Puppies Who Climbed Out of the River: The Roles and Influence of Chief Commanders and Designers

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For all its limitations, China's “Two Chiefs” program management system has been highly effective. Through periodic efforts to improve the system, the “Two Chiefs” system and the leaders who run it have evolved considerably over five generations, with a trend toward more programs, more work, better incentives, and younger personnel. This research brief addresses the following dynamics concerning chief commanders and chief designers over the first six decades of defense industrial development in the People's Republic of China: their career trajectories, roles, and influence. It also examines broad demographic trends, incentives, and challenges. This brief focuses primarily on program managers from China's aerospace industry.

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INTRODUCTION

China's "Two Chiefs" program management system has been highly effective overall. Chinese program managers have been selected through on-the-job challenges and attrition, then entrusted with incrementally greater technological leadership roles.

However, since the end of the Cultural Revolution in the mid-1970s, problems have emerged, prompting periodic efforts to improve the system through revised guidance and regulations. The "Two Chiefs" system and the leaders who run it have evolved considerably over five generations. There has been a trend toward more initiatives, involving the development of ballistic missiles, and the DFH-2 communication satellite. In 1978, China's space industry discarded "erroneous policies and slogans," restored technical titles and the chief designer system, appointed chief designers for major projects, restored and established S&T committees, established an administrative system for planning, reinstated rules and regulations, and established quality control and logistics systems.

The years immediately following the Cultural Revolution were characterized by a period of recovery. In 1977, the Party approved the "Three Grasps" (三抓) missile and satellite initiatives, involving the development of the DF-5 intercontinental ballistic missile, the JL-1 submarine-launched ballistic missile, and the DFH-2 communication satellite. In 1978, China's space industry discarded "erroneous policies and slogans," restored technical titles and the chief designer system, appointed chief designers for major projects, restored and established S&T committees, established an administrative system for planning, reinstated rules and regulations, and established quality control and logistics systems.

During this time, the defense industry's homegrown third generation of program managers emerged. Leaders included communications satellite chief designer Sun Jiadong, satellite and manned spacecraft chief designer Qi Faren, and rocket system commander Huang Chunping. This generation served as program managers in a "two chiefs" system that was defined and regulated more formally after 1984.

The fourth generation of program managers, also homegrown, rose in the years following Deng Xiaoping's reform and opening up to succeed their significantly older predecessors. Deng's reforms unleashed economic development, but also resulted in budget cuts for military and strategic industrial programs, thus making even the highest positions in China's defense industrial sector far less desirable than emerging opportunities in
a burgeoning market economy. Some
chief commanders and designers who
began their careers in the 1980s and
1990s felt this tension acutely and
considered "jumping into the sea" of
the private sector. According to J-15
and J-31 chief designer Sun Cong, the
budget cuts of the 1980s resulted in
20,000 professionals working on just
four J-8II aircraft over an entire year,
so they built another four outside the
state plan. Moreover, there was little
money to be made. Of the 48 univer-
sity graduates who began working at
the same time with Sun's Shenyang
Aircraft Design Institute (SADI) en-
trance cohort, only 20 persevered. As
Xinhua news agency documents:

China's market economy was
beginning to boom. Many aero-
space experts were lured to pri-
vote or foreign-funded enter-
prises. A popular jingle at the
time—"Making missiles earns less
than selling tea eggs"—highlight-
ed low salaries in the sector.

Others, however, like Chang'e-3
deputy chief designer Jia Yang, who
led the Yutu lunar rover develop-
ment team in addition to working
on Shenzhou 1-4, Beidou, the China-
Brazil Earth Remote Sensing Satellite, and the Haiyang satellite program,
stayed in the field. It was these engi-
neers who would come to lead China's
defense industry programs. They ben-
efited from China's military spending
largesse during the 2000s, which re-
sulted in more work and higher sala-
ries for defense industry personnel.

China's fifth generation of pro-
gram managers have reached their
positions at a time when China's de-
fense industry has received unprec-
edented resources, resulting in addi-
tional personnel, higher salaries, and
better living conditions. China's open-
ing and reform also led to a cadre of
better educated program managers
leading weapons programs.

This generation of program man-
gers is also noticeably younger than
previous generations with average
ages in the 40s leading teams whose
average age is in the 30s. From 1992
to 2003, rocket system engineers' av-
average age plummeted by 18 years.
For example, the chief commanders
and chief designers for all seven ma-
jor Shenzhou-6 systems had an av-
erage age of 48.7, five years younger
than their Shenzhou-5 counterparts.
The Shenzhou-7 team was even
younger, with chief designers of key
subsystems ranging in age from 30
to 41. In January 2004, 42-year-old
Zhang Bainan succeeded 71-year-
old Qi Faren as chief designer of the
Shenzhou spacecraft.

Despite an improvement in ma-
terial incentives, program manag-
ers and their subordinates are often
face a crushing workload generat-
ed by urgency to make progress. In
the Maoist era, when material incen-
tives were minimal, Chengdu Aircraft
Corporation's No. 611 Institute al-
ready operated on a "6-11" to "7-11"
basis. This entailed working either
six days at 11 hours per day or seven
days at 11 hours per day.

As J-10 chief designer Song
Wencong attests in his memoirs, test
periods were shortened by work-
ing constantly every day despite the
low salaries of the 1980s. Years later,
similar norms persist. In December
2012, a CCTV News Probe program
commemorated J-15 "scene-of-action
commander" Luo Yang's untimely
death from cardiac arrest following
overwork to prepare the aircraft's
first deck landing.

A CHANGING WORKPLACE

In an effort to take the "Two Chiefs"
system to a new level, China's space
industry has been experimenting with
new workplace cultures that empha-
size modern management, standard-
ization, quality control, and emerg-
ing mass production ability—part of
a larger trend in China's dual-use ci-
vilian-military technological projects.

While some of the language from
these reports are no doubt optimistic
and self-serving, China's recent pro-
fusion of relatively advanced satel-
rites suggests significant advances in
program management. For example,
the employees of Qinghua Aerospace
Satellite Technology Company, Ltd.,
can select departments in which to
work according to their own disci-
plines and ambitions, with the com-
pany assigning a department head
as a coach for a new employee with
a term of three to six months, after
which candidates may be promoted,
continue in their present position, or be terminated. The company also invites external experts to give lectures and encourages employees to attend short-term professional training and enroll in formal academic education.

Dongfanghong Aerospace Satellite Co., Ltd., China’s foremost satellite manufacturer, instituted a new management system where one person may be responsible for multiple projects, and allows communication both horizontally and vertically. The new setup makes it possible to use fewer personnel to complete more projects and makes it possible to make various decisions quickly, accurately, and in a timely manner. The approach has played an important role in reducing development and manufacturing costs while shortening the development and manufacturing cycle for satellites. Employee morale has also been improved under this system.

CONCLUSION
China’s “Two Chiefs” system has been highly effective overall. The most difficult weapons development problems occurred before this system was implemented consistently in 1962 and during subsequent Maoist political excesses when it was crippled or eliminated altogether. Admittedly, problems have emerged, prompting periodic efforts to improve the system through revised guidance and regulations. Chinese program managers are selected through trial by fire to determine talent and suitability, then entrusted with progressively larger technological leadership roles (subsystem to system to project, deputy to lead). Over five generations, the “Two Chiefs” system and its leaders have evolved considerably, towards more programs, more work, and better incentives. Average ages continue to decrease. Organizational innovation is growing, particularly for key programs. All this portends an even more promising future for China’s defense industry.

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