that scientific and technological personnel and resources are more concentrated there than anywhere else. Companies such as Huawei Technologies, led by a former military technician, also benefited much from the infrastructure of the Zhongguancun Science Park.[45]

The establishment of science parks also attracted overseas Chinese who had been educated in more advanced countries such as the United States.

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[42] Cong Cao, "Zhongguancun and China's High-tech Parks in Transition", *Asian Survey*, Vol. XLIV No. 5 (September/October 2004), p. 652.
[43] Hiramatsu Shigeo, *Jiang Zhemin to Chugokugun*, p. 112.
[44] Hui Guomu, *Zhongguo Junzhuanmin Shilu*, Guofang Gongye Chubanshe, 2006 [*Historical record of the Chinese Defense Conversion*], National Defense Industry Press, p. 28.
[45] Cong Cao, "Zhongguancun and China's High-tech Parks in Transition", p. 667.

> A number of "science parks", "special development zones" and "high-tech zones" have been established in the capital city… Returnees with scientific and technological projects or programs are warmly welcomed in Beijing to develop and produce new and high-tech production. … [As a result], Beijing ranks first in the number of returned students and scholars. Beijing had 60 per cent of all returning doctoral degree holders who were employed in science parks.[46]

A thriving defence-conversion model depends on the speed of importation of capital and advanced technology. More importantly, the institutional support of planned efforts has brought some positive results in the Chinese case. The massive reduction of military forces, the establishment of science parks in conjunction with the 863 Program and the support from the COSTIND made possible synergistic breakthroughs in such efforts.

The central government carried out and enforced the relevant policies and regulations as a series of reforms. These included providing prerogatives to returning students and scholars who had acquired scientific and technological skills.[47] The financial assistance and subsidies they received upon their return—from their employers or from government programmes—were much more generous than those received by their domestic counterparts. More than half of the returnees interviewed reported that they had received assistance from either the government or their employers.[48]

Military belief and education

In contrast, however, there are deep-seated structural differences in the Chinese approach to dealing with the software aspects of difficulties in defence conversion. Although the "top-to-bottom" approach of steering the armed forces into participating in defence conversion was similar in the cases of both the Soviet Union and China, the Chinese military had been

[46] Luo Keren, Fei Guo and Huang Ping, "China: Government Policies and Emerging Trends of Reversal of the Brain Drain", in Robyn Iredale, Fei Guo and Santi Rozario (Eds.), *Return Migration in the Asia Pacific* (Cheltenham, U.K.: Edward Elgar, 2003), p. 92.
[47] Besides the Zhongguancun Science Park, the government also built a research and development complex in the northwestern Shangdi section of Beijing aimed at fostering venture enterprises that comprised many returnees (Interview with venture entrepreneurs, July 2008).
[48] Luo Keren, Fei Guo and Huang Ping, p. 100.

indoctrinated with a military doctrine that subordinated it to the orders of the civilian authority. In the PLA, men and women were trained as dual-task soldiers, serving as civilian soldiers, capable of both fighting on the battlefield and serving as good citizens during peacetime.[49] However, it was Deng's strategy to utilize the armed forces in national economic adjustment projects. Two major factors led to the implementation of the defence-conversion policy.

Firstly, the PLA was initially able to participate freely in commercial activities without any ethical restrictions. More accurately, military doctrine guaranteed and indeed encouraged the armed forces in their economic missions. Secondly, military education, which included the development of both military and civilian skills, made it easier for the PLA to participate more aggressively in the reform process.

As an organization, the PLA has been well aware of its role as an agent of modernization. Accordingly, it has been effectively playing an active associated role in pursuing the defence-conversion programme. *Jiefangjun Lilun Xuexi* [*Theoretical Studies of the PLA*], an important course book for the Chinese military, shows how both the central authority and the PLA consider defence-conversion efforts to have been an important national strategic economic "growth engine".

> Our Central Party came up with a unified strategic ideology of rich nation and strong military … For our nation, the next fifteen years will be an opportunistic period to leap forward in the arena of dual-use technology. For the actualization of the grand-strategy of great nation and strong military during this epochal period, these hereby challenging tasks ahead of us must be accomplished: establishing and laying out the foundation for the dual-use technology, fostering military enterprises and civilian enterprises, and in these enterprises producing both military and civilian goods simultaneously.[50]

[49] For more information on the notion of civic soldier, see Jorge Dominguez, "The Civic Soldier in Cuba", in Abraham F. Lowenthal and J. Samuel Fitch (Eds.), *Armies and Politics in Latin America* (New York: Holmes & Meier, 1986), p. 263.

[50] Ku Zhisheng, "*Kexue Fazhanguan shi xinde lishi Jiedan 'fuguo changbing' de weida Jinan*", *Jiefangjun Lilun Xuexi*, 2006, p. 5 [The Perspective of Scientific Development is a Great Guide to the "Rich Nation, Strong Military" Stage of our History, *Theoretical Studies of the PLA*, May 2006.

From this discourse, the PLA's acceptance of its economic role is part of an ongoing national development project.[51] Such integrated thinking between the government and the military has been a significant factor contributing to smooth conversion. In addition, there was a sense of urgency to produce profits and support its own military units.

> As much as 90 per cent of the output of these factories went to the armed forces. With the force reduction (the one million troop demobilization), military orders shrank drastically and enterprises were urged to convert to civilian production. By 1987, two-thirds of the products of army enterprises were in civilian goods.[52]

The alternative option was never given to the PLA. As indicated, the PLA's involvement in economic development was conducted in the framework of the 16-characteristics decree that Deng issued in 1982.[53] This decree helped to justify and systematize the PLA's involvement in the defence-conversion programme. To be precise, it gave a definite direction for following the detailed policy.

In at least one other case, the relatively high political and social status of the armed forces has brought about an opposite kind of result of a conversion programme. Strategic re-alignment of the armed forces is advisable only under the condition that their role in non-military missions brings positive outcomes. As noted, the relatively high status of the Soviet Union's armed forces hindered the effectual implementation of the conversion programme.

> Surrounded by extreme secrecy and enjoying first priority in research and development, the [Soviet] military sector has not only commanded most of the nation's economic and scientific resources, but also prohibited spin-off into the civilian sector. [54]

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[51] Analysing Chinese military publications is vital to understanding the military's view given the dearth of direct access to PLA officers. See David Shambaugh, "China's Military Views the World: Ambivalent Security", *International Security*, Vol. 24 No. 3 (Winter 1999–2000), p. 56.
[52] Tai Ming Cheung, *China's Entrepreneurial Army*, p. 33.
[53] 16-characteristics decree; *junmin jiehe, ping-zhan jiehe, junpin jiehe, yi-min yangjun* [combine the military and civilian, combine peace and war, give priority to military products, and let the civilian support the military]. For more information, see Zhang Nanzheng (Ed.), *Dangdai Guofang Jingji Lilun: Qianyan Wenti Yanjiu,* (Guofang Daxue Chubanshe 2003); [*Theory of Contemporary Defense Economics: Research on Future Problem*], National Defense University Press, 2003.
[54] Tarja Cronberg, "Civil Reconstructions of Military Technology: The United States and Russia", *Journal of Peace Research*, Vol. 31 No. 2 (May 1994), pp. 205–218.

As indicated in Cronberg's analysis of the Soviet Union, the spin-off process was not smooth due to the military's reluctance to share its valuable information. The PLA's total obedience to the central authority, however, made the transition of its role smooth. In this context, it is important to note that when Deng pulled the military into the economic activities, he did not specify or provide any time limit for how long the military would need to bear the sacrifice.[55] Simply put, the Chinese military never challenged the decree from above. Unlike the case of the Soviet Union, where the military services were reluctant to transfer some of their organizational know-how, the Chinese government actively encouraged the PLA to release military technology to the civilian sector. Military technology has been steadily transferred to the civilian sector through governmental decrees—220 items in 1988, 2,336 items in 1989, and an additional 742 items in 1997.[56]

There is no doubt that such a functional relationship between the civilian authority and the military served as a lubricant for defence policy as there have not been any visible frictions on the mission. Traditionally, "when the PLA intervened, *en masse*, it was because Mao and Deng had ordered it … [In other words,] the PLA intervened in politics because it was drawn in by party leaders, not driven by internal motives or ambitions".[57]

Broadly defined, "the use of the army as a 'model' for the social policies of the post-Maoist era was begun by Deng Xiaoping. Deng's selected works include nine articles devoted to modernizing the military and defining its relationship to the party, government and society".[58] Contrary to the Soviet case, there are sources supporting the idea that the armed forces may have played only a minimal role in the decision-making process, particularly during the post-Maoist era. In the same vein, Swaine expertly argues that although the military has not "dictated" its policy in any sub-arena, the defence policy arena has been virtually the exclusive domain of the PLA, comprising the core of its involvement in the national security arena. The military's positive role in industrial endeavour definitely played an important part in the smooth defence-conversion programme in the post-Maoist era.

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[55] I am grateful to Professor Wu Xinbo for pointing out this aspect of the Four Modernizations and civil-military relations. See Deng Xiaoping, *Selected Works of Deng Xiaoping*, Vol. 3 (Beijing: Foreign Languages Press, 1993), p. 133. Deng firmly insisted to the PLA that "only when we have a good economic foundation will it be possible for us to modernize the army's equipment".
[56] Hiramatsu Shigeo, *Jiang Zhemin to Chugokugun,* p. 95.
[57] Ellis Joffe, "Party-Army Relations in China: Retrospect and Prospect", *China Quarterly*, 1996.
[58] Monte R. Bullard and Edward C. O'Dowd, "Defining the Role of the PLA in the Post-Mao Era", *Asian Survey*, 1986.

Nonetheless, without competent soldiers and defence workers, the conversion may not have yielded a fruitful result.

Educational reform was a significant promoter of the military's involvement in civilian commercial activities. In order to expedite the conversion programme, the Chinese government made every effort to teach civilian skills to military personnel who would be directly responsible for the commercial activities. According to Chinese military doctrine, one of the major purposes of cultivating the armed forces is to nurture responsible citizens who are trained in both military and civilian skills.[59]

As indicated earlier in the cases of the United States and the Soviet Union, one of the leading factors contributing to the failure of conversion programmes was the ineffective management of human capital. Many skills taught in the military are not readily transferable to civilian jobs. Due to such difficulties in the exchange of human and material resources between the military and civilian sectors, conversion outcomes have been less impressive in both the United States and the Soviet Union. The Chinese government sought to solve the problem by reducing the size of its army and transferring former soldiers to civilian enterprises. As noted by Yitzhak Shichor, "well over a million who had served as cadres in the PLA or who had technical skills, were taken by government offices, factories, mines, and industrial enterprises".[60] Demobilization was motivated not only by the perceived need for military consolidation but also by economic concerns. It is probable that reductions of between 1.5 to 2 million soldiers were advocated by the economic pragmatists in the central committee in order to allow the application of significant military resources to top-priority development areas.[61]

This effort was the most rational choice for the government, since military science was a favoured sector that enjoyed top priority for talent and other resources.[62] Therefore, the development push emphasized the PLA's moral obligation as an agent of modernization. At the centre of this effort was the *Junshi Jingji Xueyuan* or "the PLA Military Economics

[59] For example, military students are taught and tested in at least eight subject areas apart from their military studies: Chinese language, foreign language, History, Geography, Mathematics, Physics, Chemistry and Hygiene. See Monte R. Bullard and Edward C. O'Dowd, "Defining the Role of the PLA in the Post-Mao Era", *Asian Survey* (1986).
[60] Yitzhak Shichor, "Democratization: The Dialectics of the PLA Troop Reduction", *China Quarterly*, 1996, p. 337.
[61] Tai Ming Cheung, "Disarmament and Development in China: The Relationship between National Defense and Economic Development", *Asian Survey*, 1998, p. 761.
[62] Evan A. Feigenbaum, "Soldiers, Weapons and Chinese Development Strategy: The Mao Era Military in China's Economic and Institutional Debate", *China Quarterly* (1999), p. 296.

Institute (MEI), a high-level educational research and teaching establishment that was set up in 1986 in Wuhan in Central China". The institute trained the PLA's accountants, auditors and administrators of supply, transformation, fuel, housing and other logistics, and had more than 500 teaching staff and 5,000 students at any one time.[63] Such educational measures to train the armed forces in civilian skills accelerated the military's involvement in economic activities that required not only conversion of technology but also commercialization of military products.

In addition to the direct training in capitalistic-style ventures, there were new active cooperation and interaction policies between the military academies and the civilian universities. Prestigious academic institutions such as Peking, Tsinghua and Remin Universities began working with students from military academies under the guidance of the government. Some graduate programmes were obliged to enrol students with military backgrounds in order to promote integrative relations between the civilian and military academies.[64] In addition, military cadres from institutions such as the Academy of Military Science and the National Defense University pursued higher degrees abroad in order to polish their credentials. However, military officers seeking further degrees had to get permission from the Staff Department of the PLA.[65]

It is important to ask how such a close, integrative connection between the civilian and military institutions is possible. The answer can be inferred from examining the military doctrine on education. According to Deng, there were four major reasons for the existence of the PLA: (i) cultivation of an armed force that is capable of modern warfare; (ii) training political solders; (iii) obtaining skills in science and technology; and (iv) cultivating working forces that are versatile in dual-use technology. [66]

As indicated, there was a specific military doctrine that explained the objective of cultivating the armed forces. Although the government strove to make its armed forces as professional a group as possible, there were no clear boundaries between the civilian and military roles in the society as a whole.

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[63] Tai Ming Cheung, *China's Entrepreneurial Army*, Oxford University Press (2001), p. 3.
[64] I wish to thank Professor Li Bin at Tsinghua University for providing this insight.
[65] Interview with a high-ranking military officer in Beijing (23 July 2006).
[66] Shi Yewen, *Deng Xiaoping Junshi Shengya*, *Zhongguo Renmin Jiefangjun Yinxiang Chubanshe*, [*The Military Career of Deng Xiaoping*], The PLA Audio Press, 4th Edition DVD Video (procured in July 2006).

Therefore, when the government promoted the armed forces into conversion activities, it offered numerous reasons for the involvement of the armed forces into the civilian economy. One major explanation was that the soldiers would be trained with civilian skills. In this context, the Chinese military were trained as dual-task soldiers capable of succeeding in both battlefield and in civilian activities, with military training not limited to the professional "management of violence". The utilization of the armed forces in non-traditional missions is completely acceptable and rational in the Chinese view.

Regardless of the continuous development of professional military education in the post-Maoist era, PLA officers did not reject their secondary role in economic activities. Prior to the economic reform era, the nature of professional military education had been volatile due to political upheavals. Shortly after the 1949 establishment of the People's Republic of China and the subsequent war in Korea, China used Soviet assistance to expand rapidly the number of military academies and technical schools. Although most of the military schools concentrated on basic education for the armed forces, by 1955 the PLA had a total of 253 military academies and schools, and eventually consolidated to 125 schools by the late 1960s.[67] However, during the chaotic "10 lost years" of the Cultural Revolution between 1966 and 1976, military education came under severe attack. Of the 125 military schools, 82 (or approximately 66 per cent) of them were shut down during the Cultural Revolution.[68] Thus, professional military education did not follow a linear trajectory of development during the Maoist era.

During the late 1970s, the educational level of officers began to improve gradually as shown in Table 1.

	Initial stage 1978	**Take-off stage 1987**
B.A. degree and higher	12.8%	15.6 %
Associate degree	17.23%	21.7%
Above junior high	65.78%	62.7%
Below junior high	4.19%	0%

Table 1: Percentage of military officers with academic degrees. Source: Dang Dai Zhongguo Cong Shu, *Dang dai Zhongguo jun dui di hou qin gong zuo*, Zhongguo Shehui Kexue Chubanshe, 1990, pp. 223–236.

[67] Thomas J. Bickford, "Trends in Education and Training, 1924–2007: From Whampoa to Nanjing Polytechnic", in Kamphausen and Scobell et al. (Eds.), *The "People" in the PLA: Recruitment, Training, and Education in China's Military*. Strategic Studies Institute, U.S. Army War College, 2009, p. 27.
[68] Ibid. p. 31.

The proportion of officers that had received at least an associate degree (equivalent of two years of college in the United States) was 30.03 per cent in 1978 but gradually increased to 37.3 per cent in 1987. A notable change was that the percentage of officers not completing junior high school had decreased to zero by 1987. [69]

The Chinese civilian and military leadership recognized that the human resource element was a critical part of China's ongoing modernization process. With this in mind, the nature of professional military education changed significantly during the critical period of the first military reform in 1985. In June 1985, at a crucial meeting of the Central Military Commission, Deng Xiaoping announced his plan to deepen economic reform and modernization. His strategic decision included the jettisoning of Mao's notion of imminent war in favour of the assumption that the international system would be dominated by peace and economic development. In this context, Deng proposed the doctrine of "People's War under Modern Conditions", which required more advanced and educated military forces. During Deng's era, advanced professional military schools and civilian institutions were established that supported the education of officers who would be responsible for technological development and adaptation to the new, changing environment.

The milestone change was the creation of the *guofang daxue* or the National Defense University (NDU) in 1985. The NDU is truly an all-service PLA educational institution that plays a critical role in the education of China's future military leaders. Almost all the senior commanders of the PLA have now gone through NDU with formal professional training.[70] The Academy of Military Science (*junshi kexue yuan*) also began to recruit students from civilian universities into their graduate programmes.[71]

The second major change in professional military education was the development of the so-called *guofang sheng* or the National Defense Student programme, also in 1985. It is somewhat similar to the U.S. Reserve Officer Training Corps (ROTC) programme. The major motivation for its creation was the recruitment of more technologically sophisticated students and the building of a higher quality of talent among the officer corps. In addition, the PLA began to recruit officer candidates directly from civilian universities. According to

[69] Dang Dai Zhongguo Cong Shu, *Dang dai Zhongguo jun dui di hou qin gong zuo*, Zhongguo Shehui Kexue Chubanshe, 1990, pp. 223–236.
[70] Roy Kamphausen and Andrew Scobell et al., *The "People" in the PLA,* p. 34.
[71] Interview with a military officer with advanced degrees from both civilian and military institutions (July 2006).

Corbett, Jr., et al, the PLA was capable of producing approximately 30,000 new officers annually, to support a force of about 2.3 million personnel.[72]

	Institutions	Number of students
Military institutions	30 PLA universities 20 PAP universities (Paramilitary Armed Police)	10,000 high school graduates enrolled 5,000 PLA enlisted personnel enrolled
Civilian institutions	National Defense Student Programme [73]	11,000 high school graduates enrolled
Civilian institutions	Civilian university recruits	3,000 per year since 1990
Total estimate: 29,000 new officer candidates per year		

Table 2: Number of new officer candidates per year: Source borrowed from John F. Corbett, Jr., Edward C. O'Dowd, David D. Chen, "Building The Fighting Strength: PLA Officer accession, Education, Training, and Utilization", in Kamphausen and Scobell et al. (Eds.), *The "People" in the PLA: Recruitment, Training, and Education in China's Military*. Strategic Studies Institute, U.S. Army War College, 2009, p. 143.

The above estimates indicate that approximately half of all new PLA officers now come from PLA academies and the other half from civilian universities. Both the students in the National Defense Program and the civilian university recruits increased dramatically. Prior to 1985, all the military officers were educated in military academies.

If the current policy trend continues, it is likely that all PLA officers must get advanced degrees from either military or civilian universities. This is in contrast to the earlier military education process during the post-Maoist era that focused overwhelmingly on ideologically-based standards. It is clear, therefore, that the PLA has made revolutionary changes in its officer education programmes.

Conclusion

The leading factors explaining China's successful defence-conversion programme have been explained. There are two types of impediments to smooth defence conversion: (i) hardware

[72] John F. Corbett, Jr., Edward C. O'Dowd, David D. Chen, "Building The Fighting Strength: PLA Officer accession, Education, Training, and Utilization", in Kamphausen and Scobell et al. (Eds.), *The "People" in the PLA: Recruitment, Training, and Education in China's Military*. Strategic Studies Institute, U.S. Army War College, 2009, p. 143.
[73] As of 2007, there are 116 participating universities, ibid., p. 147.

issues: technology transfer barriers, and (ii) software issues: management and leadership barriers.

The chief difficulty in the hardware aspect is the physical conversion of military technologies for civilian use, of beating of swords into ploughshares. In other words, there are inherent structural difficulties in defence-conversion programmes related to the barriers between military and civilian technologies. The conversion process does not naturally happen without painful, intentional effort. In order to tackle these structural difficulties, the government has enacted a series of institutional reforms to support the ongoing procedures. There were difficulties in steering the defence enterprises and armed forces to participate in the endeavour. Enterprises in the United States were reluctant to convert due to the lack of incentives, while the privileged military officers in the Soviet Union did not completely share their institutional know-how in those efforts. In other words, these parallel parties do not seem to recognize the importance and necessity of military to civil conversion or share the vision of the policymakers. The Chinese defence and military enterprises were, however, able to participate freely in economic activities without violating ethical boundaries. More accurately, the gradually evolved military doctrine not only guaranteed but also encouraged the armed forces in their economic missions. Military education, which included both military and civilian skills, facilitated the PLA's participation in such endeavours.

In short, China sought to resolve problems associated with the defence-conversion programme with its grand strategic planning in a nationalistic fashion. The Chinese development shows how the three branches of power structure, namely the party (central party politburo), the state (the government ministries and agencies) and the military (PLA), worked together as an organic body to achieve the same policy goals.

The review of China's defence-conversion programme throws up a number of policy implications. While there is no evidence to suggest that the Chinese model can be easily exported to other emerging economies, there is, nonetheless, empirical evidence indicating that the role of the military can be extended to encompass non-traditional missions during peacetime in order to reduce the burden on the national economy of defence spending, not only by diversification out of defence production but also by integration of the armed forces into more development-oriented activities.

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