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THE CHINESE DEFENSE INDUSTRIAL REFORMS:  
HINDERING OR PROMOTING MILITARY  
MODERNIZATION?

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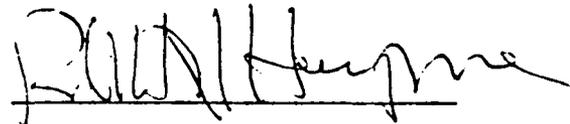
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## DEDICATION

This study is dedicated with love and appreciation to my wife,  
Maria, and my children, Brian and Michelle, for the constant love  
and support they have given to me throughout graduate school

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THE CHINESE DEFENSE INDUSTRIAL REFORMS:  
HINDERING OR PROMOTING MILITARY  
MODERNIZATION?

by

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THESIS

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TABLE OF CONTENTS

ACKNOWLEDGMENTS ..... v

Chapter

1. INTRODUCTION ..... 1

    Controversy ..... 2

    Evidence of a Hindering Influence ..... 3

    Evidence of a Benefiting Influence ..... 5

    The Method of Analysis ..... 8

2. THE DEFENSE INDUSTRY AND THE ECONOMY ; ..... 8

    The Pre-Reform Defense Industry ..... 8

    Third-Line Industry ..... 10

    Purpose of Reforms ..... 11

3. DEFENSE INDUSTRIAL POLICY ; ..... 13

    Policy ..... 15

    Benefits ..... 19

    Obstacles ..... 21

    Assessment of Product-Mix ..... 24

    The Need for a Comprehensive Policy ..... 25

    Summary ..... 27

4. DEFENSE INDUSTRY'S STRUCTURAL CHANGE ; ..... 29

    The Leadership's Guiding Principles ..... 31

    Benefits ..... 36

Obstacles .....	41
Assessment .....	44
Summary .....	48
5. INDUSTRIAL MANAGEMENT <i>ind.</i> .....	50
Benefits .....	52
Obstacles .....	55
Assessment .....	57
Summary .....	61
6. HINDERING INFLUENCE OF THE DEFENSE INDUSTRIAL REFORMS .....	63
Deng's Plan of Attack .....	64
The Overall Benefits .....	65
The Overall Obstacles .....	66
NOTES	
Chapter One .....	70
Chapter Two .....	71
Chapter Three .....	72
Chapter Four .....	75
Chapter Five .....	79
Chapter Six .....	81
BIBLIOGRAPHY .....	82
VITA	

## CHAPTER ONE

### INTRODUCTION

China has emphasized economic development over Maoist ideology since the Third Plenary Session of the Eleventh Chinese Communist Party Congress, held in December 1978. An important component of this effort is the defense industry, a component which gives equal importance to China's army-building as well as economic construction. Therefore, the Chinese defense industry has influenced the development of both the economy and the national defense. In linking the two, the Chinese leadership believed that a strong national economy would provide the technological foundation for a defense industry that could develop and produce the advanced weaponry of a modern military, a process which would benefit both kinds of developments.<sup>1</sup> Deng Xiaoping, leader of the reforms, carried this view further saying that the modernization of China's military is possible only by developing the country's industry and agriculture first.<sup>2</sup> In other words, a strong economy fosters a competent defense industry which in turn contributes to military modernization. Events in the army-building effort have indicated that Deng's view has been correct, but, at the same time, it has also been inaccurate. The defense industry, while serving the national economy, has shown signs that had hindered and promoted military modernization simultaneously.

If the defense industry has been hindering army-building, why has there been no change in these modernizing reforms? A possible answer is that this observation merely supports the fact that military modernization has had the lowest priority in Deng's "Four Modernizations." The emphasis has been on modernizing agriculture, industry, and science and technology, not national defense. Nevertheless, the People's Liberation Army (PLA) has made progress in modernization. It has increased its combat capability by reorganization, education and integration of new weapons, most of which have been produced by the indigenous defense industry. The PLA has made significant progress in upgrading its military capability; nonetheless, it has also embraced newly developed practices and ideas that evolved from defense industrial reforms which seemed to undermine defense construction. These hindering and promoting tendencies require investigation to determine the underlying influence which the Chinese defense industry has exerted on the effort toward military modernization.

### **Controversy**

The Chinese leadership decided on a program of gradual development of the military while concentrating on economic construction (see chapter two). However, incremental modernization of weapons did not stop the PLA from developing new arms nor from improving existing ones. With or without the leadership's priority, the success of weapons development has depended on the performance of the Chinese defense industry which has had the responsibility of developing new technology, building new weapons and improving old arms.

Therefore, the defense industry has been a key player in determining the outcome of the Chinese military modernization effort.

Since the indications showed a benefiting and obstructing influence, let us examine them to get an insight into this controversy. First, I will present the evidence that supports the hypothesis that the Chinese defense industry has hindered military modernization. I will follow that with evidence that supports the opposing hypothesis--the defense industry has promoted military modernization. Lastly, I will present my method of evaluating the issues in order to determine the more appropriate hypothesis. The issues for each can be divided into three aspects of the defense industrial reform: change in management system, structural change and defense industrial policy.

#### **Evidence of a Hindering Influence**

To increase the country's productivity, Beijing has directed the defense industry to produce consumer goods. This guiding principle has opened the lucrative consumer goods market to the management. In the process of switching to consumer goods production, some managers, eager to make money or to advance their careers by showing their loyalty to following state policies, have been stressing the quantity of consumer goods and ignoring the quality of military production.<sup>3</sup> This is a hindrance to army-building. The managers' biased motivation could have been precipitated by pressure to meet consumer goods quotas and to keep pace with reforms, or by de-emphasis from the top on military production. Of course, some managers are just corrupt, looking after themselves.

In any case, ineffective management and nonproductive managerial practices have hindered military modernization.

Another hindering aspect to military modernization is a production policy which pushes for the production of more consumer goods. This policy encourages local governments to apply more control over the production of civilian products made in defense enterprises. In addition, steps have been taken to retool parts of the defense industry to produce more consumer goods.<sup>4</sup> Production policy is shifting away from making military equipment toward consumer goods, a negative sign for the PLA.

The third aspect that has impeded military modernization is the structural change of the defense industry. By the late 1970s, the ministers of Machine Building Ministries who were PLA officers had been replaced by civilians. In mid-1982, the National Defense Industry Office (NDIO) and the National Defense Science and Technology Commission (NDSTC) were merged to form the National Science, Technology and Industry Commission (NDSTIC), an organ that supervises all defense industry producers and consumers, research and development, production, planning and procurement of all military equipment. The restructuring aimed at removing redundancy in functions among the PLA, NDIO and NDSTC. Because of the merger, the PLA's role in the production process has become more limited.<sup>5</sup>

The restructuring has placed civilians in defense industry leadership positions, a trend which may diminish PLA interest in weapon production. Because China has been active at selling arms abroad, the PLA's proposals for

equipment could be ignored if the civilian leadership preferred to build weapons that would sell well in the international arms market. As a result, the PLA would get hardware that would not suit its needs. The structure of the defense industry in terms of military-civilian relations could be a potential hindrance.

#### **Evidence of a Benefiting Influence**

There are positive signs from the defense industry that support the hypothesis that the industry has promoted military modernization. In the structural aspect, the structural change in the defense industry may not have been perceived as a move to diminish PLA authority in military production. Most PLA leaders accepted the change as part of a plan to disengage the military from politics, a plan which most military leaders support in favor of professionalism over politics.<sup>6</sup> Structural change which shifted military-civilian relations toward the civilians have contributed to building a more professional and modernized PLA.

Another positive sign has been the defense industrial policy which called for the integration of more advanced technology into older-generation weapons, a process which increases their effectiveness and that of the PLA. Even though the policy supported economic development more than army-building, this emphasis has not kept the defense industry from producing military hardware. On the contrary, the policy which seemed to divert military production efforts has been contributing to the development of the civilian industries, a scheme which the leadership has embraced all along as the prerequisite to army-building. Therefore, the defense industrial policy promotes the gradual modernization program.

The third aspect, change of management system from a central planning style to a decentralized orientation, has increased productivity and economic crime. We all know that corruption and "back-door" relations exist in Chinese society, and some people have blamed them on major economic reforms which shifted socialist ideas toward capitalist practices, such as decentralization, profit-making, competition, motivation and incentives, concepts that encourage efficiency.<sup>7</sup> This shift increased productivity which has been proven by the introduction of the "contract system" in agriculture and later in industry, which resulted in cost-saving and increased production. It is true that these market practices ushered in corruption or anti-socialist ideas, but their impact on national economic and defense construction is not clear until we analyze their effects.

#### **The Method of Analysis**

The three aspects of the defense industry--managerial practices, leadership structure, and policy--encompass old residual habits and newly developed practices that evolved from defense industrial reforms. Some of them are obstructive; others are beneficial to military modernization. By analyzing these three aspects, we can determine the role that the defense industry has taken in army-building.

If the managerial practices have not supported efficient production, the leadership structure has favored civilian interest rather than military needs, or the policy has been shifting away from a military focus, then the defense industry has hindered military modernization. If the practices and ideas in the three aspects indicate the opposite, then it has promoted modernization.

In the following chapters I will analyze the practices and ideas in each aspect to see whether the trends indicate a promoting or a hindering role for the defense industry in the efforts toward military modernization.<sup>8</sup> My primary sources are translations of Chinese newspaper and magazine articles by the Foreign Broadcast Information Service. I realize that this source is politicized and propagandized by the Chinese government, but these articles do provide an insight into the attitude and moods of the Chinese leaders and the trends of the national issues. Through these perceptions, I will develop the civilian and military positions concerning army-building. The way they have viewed military modernization can indicate their degree of support for building national defense.

Each chapter will address one aspect of the defense industry. I will examine the benefits and obstacles separately in each chapter and then assess the hindering and promoting evidence to determine the predominate tendency. My criterion for a promoting influence is a tendency that supports a professional and modernized PLA. The opposite effect would signify a hindering influence. The last chapter will summarize all three aspects and determine whether the defense industrial reforms have hindered or promoted military modernization.

## CHAPTER TWO

### THE DEFENSE INDUSTRY AND THE ECONOMY

To understand the role of the defense industry in the effort toward military modernization, it is necessary to analyze China's attempt to change a cumbersome, autonomous and inefficient pre-reform defense industry into a more manageable, well-connected and cost-effective military industrial system. During the transformation, some old impractical habits found their way into the new system, obstructing the army-building effort; at the same time, the new system has made tremendous progress in economic and national defense developments that has fostered a more powerful PLA. In this chapter I will examine the characteristics of the pre-and post-reform defense industrial systems in order to provide the setting of the "promoting or hindering" controversy.

#### **Pre-Reform Defense Industry**

The pre-reform defense industrial system operated under a state-guiding concept that required the national defense forces to be ready to fight "an early war, an all-out war, and a nuclear war."<sup>1</sup> As a result, China placed priority on the construction of a massive defense industry in the mid-1960s which consumed large sums of money. Since this project had priority, it enjoyed what seemed to be unlimited resources; moreover, much of the work was done in secrecy, creating a resource-abundant closed system not questioned by anyone outside the Chinese leadership. This closed system eventually developed into the defense

industry that ate from an "iron rice bowl."<sup>2</sup>

The closed internally-oriented defense industry operated under a highly centralized policy which was distinct from the civilian industries. Besides different policies, the two industries were separated without any links. They operated on different guidelines with the military industrial system getting a larger share of resources.

In addition to the division between systems, the defense industry was subdivided by regions, departments and even factories, creating a system without internal horizontal connections.<sup>3</sup> Factories aimed for productive self-sufficiency by manufacturing all component parts plus assembling the end-items. Cost-effectiveness was ignored; cutting cost by using component parts from other factories or exchanging ideas was not practiced. Instead, the managements isolated their factories, not concerned with improvement but concerned with earning their living by eating from the state's "iron rice bowl." It was easier to mind their own business than to innovate; after all, wages were the same.

The lack of motivation on the part of managers and workers not only led to the inefficient duplication of production, but it encouraged production below maximum capacity. As long as production met the state quotas, the workers had fulfilled their duty. There were no personal gains to be had by producing more. Furthermore, when resources became short or demands for military equipment decreased, much of the productive capacity lay idle. The defense industry consumed an enormous amount of money and resources, yet it had serious defects in efficiency and cost-effectiveness, adding to the burdens of the state instead of

developing the national economy.

Since China began its reforms, the defense industrial enterprises that were located close to urban areas have been doing well economically and are serving the national economy. On the other hand, enterprises that were located in the remote mountainous region, the third-line region,<sup>4</sup> could not and still cannot adjust to Deng's reforms.

### **Third-Line Industry**

Construction of enterprises in the third-line region was a secret to foreigners as much as it was to the Chinese. It was not until after the 1978 reform movement that the Chinese started to write about it, thereby revealing the third front industrial structure.<sup>5</sup> This third front was conceptualized when China believed in constant readiness to defend against aggression, partially due to America's involvement in Vietnam and the Soviet threat in the northern border. In face of these perceived threats, China wanted a military industrial complex in the secured inner region that could support a protracted war as the Chinese army retreated inland from the coastal areas while delaying enemy advances.<sup>6</sup> The goal was to construct an entire defense industrial system in the remote and secure third-line region independent of the industrialized coastal urban centers which would be given up when defense of them should become disadvantageous.<sup>7</sup>

China spent twenty-eight billion yuan (four billion U.S. dollars), an average of 40 percent of the national investment during 1963-1975, on this project. The third front employed 1.35 million workers in about two thousand enterprises and ninety-two research institutions.<sup>8</sup> The magnitude of constructing

this project was enormous in resources and human effort. However, its productive output was minuscule, a disappointment to the leadership. On top of the disappointment, the negative impact of the high construction cost on the national economy was comparable to the adversity generated by the Cultural Revolution. As Barry Naughton puts it,

The Third Front, however, was a purposive, large-scale, centrally-directed programme of development carried out in response to a perceived external threat with the broad support of China's national leaders. Moreover, this programme was immensely costly, having a negative impact on China's economic development that was certainly more far-reaching than the disruption of the Cultural Revolution.<sup>9</sup>

In addition, the project lost its support in the early 1970s when China's relations with the U.S. and U.S.S.R. improved. The shift in threat perception led to the abandoning of an inefficient massive industrial system, thus wasting resources that were consumed by this project.

### **Purpose of Reforms**

Deng wanted to correct the defects of the defense industry, especially the dilemma of the third front enterprises, by integrating it into the national economy. He envisioned that its advanced technology and massive productive capacity would serve the economy. The high-technology machinery of the defense industry could produce goods that the less advanced civilian industries could not; moreover, the entire economy could share the military technology which would benefit all industries. Deng also saw that such integration could establish horizontal links among defense and civilian enterprises, communication channels that would enable the coordination of production and resource distribution, thereby eliminating productivity under-utilization.<sup>10</sup>

Deng's reforms have aimed at bringing the massive productive potentials of the defense industry into full play in serving the national economy, especially the third front potentials. Through policies, reorganization and management practices, he wanted to develop the economy by making use of the defense industrial productive potentials while modernizing the PLA simultaneously. Even so, it is well known that the emphasis has been on economic development, with national defense having the lowest priority of the four modernizations.

Because of its low priority, the PLA's annually allocated budget diminished in the 1980s; instead, the funds went to light industry or consumer goods development. Furthermore, to make up for the lost funds, Beijing encouraged the military enterprises to produce consumer goods, an innovation which would enhance the integration of defense and civilian industries, utilize idle productive capacity, and promote economic construction.

Without money, the PLA curbed its desire to buy new weapons, forcing it to make non-technological reforms, such as formulating modern military strategies and tactics and improving educational systems, force structure, training and professional leadership. As the PLA demanded less new military hardware from the defense industry, some military enterprises willingly entered the lucrative consumer market looking for profits to make up for the waning PLA demands.<sup>11</sup> The whole pattern of defense industrial reform supported Deng's army-building policy of gradual weapons modernization paced on the progress of economic and technological development or economic construction before military modernization.

**CHAPTER THREE**  
**DEFENSE INDUSTRIAL POLICY: HINDERING OR PROMOTING**  
**MILITARY MODERNIZATION**

The reform-period Chinese leadership, wanting to project China as a world power, formulated policies to accomplish its primary goal of economic development. In addition, the leaders identified secondary goals of adjusting the defense industry and modernizing the military. Their priorities conformed to Beijing's overall scheme of applying the defense industrial potentials to building the economy while modernizing the military and fixing the defects of the arms producers simultaneously. Consequently, national defense, being the lowest priority, did not warrant dedicated policies or plans. Instead, most policies or plans aimed primarily at economic construction while attempting to advance other areas of development such as army-building. Therefore, defense industrial reform policy that promoted economy-building might have hindered or promoted military modernization, a secondary objective.

One way that policies might have obstructed army-building was simply the lack of them. Under a central planning system that inhibits motivation and innovation, the lack of guidance is as much an obstacle as having poor policies. Workers tend not to try new and better ways without authorization from the top. A case in point is the increase in saving by the reduced Materials Bureau of the People's Liberation Army's (PLA) General Logistics Department (GLD).<sup>1</sup>

In 1987 the Materials Bureau had a 72 percent personnel and 50 percent material reduction; however, it saved over 100 percent over the preceding year in arranging and ordering materials for the GLD. The main contributing factor, according to the bureau leaders, was the implementation of enterprise management and profit-oriented economic accounting policies which did not exist before. These policies encouraged the bureau to economize and save, more than compensating for the reduction.

As we can see, reform policies have raised efficiency, but the lack of them has the potential to hinder progress. On the one hand, policies have restricted the modernization effort. The small annual budgets allocated for national defense, because of its low priority, have caused the PLA to dedicate more time to agricultural and sideline production as means to offset its financial problems and as means to maintain soldiers' standard of living, time which should be used for training. The defense industry has also been affected; it has coped with this financial problem by selling arms abroad for foreign exchange, a program that the leaders endorsed but which has undermined the PLA's access to better weapons.<sup>2</sup>

On the other hand, other policies have guided the PLA along steady improvement in the post-reform era. To support this point, in the area of arms modernization, the Chinese F-8 fighter jets, with U.S. help, will soon have all-weather attack capability;<sup>3</sup> the army has designed and produced a high-technology unmanned vehicle,<sup>4</sup> and the navy claimed that it can also research and manufacture new equipment.<sup>5</sup> On top of this progress, China has become the third nation to master the recovery technique of satellite technology.<sup>6</sup> Even foreign arms-buyers

complimented the improvement in Chinese weapons.<sup>7</sup>

Defense industrial policy has produced both benefits and obstacles for military modernization. In this chapter, I will examine the role this policy played in building a modernized army with advanced weapons. The first section will describe the policy. The second section will examine the benefits and obstacles generated by the policy. The last section will determine whether the defense industry has played a promoting or hindering role.

### **Defense Industrial policy**

The military policy under Deng has been to modernize weapons gradually using indigenous technology as much as possible.<sup>8</sup> This basic premise has not changed since reform began; only minor adjustments have been made to maintain the momentum of modernization. The leadership developed this policy in the late 1970s, conforming to the four modernizations: industry, agriculture, science and technology, and national defense. To modernize China, the leaders forsook the importance of defense-building in order to concentrate resources toward developing the other areas. They based this bold decision on the anticipation of a more peaceful world and the requirement to have a developed economy in order to properly support further army-building efforts.

A slow military modernization required less money, a precious asset to a developing country that preferred to spend it on economic development and an asset that could be squeezed out of the defense budget. Consequently, defense spending has decreased since 1979, providing a source of money for development.

Besides developing the economy, Beijing wanted to cure the ills of the defense industry, thus killing two birds with one stone, the stone being the money from the defense budget. The leaders encouraged the defense industry to adjust to civilian production practices, to make full use of its technology and capacity, and not to depend on state subsidy. Faced with financial hardship, the defense industry had to innovate or liquidate. Its management chose to innovate, a decision that popularized using idle machinery to produce consumer goods which would help develop the economy and earn extra income, thereby offsetting the low budget.

Production of consumer goods by defense enterprises started as early as 1979;<sup>9</sup> however, the policy was not formalized until 1983.<sup>10</sup> This policy has been the key to the integration of civilian and defense industries, a process which develops the economy while correcting the defects of the defense industry. Manufacturing consumer goods capitalized on under-utilized capacity, drawing the military enterprises into the commodity market system, transferring technology to the civilian sector, and increasing the development of light industry. This policy has been and still is the key to economic construction and readjustment of the defense industry.

While the production of consumer goods has contributed to economic development and income generation for the military industry, the PLA, with its low budget, has had limited access to modern weapons or the technology to build them. This is partially due to the self-reliance plan which called for the maximum

use of indigenous productive capacity. Since China has been several decades behind in technology, its defense industry could not produce the modern weapons that the PLA needed to fight a modern war.

With limited funds, restricted imports and backward technology, the PLA could not obtain enough foreign weapons to increase its combat capability.<sup>11</sup> The PLA had to settle for improving available arms and making non-technological reforms, hoping that once the economy had developed sufficiently, the PLA would have the money to buy or produce better weapons and have the force structure and trained personnel to use them. In the meantime the military had to be satisfied with being the lowest priority, so that the defense industry could concentrate on adjusting itself while contributing to economic construction by producing more consumer goods rather than military equipment.

As the policy crystallized, the PLA and defense industry searched for modernizing innovations; they found the international arms market.<sup>12</sup> By selling weapons abroad, they were making money and earning badly needed foreign exchange. With this money, the defense industry financed military technology transfer from abroad to upgrade indigenous research and development (R&D) institutions and manufacturing enterprises, an innovation that enhanced the development of the defense industry and produced modern weapons for the PLA.

The lucrative arms market opened another money-making scheme in addition to consumer goods production. The defense industry adjusted as best as it could in conforming to the policy that the leadership dictated for economic and defense construction.

While the PLA and the defense industry were adjusting to reforms, Deng Xiaoping and the Central Military Commission (CMC) in the summer of 1985 endorsed another major guiding concept for national defense development. Deng announced that the world was in a period of peaceful coexistence, that there were no immediate threats to China, and that China should take advantage of the peacetime by concentrating on economic development. This threat perception or the lack of it altered China's defense posture from "war preparedness 'like an arrow on the bowstring' to peaceful construction."<sup>13</sup>

This perspective rationalized the additional squeeze that the Chinese leaders had planned for the PLA. They reduced the PLA by 25 percent to three million soldiers, attempting to build a leaner, better-trained and more professional armed forces. A smaller PLA presented a lesser economic burden to the state, which meant more resources for other kinds of development.<sup>14</sup> A smaller PLA also decreased military equipment demands, causing more idle productive capacity that could accelerate consumer goods production and probably induce more foreign arms sells.

The new defense industrial policy began to take shape after the 1985 CMC meeting. Richard Latham calls it the sixteen-character policy:

Military-civilian integration (junmin jiehe)  
 Peace and war integration [in production] (pingzhan jiehe)  
 Priority for military products (junpin you xian)  
 The civilian [sector] supports defense (yimin yangjun)<sup>15</sup>

The policy directed more defense enterprises to convert their military-exclusive production system to incorporate production of civilian goods. Some enterprises of the Ministries of Ordnance, Aviation, Astronautics and Nuclear Industries came

under state planning for allocation of funds and materials in making consumer goods. The policy also directed the retooling of some enterprises; using idle machinery was not enough.<sup>16</sup> Generally, the policy called for faster and more integration of defense and civilian industries and production of more consumer articles, but also for maintaining the core of defense industry as a contingency.

This policy has not changed since then. Beijing still adheres to incremental weapons modernization using indigenous capacities. The defense industry has to satisfy its assigned economic construction role by producing consumer goods along with integrating with civilian industries. Compounding this duty is its responsibility to supply better weapons to a reduced PLA within a world situation which is less threatening, yet hostile enough to accommodate huge volumes of arms sales. Let us turn to the benefits and obstacles that resulted from this policy.

### **Benefits**

Beijing has portrayed the Chinese defense industry as a patriotic industry that has achieved monumental accomplishments, and it has. The value of non-military products has increased by double digits annually since 1985; there was a 35 percent increase in 1988 and a 33 percent in the first half of 1989.<sup>17</sup> The province of Shaanxi claimed that 60 percent of the total output from its military enterprises were civilian products,<sup>18</sup> and Sichuan claimed 63 percent.<sup>19</sup> The China Nuclear Industrial Corporation of the Ministry of Energy predicted that its output value of civilian products would increase by 20 percent annually, and it has eighteen on-going major technology transferring projects.<sup>20</sup> The list of

accomplishments continues. The defense industry, with governmental help, has adjusted vigorously.

The defense industry has also made tremendous progress in transferring military technology over to the civilian sector. Since 1983, over thirty thousand military technologies have been adopted to produce civilian goods.<sup>21</sup> Such transfers have doubled annually in the mid-1980s, and they have continued to increase.<sup>22</sup> Besides transferring technology, research institutions, military enterprises and the PLA have trained thousands of technicians, filling urgently needed technical positions throughout China's economy.<sup>23</sup> The PLA even opened its military hospitals, airfields and transportation assets to ease the over-strained civilian systems.<sup>24</sup>

Regarding the duty of supplying better arms to the PLA, the defense industry excelled, especially in R&D. China's nuclear and astronautics industries have reached an advanced technical level, capable of launching satellites and countering enemy attacks with nuclear weapons.<sup>25</sup> All three armed services have the capability to develop advanced military equipment, such as laser range finders, missile training simulators and nuclear powered submarines.<sup>26</sup> According to Western visitors, some of the weapons plants are as elaborate as plants in U.S. or other Western powers, making use of computers and Chinese know-how.<sup>27</sup>

As a result of the defense industry's domestic effort and its technology transfer from foreign arms transactions, the PLA procured some new hardware and modified certain existing weapons. Although its arms inventory is backward in some areas in comparison to the superpowers, these insignificant changes and

additions, relative to Western military technology, have elevated the status of a leaner and more professional PLA to a credible regional fighting force with expanded combat capabilities.<sup>28</sup> If China develops power projection with a blue-ocean navy and an air-refueling-capable air force, there would be an imbalance of power in the Pacific region, causing concerns for the countries there and the U.S.<sup>29</sup>

The whole strategy of military modernization--enhancing economic development by tapping the potentials of the defense industry while professionalizing the PLA and gradually improving its weaponry--has seemed to be working effectively, or it has been portrayed as such by China. However, even a well-oiled, fine-tuned machine has defects or potential faults; this strategy or the defense industrial policy is no exception.

### **Obstacles**

The success stories of military enterprises' switching to making civilian products and designing and building new technology and weapons have involved mostly first-line military enterprises, factories that are located in or near the coastal economic regions. On the other hand, the third-line industry has been struggling all along. In fact, according to a 1987 survey, the utilization rate of the third-line military enterprises was only 30 percent, and 50 percent of the defense industry is estimated to lie in the third front. The usage rate for precision high-technology machinery was even lower. The most striking data indicated that at least 50 percent of all military enterprises, probably mostly third-line enterprises, did not produce key consumer goods; this figure is still true today.<sup>30</sup> With so many

defense industry produced-civilian articles in the market, how can that be?

Civilian goods production was supposed to enhance the integration of the defense industry into the national economy. The intent was to take advantage of the idling, high-technology machinery of the military enterprises and to utilize them in making precision products that were critically needed but were too advanced for Chinese civilian industries to make.<sup>31</sup> Instead, the defense industry flooded the market with consumer products, such as fans, bicycles and washing machines, products that were needed but did not advance the technical development of the civilian industry. The consumer products fulfilled short-term demands but neglected long-range economic construction requirements.

Another negative impact of producing low-technology articles has been the crowding of the common goods market. Not only has the defense industry competed for the same markets with civilian industries, but it also has competed with other defense factories.<sup>32</sup> They have also contended for supplies. To make matter worse, supplies for making consumer products by the defense industry were not figured into state planning; the military enterprises have been siphoning off supplies from the civilian sector. However, without state planning, the supply channels to the third-line enterprises were not dependable, causing instability for the military enterprises and shortages for the civilian sector.<sup>33</sup>

The worst obstruction to economic development has been the potential to induce regression which is more dreaded than the slowing-down progress. Producing low-technology articles has tended to degrade the strict quality control used to produce precision products. Since this type of manufacturing emphasizes

quantity over quality, good, tight and detailed procedures can give way to short-cuts and poor quality control, destroying well established high-technology practices and the foundation for advanced development. In the meantime, a more tangible setback would be the increase in the under-utilization of precision machinery, a defect that the leadership wanted to eliminate.<sup>34</sup> Hasty unplanned ventures of consumer goods production by some military enterprises, if not corrected, would lead to seriously detrimental work habits in the defense industry.

The mentality to make a quick yuan has driven the defense industry to producing civilian articles that were highly demanded but less contributive to the technical advancement of the economy. The output value of consumer goods definitely increased, but the increased value does not reflect actual economic strength. This latent strength has been restricted by not fully exploiting the technical expertise of the defense industry.

By not efficiently employing the military production assets, defense industrial adjustment and economic construction have been hindered. Since military modernization is closely related to their progress, a slow-down or regression would impact negatively on army-building. As the defense industry diverted more assets toward making consumer goods, it put less stress on producing military hardware.<sup>35</sup> A slumping production of defense equipment provided fewer choices of weapons for the PLA, decreasing its combat capability. On the contrary, the PLA, as stated earlier, seemed to be getting adequate improved weaponry, hence gradually turning China into a regional power.

Then the issue is not that consumer goods production has been

problematic for the PLA; the question is what is the proper proportion of consumer goods and military hardware production for the defense industry? How much military production is enough for national security, and how much civilian production is enough for economic construction?

### **Assessment of Product-Mix**

The proper product-mix goes beyond the proportion of production. It includes selecting the appropriate civilian articles for a particular military enterprise based on market demand and its technological strength. Since there are still so many enterprises which do not produce a key consumer good, a proper product-mix for the entire defense industry necessitates a comprehensive plan to integrate the rest of the third-line enterprises with the civilian economy, a strategy that must take into account the whole economic development program in order to determine the correct productive nature of each military enterprise. Some should produce only military goods, others should produce both military and civilian products, and the rest should be closed due to poor cost-effectiveness.<sup>36</sup>

Only such a plan can determine the proportion of production and coordinate a controlled effort to develop a proper product-mix for all military enterprises. The objective is to integrate the defense industry with the national economy without the "everyone-for-himself" chaos.<sup>37</sup>

We have realized that the defense industry has had problems throughout the reform decade. In addition to improper product-mix, its huge size, poor location without supporting infrastructure, price distortion and persistent central planning have all been contributing factors to a defense industry that could not

adjust properly to reforms. Nevertheless, improper product-mix continues to be the major obstacle because producing consumer goods has been the link to integrating defense and civilian industries. A plan that addresses proper product-mix would directly and indirectly resolve these hindrances.

### **The Need for a Comprehensive Policy**

Implementation of such a plan requires a comprehensive policy, which is lacking in the defense industrial sector. The answer to how much military production is enough has been ignored. As mentioned in the beginning of this chapter, the lack of policies could hinder modernization as much as poor policies. China is lacking a better defense industrial policy. Beijing's Economic Daily (Jingji Ribao) supports this view:

It is especially necessary for the state to work out a proper policy on industrial structure and industrial organization; put forward a definite plan or model for industrial development ... bring into play the advantages of the defense industry in the third-line region ... it is necessary to use a clear-cut policy to guide the "shift to civilian use" of military enterprises in the third-line region in order to rationalize the industrial structure of the defense industry in the third-line region.<sup>38</sup>

The defense industry, despite a decade of reform, is still irrational, and it needs a comprehensive policy to promote its contribution to economic construction and military modernization.

An irrational defense industry has been doing an adequate job in modernizing weapons for the PLA. Therefore, what more would army-building gain if the defense industry adjusted and rationalized? First of all, a more efficiently operated military sector would worry less about idle capacity, improper product-mix, and not applying high-technology machinery. These are internally

focused practices which could cause management to look inward. Without these inhibitors, the defense industry would concentrate more on marketing, developing horizontal networks for improving production and supply, and expansion.

Secondly, by looking outward, the military enterprises may go beyond the domestic market into international trade. As they take advantage of their technical assets, their civilian products could become more advanced and sophisticated, making the products more competitive in the international arena. An export orientation could attract joint-ventures with foreign companies which would bring into China world standard technology and foreign exchange.

Thirdly, if the third-line industry extricates itself from its predicament with the assistance of a comprehensive state policy, more military enterprises could join the first-line defense industry in getting a bigger share of the international arms market. Those enterprises that could not compete might still contribute by buying weapons from abroad for reverse engineering, promoting Chinese R&D which could be pumped back into the internationally competitive enterprises. The less-advanced factories could also produce weapons for the PLA using R&D innovations, while the advanced ones could compete internationally, earning foreign exchange and keeping up with international standards.

Therefore, an irrational or poorly planned defense industry has contributed sufficiently toward military modernization, but a well-adjusted defense sector would contribute significantly. The current defense industrial policy is not hindering army-building; conversely, a comprehensive policy that addresses product-mix would enhance military modernization on a much larger scale.

## Summary

Deng's vision that China must develop its economy to become a respected power in the world demanded reform policies that supported his goal. The defense industry, being a component of his plan, contributed by applying its high-technology and productive capacity to making consumer goods to assist economic development. As a parallel plan, the defense industry had to adjust its non-productive central planning nature to a cost-effective orientation while producing better weapons, thus promoting the PLA's own modernization. Consequently, the defense industrial policy has aimed to build the economy first, then to promote army-building as a secondary task.

The defense industry generally adjusted well to the policy. It has made tremendous progress in both military and civilian production, R&D and integration. But most of the enterprises in the third-line region still adhere to old methods, unable to meet the new challenges. Most enterprises that switched to producing consumer goods remained inefficient because of improper product-mix, making low-technology articles that competed with civilian industries. These defense enterprises, seeking to make a quick profit, did not use their technical endowment to serve the long-term economic development goal.

What the defense industry needs is a new comprehensive policy that coordinates the integration of the military and civilian sectors by specifying transformation instructions that include closing insolvent enterprises. The policy must also address the types of consumer products that the solvent enterprises should produce and their proper proportion to military hardware. In addition, the

policy should give guidance on moving the remotely located plants or extending the road networks and other infrastructures; moving funds, the transition period, local government responsibility and management responsibility should all be planned.<sup>39</sup> Anything less would not be comprehensive.

Even though the defense industry needs a new comprehensive policy to guide its readjustment, the current policy has served military modernization adequately. The PLA has made steady improvement in non-technological reforms and weaponry modernization. However, a new policy is needed to prevent the proliferation of poor work habits in the defense industry. Up to now, progress has overcome the stagnant influences; therefore, the current defense industrial policy has promoted military modernization.

**CHAPTER FOUR**  
**DEFENSE INDUSTRY'S STRUCTURAL CHANGE: HINDERING**  
**OR PROMOTING MILITARY MODERNIZATION**

For policies to be effective, they must have guiding principles or means to achieve their objectives. The objective is the desired end result ,and means define the guidelines within which actions must be taken to arrive at the end result. In other words, within the policy implementation process, the means are as important as the ends.

The defense industrial policy has had explicit objectives, but its guiding principles have not been clear. The policy has called for the integration of the defense industry with the civilian sector in order to add its potential toward promoting economic development and assisting defense construction. The objectives have been to correct the egalitarian nature of the defense industry by transforming it from a central planning system to market enterprise management, to apply its more advanced technology toward stimulating the civilian sector, and to develop the economy while enhancing military modernization. However, only one principle has been made explicit: the production of consumer goods by the defense industry as the key link in the integration of the defense and civilian sectors.

Because the leadership has announced only one guiding principle, there has been a lack of coordinated effort in achieving the objectives, a conclusion that

was reached in the previous chapter. The need for a more comprehensive defense industrial policy is another way of saying that more guidelines are needed to realize the objectives. The leadership, by not specifying guidelines, has allowed uncoordinated, ad hoc progress and sporadic retrenchments that characterized not just the defense industrial reform but the entire economic development program. Therefore, steps taken to implement the defense industrial policy may in fact be so out of synch with the program that they could have hindered one sector while promoting another due to the lack of comprehensive planning.

Without a comprehensive plan, implementation of the defense industrial policy has generated measures which have been both hindered and promoted military modernization. Structural and managerial changes in the defense industry have been the two major measures that the Chinese bureaucracy have manipulated in the implementation process, guiding principles that could have benefited or obstructed army-building because they were not clearly stipulated by the leadership. The structural changes strove to transform a closed autonomous defense industry into an open, well-connected military-civilian complex. The managerial changes aimed to break the "iron rice bowl" by adopting competitive profit-making techniques.

This chapter addresses the structural aspect, and the following chapter examines the managerial workstyle. First, I will investigate the defense industrial policy's means of achieving its objectives and the expected and unexpected by-products as envisioned by the Chinese leadership. Second, I will analyze the beneficial and obstructive influences that these by-products have had on military

modernization. Third, I will assess the influences to determine whether structural change in the defense industry has hindered or promoted army-building.

### **The Leadership's Guiding Principles**

Making policies without guidelines is similar to telling a child to study without giving him specifics. The child could study comic books or study for a minute and then resume playing again. Therefore, without specific means or intermediate objectives, the roads to policy fulfillment are many; the end results could be very similar, but the means would be diverse. In public policy-making, political and economic factors constrain the means to a narrower field of choices, but the scope is still too vast for the implementation of a policy unless guiding principles are made known, thus guiding implementing actions toward the objectives.

In addition to the directive of producing consumer goods by the defense industry, another guiding principle of the defense industrial policy was the adjustment of its structure by replacing military leaders with civilians, an explicit action that stemmed from Deng Xiaoping's implicit desire to separate the Chinese military from national politics. Since the beginning of the reform era, Beijing has taken additional steps in separating PLA officers from the defense industrial complex in order to adjust the industrial structure, promoting quicker and more thorough integration of defense and civilian industries without interference from the PLA.

At the time Deng initiated reforms to correct the malpractices of the defense industry, he had decided to remove PLA leaders, potential opponents of his

reforms, from the military industry. Since the program decreased the importance of the PLA, as specified by the four modernizations, Deng undermined his potential adversaries by replacing PLA officers with his supporters in leadership positions to carry out his reforms.<sup>1</sup> This measure to adjust the defense industrial structure paralleled Deng's desire to reverse the PLA's influence on national politics, a predisposition that had intensified as a result of the Cultural Revolution. This predisposition goes back to the civil war days when party and military leaders were synonymous, but the Cultural Revolution provided the PLA the opportunity to hold party and state positions in larger numbers. Deng wanted to decrease the PLA's control of the defense industry, party and state institutions.

An example of the PLA influence was Marshal Nie Rongzhen's positions within various institutions. He served as the director of the National Defense Science and Technology Commission, a military research and development (R&D) supervisory group, from 1958 to 1968 while holding positions in the Politburo, the Central Military Commission--the highest ruling organ of the military--and the National Defense industries Office, a defense industry supervisory organization.<sup>2</sup> This was clearly an epitome of military-political influence in Chinese leadership, and this was what Deng wanted to eliminate or undermine.<sup>3</sup>

While Deng and his supporters wanted to isolate the PLA from non-military matters, they also directed the integration of the defense and civilian industries, transforming a closed system to an opened network. Consequently, the defense industrial reform has been a delicate balance of structural separation

and integration. The course of action taken by the leadership was the replacement of PLA officers holding defense industry leadership positions by civilians, thus promoting separation and integration simultaneously.

The Chinese leaders, compelled to revitalize the defense industry by integration, were also eager to diminish the PLA's political role. Caught between these two issues, they initiated a structural change to accommodate both imperatives. They placed civilians in the defense industrial ministries and initiated the integration of the military and civilian sectors with the support of these newly appointed civilian leaders.

PLA officers holding defense industry ministerial positions were replaced by civilians systematically. By the end of the 1970s, civilians were in charge. Furthermore, between 1981 and 1982, the numbered (one to eight) ministries of the machine-building industries were reorganized and renamed according to their function. They rose to the level right below that of the State Council and the State Central Military Commission (CMC),<sup>4</sup> giving the State Council direct control over the civilian-managed Ministries of Defense Industries.<sup>5</sup>

To reinforce civilian control, the National Defense Industries Office (NDIO) and the National Defense Science and Technology Commission (NDSTC) merged forming the National Defense Science, Technology and Industry Commission (NDSTIC) in 1983. The NDSTIC consolidated the responsibility of interacting with the PLA on requisition and fielding of military hardware and coordinating defense industrial production and R&D. The purpose of this merger was to eliminate redundant responsibilities and to streamline the relationship

between the defense industry, PLA and the leadership, thus eliminating bureaucracy and giving the leaders more control.<sup>6</sup>

The NDIO coordinated military production and acted as a middle-man between the State Council and the ministries of the machine-building industries. The organization executed directives from the CMC and the State Council concerning who, what, when, where and how many were to be produced and delivered.<sup>7</sup>

The NDSTC was responsible for military R&D. It allocated funds for projects and directed the application of technology to production. Its direct supervisory unit was also the CMC and the State Council, from which requests for specific weapons by the PLA were consolidated and passed to the R&D institutions under the NDSTC. The NDSTC then transferred the results to the NDIO for production, which in turn delivered finished weapons to the PLA.<sup>8</sup> The entire process was not as smooth as it sounds. Since the defense industry was a closed system without horizontal links, effective coordination was the exception rather than the norm.

The merger consolidated R&D and production, a move that attempted to overcome bureaucracy and to give the leadership more control over the defense industry. The NDSTIC tried to manage all military-related scientific and technical projects, eliminating the General Logistics department's (GLD) interest in overseeing production of PLA arms. However, the PLA's General Staff Department (GSD) and GLD have continued to operate their own defense enterprises.<sup>9</sup> Consequently, forming the NDSTIC has not completely separated

PLA involvement in the procurement process, but it has served to eliminate some bureaucracy, allowing the leaders to have more direct control over weapons production.

The creation of the State CMC in 1982 further illuminated Deng's implicit goal of reducing the PLA's role in politics. The State CMC, according to the 1982 State Constitution, being the leading body of the PLA, will "direct the armed forces of the country."<sup>10</sup> In this role the State CMC has had the responsibility of coordinating resource allocation, production and R&D among the civilian defense industrial ministries, the later-founded NDSTIC (1983), and the PLA. As integration of defense and civilian industries crystallized, the State CMC and the State bureaucracy were better suited for managing the economic planning which affected the military and civilian sectors. This relationship has also conferred a better image of a state army rather than a political instrument of the party.<sup>11</sup> The establishment of the State CMC weakened the PLA's influence in politics.

In the implementation of the defense industrial reform, the leaders' guiding principles have been the production of consumer goods and structural change. Beijing wanted to correct the defense industry's closed system by integrating the military and civilian sector, encouraging the defense enterprises to produce civilian goods and placing civilians in top positions in order to lessen the PLA's involvement. While military-civilian cooperation was being strengthened, the PLA was being isolated.

## Benefits

The defense industry's structural change process--putting civilians in charge, isolating the PLA, and integrating military-civilian industries--has introduced many benefits for the defense industry and military modernization. The integration has fostered military-civilian cooperation in production and especially in R&D.

The automotive industry is one example that has greatly benefited from this cooperation. The first automotive military-civilian joint venture was established in Liaoning by the Songliao Joint Automotive Industry Company in 1988. This venture consolidated numerous inefficient army and local enterprises, combining assets and resources to produce better and more vehicles for the PLA and the civilian sector.<sup>12</sup> Some ordnance factories of the defense industry took the foreign joint-venture direction and formed partnerships with foreign companies to produce civilian vehicles, generating a demand for more spare parts from other domestic enterprises.<sup>13</sup>

Cooperation in R&D benefited the military more than the civilian sector. The joint effort by the defense industry and the representatives of the GLD of the PLA in Chengdu produced an advanced laser range finder.<sup>14</sup> The Institute of Engineering of the Second Artillery Corps developed a missile training simulator using military and civilian scientists.<sup>15</sup> Moreover, military-defense industry and military-civilian partnerships provided the innovation for the University of National Defense Science and Technology, China's first comprehensive high military technology institution, to design and produce unmanned cars, the

foundation of robotics.<sup>16</sup> Therefore, military-defense industry cooperation improved along with military-civilian integration.

Without a military-civilian partnership, the less-advanced civilian industries have encountered more difficulties in absorbing foreign technology. This was clearly demonstrated by the U.S. Cherokee jeep venture in China. Chinese manufacturers had to import parts from the U.S. because Chinese-made parts could not meet quality specifications or were more expensive to make than imports.<sup>17</sup> If the military-civilian R&D effort were fully implemented, the high-technology defense industrial know-how would spill over into the civilian sector, lessening such problems.

Military-civilian cooperation has improved production and technology-transfer, bringing efficiency into joint ventures and high-technology into military weaponry. As a result of increased competitiveness, defense enterprises have expanded their market domestically and internationally, an expansion that further enhanced the spill-over effect.

The China North Industries Group (Norin)--a conglomerate formed by combining the China North Industries Corporation (Norinco) and factories of the Ministry of Ordnance Industry--has expanded from a defense enterprise to an international arms seller, and it is forging ahead in the overseas civilian product market.<sup>18</sup> With about one hundred and sixty military and civilian enterprises, thirty-seven R&D facilities, and over one hundred surveying, marketing and supply units, Norin was given provincial status in China's economics planning.<sup>19</sup>

Another example of an expanding company is the Capital Iron and Steel Corporation (CISC). It has taken over parts of the North Industrial Group Corporation (NIGC) and some of the military factories under the Ministry of Machinery and Electronics Industry. This take-over has formed a steel-producing and machinery engineering company that is competitive in the world economy.<sup>20</sup>

Military-civilian partnership has salvaged numerous inefficient and insolvent enterprises by linking them with stable and profitable corporations. The restructuring has generally increased the scope, productivity and influence of the merged corporations in the domestic and world market. This increase in importance has resulted in greater profit and increased competitiveness for the civilian component and better, more advanced weapons for the military.

In addition to the military-civilian joint ventures, the military-defense industry cooperation has also prospered. Each of the departments of the PLA runs some front-corporations in dealing with international trade; moreover, they control their own R&D facilities and domestic market enterprises. Even the ministries of defense industries and the NDSTIC finance front-corporations, capturing a share of foreign exchange and technology.<sup>21</sup> Direct access to these two assets enables the PLA to conduct its own R&D and production. Of course, these benefits have not yet permeated into the third front.

Besides economic benefits for the first-line enterprises, the defense industry's structural change ushered in social benefits for the PLA. The Chinese leadership has encouraged local governments and civilian industries to assist the integration of the defense industry into the national economy and to sympathize

with the PLA's low budget dilemma. As a result, civilian leadership in the defense industry could relate better with local governments because the military chain of command was absent. A common background among the leaders has functioned better than having both military and civilian leaderships. Consequently, provincial governments with a huge defense industrial complex have followed the party line and spent time and resources in supporting the transformation of the defense enterprises, thus improving army-civilian relations.<sup>22</sup>

The state government has also gone to great lengths to pacify the PLA's potential animosity because of being placed last in priority. The party and the state have often urged civilians to respect the PLA and to understand the army's plight in modernizing with a limited budget. The PLA, with CMC approval, has tried to be more appealing by adopting rank insignia and better-fitting uniforms. The state government has given defense enterprises preferential tax rates. Military supply factories were either exempted from or paid a lower rate of taxes.<sup>23</sup> The PLA and the defense industry have lost priority but have gained social and economic benefits.

As part of the structural change and the appeasement of the military, the instatement of the civilian cadre system in the armed forces has helped to reduce the size of the PLA, delineate nonmilitary staffs from combat troops and professionalize the army. The civilian cadre system of 1988 separated soldiers from personnel wearing military uniforms who were scientists, research fellows, professors, lecturers, doctors, nurses, artists and writers--professionals who did

not take part in actual combat. Yang Baibing, member of the CMC and the General Political Department's director, explained the advantages of the civilian cadre system in a speech given to the members of the CMC and senior PLA officers.

The introduction of the civilian cadre system will help stabilize the contingent of specialized technical cadres and retain them, improve their management and training to bring their talents better into play, and increase the channels for recruiting specialized technical cadres for army construction in various fields. Further perfection of this system will give a strong impetus to the army's modernization.<sup>24</sup>

The benefits of changing the defense industrial structure--putting civilians in charge, isolating the PLA from nonmilitary affairs and integrating military-civilian industries--are numerous, and they have promoted economic construction and army-building. Improvements in military-civilian cooperation have elevated the level of army and civilian industrial productivity, R&D and technology. Some defense enterprises have multiplied in size to capture foreign technology and a share of the international market which further accelerated their growth, leading to more advanced technology for weaponry. Structural change has reaped social benefits as well as tax exemptions for the PLA and the defense industry. Chinese leadership has raised the social status of the military to counter the low modernization priority that the PLA was assigned. As an added step to isolate the PLA, Beijing enacted the civilian cadre system which separated defense civilians from soldiers, a measure that further professionalized and modernized the PLA.

Ding Henggao, minister of the NDSTIC, summed up the public official view of the benefits.

China has not only established a sound defense industry with research, testing, and production units supporting each other but has also trained a number of quality research personnel. Armed with a fine traditional workstyle, the research personnel have quickly adapted themselves to new strategic changes in the course of reform and opening to the outside world and contributed to national economic construction and advances in science and technology.<sup>25</sup>

### Obstacles

Chinese official announcements have been known to be biased. What Mr. Ding stated was true, but he purposely left out the not-so-successful results. Even though the defense industry structural change has netted benefits for military modernization, the PLA has also inherited organizational obstacles to army-building. In addition, as stated in the previous chapter, the other explicit guiding principle of the defense industrial policy, consumer goods production, has generated practices and ideas that have been counter-productive to army-building. Therefore, structural change and consumer goods production have introduced practices that have also hindered the PLA and the defense industry in the effort toward military modernization.

Making civilian products has de-emphasized military production. With the priority going to making civilian articles, according to sources having access to the State Planning Commission, military hardware production has been scaled down.<sup>26</sup> This trend of more consumer products and less defense equipment was also confirmed by the NDSTIC.<sup>27</sup> Even the general manager of the China Nuclear Industrial Corporation, Jiang Xinxiong, believed that it is necessary to develop civilian products to expand market diversification. He expected his company to make seven hundred to eight hundred million yuan of consumer goods in 1990, much more than military sales.<sup>28</sup>

As emphasis on consumer products grew, military production and R&D naturally decreased. The industries concluded that profit drives everything. As long as they are making money and paying taxes, the bureaucracy has overlooked army-building. Too much emphasis on making civilian goods has undermined efforts to meet the PLA's need for modern weapons.

The big international Chinese arms sellers have added their contribution to obstructing military modernization. They expanded to attract foreign exchange and technology; however, the improvement in technology has not directly upgraded PLA weaponry. Instead, advanced technology has been used to develop better weapons for the international market rather than for the PLA; the world arms market has been more lucrative.<sup>29</sup> Wu Huanhua, vice-president of China North Industries Corporation (Norinco, later Norin), explained that a reduction in military equipment demand from the PLA due to budget constraints has forced arms-makers to increase foreign sales.<sup>30</sup> The PLA simply has not had the clout (or money) to influence the defense enterprises in its favor.

According to the state policy, defense enterprises that switched to making consumer goods became part of the local industries supervised by local government. Their supply channels and product markets were controlled locally as part of the integration and decentralization effort. Military control diminished as more factories shifted to making civilian articles, weakening the PLA's clout even more.<sup>31</sup>

As its circle of influence contracted, the PLA turned toward its own enterprises for financial solutions. The services have had to rely more upon their

sideline productions, agricultural outputs and other money-making business ventures. Instead of training for war, soldiers have sought to improve production methods and management styles. Air Force units at Guangzhou have sent their senior officers to learn economic laws in order to revamp production management, making their enterprises more competitive.<sup>32</sup> The PLA has been forced to adjust to China's economic reality which has caused the military to rely on its own assets rather than opening up to form horizontal links. Furthermore, soldiers have concentrated more on profit-making than war-fighting, a contradiction to good soldiering.

This trend of profit-making has not done much to modernize aspects of the PLA that have not made money, such as the combat logistics system. This system, a total failure in the 1979 Vietnam conflict, is still a source of much worry. The GLD announced that logistical development still lagged behind that of weapons.<sup>33</sup> Even weapons modernization is not all satisfactory. Although limited progress in weaponry has projected China to a position of regional power, its weapons lack advanced technology which the NDSTIC and the defense conglomerates could develop. A concerted effort to channel development of weaponry to the PLA would enable the senior officers to concentrate and deal more effectively with other non-profitable aspects of military modernization, such as combat logistics.

Structural change in the defense industry has manifested obstructions that accompanied the many benefits. The primary tendency of these obstacles has been the alienation of the PLA, a trend that coincided with Deng's desire to isolate

the PLA from politics. As civilians replaced soldiers in defense enterprises, profit-making became the priority, not national defense, an impetus that forced the PLA to rely more on its own assets. Even the military has succumbed to the temptation of the lucrative market economy. The military would rather spend time and effort on learning how to run a successful business than on training for war. The main by-product of the structural change has been the desire to make quick profits.

The nature of this by-product has been pervasive. Consumer goods production and leadership change have diminished the incentive for military and civilian enterprises to focus on PLA needs. Instead, they have produced goods which were in demand or profitable. Even the big defense companies yielded to the more lucrative international arms market by making better and more cost-effective weapons for buyers from abroad, not from the PLA. These consequences have impaired the PLA's clout.

The integration of military and civilian industries, being part of the structural change, has further decreased the influence which the PLA at one time wielded. Consequently, the PLA has encountered obstacles to military modernization as a result of structural change in the defense industry.

#### **Assessment**

On the one hand, structural change in the defense industry has deteriorated the PLA's bargaining power, yet we concluded that military productivity and R&D have increased as a result of improved military-civilian cooperation, an aspect of structural change. On the whole, enterprises that had integrated army

and civilian production have improved operation by making good use of advanced military technology. These companies have progressed beyond the struggling initial stage of integration. However, a large number of enterprises could not jump this hurdle, and they have magnified their dilemma by making unwanted consumer goods without using their comparative technical advantage. Unable to advance beyond making the normal consumer goods, these enterprises, many from the third front, have continued to concentrate on low-technology, common consumer products, not contributing to economic development nor to army-building.

Changing the production emphasis from military to consumer goods has offset the benefits generated by improved military-civilian cooperation. As mentioned earlier, the enterprises that selected a proper product-mix--picking a desired ratio of military and civilian production and choosing an appropriate civilian article for a particular military enterprise based on its technological strength and market demand -- have generally taken full advantage of the military-civilian partnership, progressing in productivity and R&D. However, their quantity is small as compared with the many third-line enterprises that have not even chosen an appropriate civilian article (about 50 percent).

Of course, there have been spin-offs of technology, but again, they have associated with only well developed enterprises, such as the nuclear and astronautics industries. This inequality has created a gap of technical knowledge among industries throughout the Chinese economy. As of today, increased

production and technology spin-offs due to military-civilian cooperation have been confined to the larger, more developed enterprises.

Even the expansion of the defense corporations and the operation of front-companies have not benefited the military as much as they have benefited the economy. These practices tended to focus on financial gains rather than security measures. As a result, China's foreign trade and foreign exchange influx have upgraded the technology within those industries that were affected by the expansion. However, the PLA's influence diminished gradually as the desire to make profits amplified.

PLA junior officers have voiced their objection to the inability to procure weapons that would fit their needs. In the acquisition process the PLA's requirements go to the NDSTIC which in turn assigns tasks to the defense industry. As stated above, the civilian leaders, even some PLA officers, have looked toward the market for profit. If the market demands and the military requirements were similar, procurement would be feasible; if not, which has been mostly the case, the PLA has had very little to say about what new weaponry to acquire.<sup>34</sup> Even though the military has its own front-companies, the "emergence of a new generation of profit-minded liberals in key posts within the defense industries, as in the PLA, undoubtedly makes consensus on acquisition even more difficult to achieve."<sup>35</sup>

Veteran military cadres have had doubts about the reforms. The rise in social status, supported by the leadership, contradicted the decline in soldiers' standard of living which was caused by the low military budget. Veterans have

viewed this contradiction as evidence that leaders have not shown concern for military modernization.<sup>36</sup> An example of this contradiction was that the state supplied only 70 percent of the PLA's mess budget while the military had to earn the other 30 percent.<sup>37</sup> Deng told the PLA to exercise patience, a virtue that the soldiers seem to have run out of.

It is not surprising that the PLA has been losing influence in its effort to modernize. The Chinese leaders wanted a strong defense, but they wanted a well developed economy more. Structural change in the defense industry has supported economic development, reflecting the leadership's desire.

Shifting to civilian leadership has obstructed army-building, so has the formation of the NDSTIC. The director of this organization, Ding Henggao, a lieutenant-general of the PLA, sided with the civilian leaders instead of the military. He said:

Over the past ten years, adapting itself [NDSTIC] to the major environment of reforming the state's economic structure and scientific and technological structures and in keeping with the general train of thought of developing the planned commodity economy, [the NDSTIC has] carried out many readjustments and reforms, thus instilling new vigor and vitality in scientific research and production for national defense.<sup>38</sup>

The NDSTIC's utmost goal has been to contribute to economic development; promoting army-building has never been its primary goal. Since this commission's formation, the NDSTIC, GSD, GLD and the State Council have run different enterprises in the third front, not lending themselves to a centralized controlling organ overseeing the entire defense industry.<sup>39</sup> Therefore, structural change in the defense industry was intended to benefit the national economy more than the PLA.

## Summary

The Chinese leaders enacted the defense industrial policy to replace egalitarianism in the industry with competition and profit-making, by integrating the military enterprises with the civilian sector. They planned to put the full technical and productive potentials of the defense industry into developing the national economy and hoped to modernize the PLA at the same time. In implementing this policy, the leadership stipulated that the military enterprises must produce consumer goods and change their structure. These means of achieving the objectives have guided the defense industrial reform. From the assessment, the by-products of the structural change have obstructed more than they have promoted military modernization.

Structural change has placed civilians in leadership positions, isolated the PLA from politics and enhanced military-civilian industrial integration. It has improved military-civilian cooperation, leading to increased productivity and technology spin-offs. However, the underdevelopment of the third-line industry and the profit-making orientation have undermined these benefits. Many civilians and some military officers have embraced the reform as an opportunity for personal gain, a perception that has diminished PLA interest in the defense industry.

Even social status improvements have been offset by the decrease in the living standards of the soldiers. The overall increase of wages and earnings in the society has magnified the PLA's dilemmas. The veterans are losing confidence in the reform while some younger officers view the changes as an opportunity to

increase the standard of living of themselves and their soldiers.<sup>40</sup> Both views hinder the army-building effort.

Structural change in the defense industry has produced serious obstacles to military modernization. To prevent further decay of the PLA's influence in the defense industry, a more comprehensive policy with more specified guiding principles is needed to insure the profit-making tendency is halted and pushed back. As a result of its diminishing influence, the PLA has been fighting an uphill battle to develop the army. Structural change in the defense industry has hindered the effort toward military modernization.

**CHAPTER FIVE**  
**INDUSTRIAL MANAGEMENT: HINDERING OR PROMOTING**  
**MILITARY MODERNIZATION**

Economic development requires replacing stagnant work habits and thinking with efficient pragmatic practices. The reform-era leadership has shifted from a centralized planned economy to a decentralized market-oriented management system.<sup>1</sup> This decentralized, efficient management style advocated by Beijing was another means of achieving the defense industrial policy objectives, in addition to structural change and consumer goods production. Since the defense industrial policy has promoted military modernization while structural change has hindered it, we need to examine the role that the reformed management has played in the army-building process.

The shift in management has been following the overall objectives of the reforms. Eliminating the "eat from the same rice bowl" syndrome needed work conditions that awarded diligent workers, efficient managers and competitive enterprises. Egalitarianism, a soothing ideology, could not generate the incentives to motivate workers or managers to increase quantity or improve quality. In order to perpetuate economic development, China needed an economic system that encouraged innovation and competition. Reforming the management system was a guiding principle that the Chinese leadership endorsed in developing the economy and national defense.

Zhao Minsheng, former vice-minister of the machine-building industry, viewed poor management as one of the greatest obstacles to economic development. He blamed the inferior quality of Chinese products on poor management style which tended to concentrate on quantity, causing defects in the quality of products.<sup>2</sup>

Zhao Ziyang, former party general-secretary, called for a new science and technology management system. He pointed out that the past system was set up vertically, with research organizations responding only to higher authorities. Horizontal links to society and production units were absent. These channels would have encouraged technology transfers, thus nurturing the total capability of the productive force and contributing fully to economic development.<sup>3</sup> Without these links, development was constrained. A new management system that embraced advanced science and technology would be vital to an emerging economy.

Chinese leaders knew that reforms must be accompanied by a liberal management system to replace the old conservative one. New management should apply advanced technology to improve quality control and to emphasize the managerial responsibilities of cost-effectiveness and efficiency. Managers would have to be responsible for the solvency of their factories, an unfamiliar economic principle in China that focused on competition, profit-making and incentives.

New management, on the one hand, has improved the quality of goods and productivity of the labor force; on the other, corruption has also increased as a result of nonegalitarian measures. This shift in management style has affected the

entire economy including the defense industry. In this chapter, we will analyze the effect of the new defense industrial management system on military modernization. We will examine the benefits and obstacles generated by this shift and then assess their underlying influence on military modernization.

### **Benefits**

Productivity has definitely increased under the commercialized management method. Being solely responsible for their own profits and losses, defense industrial managers could no longer depend on state subsidies but on their own innovations. Consumer goods production surged due to market demand and profit earnings. Even though most of the products were common goods not utilizing the technical advantage of the military enterprises (see chapter three), the fact is that factories have made a large quantity of them. The market-oriented management system brought out the latent productive force of the Chinese workers.

Eyeing profits, managements have been concerned with every aspect of improving the competitiveness of their goods. Product quality, a weakness in a centralized planning economy, has received special attention in the defense industry. The past practice of inspecting only the finished products has given way to constant examination of the entire production process. Plant 132, a jet-fighter factory, set up teams of factory PLA representatives as quality control officers inspecting all major processes continuously. This innovation, complemented by computerized operation, has increased work efficiency and improved product quality.<sup>4</sup>

Besides improvements in productivity and quality control, the management, with Beijing's blessing, has revamped the fund allocation procedure for research and production of China's weapons and equipment. The National Defense Science, Technology and Industry Commission (NDSTIC) distributes funds to the agencies in the PLA.<sup>5</sup> The military departments manage the allocated budget to fund the weapons and equipment that they want. This method of fund management has given the military the authority to participate in the development and production of weapons, instead of just placing orders.

Prior to this fund management system, the money was distributed to the ministries of different industries which in turn parceled it out to various research and production facilities. Therefore, research on weaponry depended on the desires of the researchers because the funds were in their control. The PLA could only make its requests known, hoping that the defense enterprises would listen.<sup>6</sup> The military, the users of the weapons, could not influence the research and development (R&D) of military hardware.

Complementing this more efficient funding method, the contract system was also adopted in 1988. With the money being distributed directly to military departments, the PLA has subscribed to competitive bidding on weapons contracts by research and production enterprises.<sup>7</sup> The defense enterprises submit their proposed cost and schedule, bidding among themselves in meeting the PLA's specifications and stipulations. The PLA, instead of being a bystander as in the previous system, has become the decision-maker. The contract system has

introduced competition, efficiency, and speed of development and manufacturing into the military R&D and production process.

Even before 1988, pilot projects of the contract system produced encouraging results. The first contracted missile escort vessel was delivered to the navy in half the normal time required to build such a ship. The army experienced the same efficiency in the production of its armor-piercing shell; it was delivered sooner, and its quality was better.<sup>8</sup> In addition, the bids were generally lower than the quoted prices; thus Beijing claimed a saving of fifteen million yuan by mid-1988.<sup>9</sup> The funding and contract systems have speeded up production, improved quality and saved money.

Market-oriented management, a necessary practice of economic development that the Chinese leadership advocated, has aimed to eliminate the past, inefficient egalitarian management work habits. This old method, devoid of incentives and motivations, paid workers and managers regardless of whether they worked or not, thus encouraging minimal effort. In the new system, the responsibility was placed directly on the shoulders of the wage-earners, contrary to former practice; they actually had to work for a living by producing more and better goods than someone else who was competing for the same yuan. The Chinese defense industry, as well as all industries, innovated to increase productivity and improve quality. With a new funding method and the contract system, the PLA reaped enormous benefits as it advanced from being a bystander to a decision-maker in the weapons R&D and manufacturing process. The new market-oriented management has benefited military modernization.

## Obstacles

Even though quantity and quality both improved, management has tended to concentrate more on quantity.<sup>10</sup> Profit-making, which has driven structural change in the defense industry, has also dominated the direction of the market-oriented management system. To the managers, making more meant earning more, a fact that was more applicable to the early reform period when consumer good demands outnumbered supplies. As supplies increased to match demands, quality started to matter more. However, with over one billion Chinese, many goods continue to remain in short supply; therefore, quantity rather than quality still dominates the new management focus.

Profit-making has opened the way for corruption which is pervasive in China today. The party and state have initiated many anticorruption campaigns, hoping to restore morality and ethics; however, these campaigns together with severe punishments have not curbed this growing trend.<sup>11</sup> Even the Chinese Premier, Li Peng, recognized the severity of this development; he said, "Corruption has seriously hampered the healthy development of economic construction and caused great dissatisfaction among the people."<sup>12</sup> He supported punishing cadres who had been caught in order to deter others.

The PLA with its access to state funds and subsidies has been in positions that have led them into corrupted practices. Their access to resources and transportation has enabled military cadres to buy items at state prices and then ship them to other parts of the country to resell at higher market prices. An army unit in Shanxi was caught reselling coal in Eastern China at a higher price, making

profits which the soldiers pocketed.<sup>13</sup> Another scheme was buying imported cars and reselling them in another region or in the black-market.<sup>14</sup> The military ruling body, the Central Military Commission (CMC), has banned both practices.

The CMC has taken other steps to curb military corruption. It has punished some officers while urging the PLA to obey laws and policies and to educate soldiers on resisting corruption.<sup>15</sup> The CMC has emulated the rectification and education campaign conducted by the Chengdu Military Region which had investigated and sentenced all known corruption offenders. The region required the soldiers to analyze each case and to develop counter-corruption measures that would correctly handle each occurrence.<sup>16</sup> The CMC has recognized that the negative influence of corruption has hindered the effort toward military modernization.

In addition to campaigns, the CMC established regulations prohibiting soldiers from commercial activities that undermined moral principles, such as the "ten no's" regulation limiting military business ventures.<sup>17</sup> The PLA has also begun to enforce old forgotten regulations that prohibited active-duty soldiers from making personal gains, such as helping family businesses getting supplies and marketing their products.<sup>18</sup>

The PLA, following the guidelines of the CMC, has reemphasized its role of political indoctrination and inspection. The General Political Department (GPD) has constantly urged leaders and soldiers to conduct themselves properly in the interest of collective, not personal, benefits.<sup>19</sup> This organ of the PLA, once the vanguard of radical Maoist ideology, has redirected its revolutionary fervor to

oppose corruption. The PLA's Audit Department (AD), another anticorruption instrument of the military, has recovered over ninety-seven million yuan of mismanaged money by exposing military corruption. The work of the GDP and AD has helped to maintain honesty and incorruptibility in the PLA.<sup>20</sup>

Military economic crime has become a serious threat to the progress of national defense-building, similar to the way civilian economic crime has affected economic development. Both social ills have distorted the supply and price systems and weakened the people's confidence in the government and the military. As a result of decentralized market-oriented management, the opportunities for making profits legitimately and illegitimately have increased. The PLA, not to be out-performed by civilian cadres, has jumped on the bandwagon of profit-making by taking advantage of its ready access to resources and transportation. The impetus of personal gain has shaken the PLA's patriotic image and sincere selflessness. Some defenders of the motherland would evidently rather forsake national defense for personal interest.

#### **Assessment**

The benefits of increased productivity, quality and efficiency have been counterbalanced by corruption, a national dilemma that has subverted the basic virtues of honesty; furthermore, corruption has disrupted everyday life by distorting regulatory and bureaucratic procedures. A Chinese scholar, Su Shaozhi, believes that corruption is the greatest obstacle in China's economic development. Using one's position to buy and resell is the primary cause of

inflation, and the "eagerness for quick success and instant profit is approaching absurdity."<sup>21</sup> If corruption is not controlled, China's reforms will fail.

Even the competitive, efficient and time-saving contract system has had drawbacks due to corruption. The U.S. Central Intelligence Agency pointed out some shortcomings of the contract system in a Congressional hearing:

1. Contracts do not make up for incompetent managers.
2. The system does not distinguish between negotiated low targets and increased production efficiency.
3. State-directed employment of surplus workers and production of dictated products do not support the system's total management accountability.
4. A distorted price system that holds down prices impairs profit incentives of the contract system.
5. Short-period contracts discourage long-term investments.<sup>22</sup>

The contract system is not the panacea to China's economic and national defense development.

Corruption has been prevalent among party cadres including military officers. It is obvious that their special privileges and the almost unlimited access to governmental resources have been major temptations. The PLA, especially, has been targeted for vandalism because of its tangible assets. The Gansu Military District has reported an increase in damages to military installations resulting from theft. Lumber, fencing and wires were stolen, damaging the facilities during the thefts.<sup>23</sup>

Despite the tough rhetoric from the leadership, harsh punishments have not deterred corruption. Since more party members violated economic crimes than nonmembers, the members have generally been treated leniently because of their connections. Especially the senior cadres, the big-time offenders, have been let

off easily.<sup>24</sup> Consequently, instead of deterring corruption, inequitable justice has condoned corruption.

The PLA, in its fight against corruption, has voiced its desire to separate its command channel from the enterprise management.<sup>25</sup> It has recognized that commanding soldiers and running enterprises are not complementary. Since the PLA-owned enterprises compete in the national economy, they have to rely on market-oriented management, as directed by Beijing as part of the military-civilian integration process. Moreover, the leadership wanted the PLA to improve and develop its productive forces, thus offsetting the limited budget without turning to profiteering.<sup>26</sup> In other words, the army should sacrifice for the country, a patriotic statement that leads to the question, how much sacrifice is enough?

The PLA believes that sacrifice is its duty, but being the protector of the nation deserves some state benefits. In a survey taken of the military's reaction to defense reforms, 26 percent of the officers surveyed support the view that "since the Army is special in nature, it is still justifiable to eat a little from the same big pot."<sup>27</sup> Many officers have hoped for substantial benefits from military modernization, not more belt-tightening.

The recent support for a separate enterprise management system from the military chain of command shows that the PLA has been frustrated by the belt-tightening and corruption generated by shifting to a market-oriented management while competing in the economy. The management of enterprises has induced poor moral military leadership practices that have undermined a potential modernized professional army. Even though the PLA has supported the

implementation of the enterprise management system in those military economic units that resemble civilian enterprises, the military is against holding officers in the PLA chain of command responsible for operating competitive PLA-owned enterprises.

Even civilians have been constrained by the new management. Because of the Chinese economic and social systems, directors of enterprises could not be the driving force of a company in the western sense. They have to please the retired former directors and party officials who have connections to the top that could make things difficult for the current managers. They are also pressured from above and below to develop the good-old-boy network as part of gaining respect and favors. The most important network is the peer connection which everyone in China refers to as the "back door" method. One's peers could deliver the scarce resource, the badly needed investment or just tickets to the theaters.<sup>28</sup> In China these practices have impaired the independent, decentralized, market-oriented management system.

The by-products of switching to the market-oriented management system--competitive, efficient and time-saving procedures--have benefited the defense industrial enterprises more than the PLA-owned factories. The defense enterprises, being purely economic entities, need to harvest the full capability of the production force by using incentives and innovations. The PLA-owned enterprises, with the dual role of production and protection, have diverted the military's national defense duty to making profits, thereby hindering the effort toward military modernization.

## Summary

As a means to achieve the objectives of the economic development and army-building policies, the shift in the management system has changed the old, conservative, egalitarian management work habits to the liberal, competitive, decentralized, market-oriented management style. Accompanying structural change in the defense industry, management reform has influenced the national economy and military modernization. Under decentralized management, defense industrial productivity and quality control progressed while the PLA advanced to a decision-making role in the military equipment R&D and production process because of the introduction of the contract system. The defense industry and the PLA have benefited from this shift.

The market-oriented management system has brought corruption, offsetting the gains that the defense industry and PLA have enjoyed. Economic crime, pervasive in all aspects of Chinese economic growth, has threatened military modernization more than economic construction. Corruption has hindered defense industrial development; moreover, it has shaken the fundamental virtue of the PLA-owned enterprises by redirecting the military's primary duty from national defense to profit-making. Some PLA officers have used their privileges for personal gains, forsaking their duties of training for war and sacrificing for the country.

Corruption, if not corrected, would foster an entrepreneurial army that would be driven to make money by self-interested officers.<sup>29</sup> Therefore, the market-oriented management system has provided more profit-making schemes to

the military, but it has hindered the effort toward modernizing the PLA into a professional, patriotic armed force.

**CHAPTER SIX**  
**HINDERING INFLUENCE OF THE DEFENSE INDUSTRIAL**  
**REFORMS**

Beijing has shown the world a gradually developing defense industry and an increasingly combat-capable PLA. Some aspects of the industry have achieved international recognition, while the army has the potential to pose regional threat. However, China is still working on the third front problem, the nonproductive military industrial complex built in the remote regions of China during the Mao years, and its military still lacks advanced weapons that can fight a modern war. On the one hand, China's military modernization efforts have been effective, as shown by the increased capabilities of the defense industry and the PLA. Conversely, its national defense program has been threatened by reforms, as supported by the decline of influence that the PLA once wielded in the political and economic arenas. Therefore, the defense industry has promoted and hindered the effort toward military modernization simultaneously.

I want to illuminate this controversy and to determine the underlying influence which the Chinese defense industry has imposed upon the effort toward military modernization. I have examined three aspects of the defense industry--policy, structural change and managerial style--by analyzing the benefits and obstacles that each aspect has generated due to the defense industrial reforms. The tendency of the by-products from the benefits and obstacles is my criterion. A

tendency that pushes for a professional and modernized PLA is a promoting influence, and the opposite is a hindering factor.

In the previous chapters I have assessed each aspect, and in this chapter I will evaluate the combined assessment of all three aspects. We have concluded that the defense industrial policy has promoted army-building, but structural and managerial changes have hindered military modernization.

### **Deng's Plan of Attack**

Deng and his supporters envisioned changing a massive, closed, inefficient, wasteful, central planning defense industry to a streamlined, opened, efficient, cost-effective, decentralized military production complex. Deng used a two-pronged attack to solve the third front and economic development problems. One prong tried to solve the third front problem of the defense industry by decentralizing and integrating it with the civilian sector. The other prong attempted to develop the economy by bringing the full potential of the military industry--its advanced technology, idled productive capability, access to supplies and funds--to assist the civilian industries.

The leadership believed that a developed industrial sector, particularly the defense component, would better serve the needs of the PLA, an industry that could provide high-technology weaponry and spill-overs into the society, enabling it to cope with advanced science and technology. An underdeveloped economy would not sustain the technical demands that a modernizing army would place upon it. Because of this development, the PLA has received weaponry and

hardware through the technological progress that the defense industry had achieved.

Beijing's plan was to use the potentials of the defense industry to develop the economy while correcting the defective military production complex. The plan also included the secondary task of assisting army-building. Therefore, the plan follows the view that economic development comes before military modernization.

The leadership enacted the defense industrial policy to accomplish this plan. Even though there was a policy, Beijing provided few guiding principles in directing the reforms on this uncharted road toward development. The leaders directed the implementation of structural change and market-oriented management to correct the egalitarian and inefficient nature of the defense industry. The leaders also encouraged military enterprises to produce consumer goods to integrate the defense and civilian sectors and to enhance technology transfer.

### **The Overall Benefits**

The sixteen character defense industrial policy called for integrating military and civilian industries (junmin jiehe), peace-time and war-time production (pingzhan jiehe), with priority on military products (junpin you xian), and the civilian sector supporting national defense (yimin yangjun). By following this policy, the defense industry has improved and increased consumer goods production, technology transfer, military R&D and military production. As a result, the PLA received some new and some modified weapons which have expanded its combat capabilities to make it a powerful regional force.

While the PLA was growing in military strength, structural change in the defense industry--putting civilians in charge, isolating the PLA and integrating military-civilian industries--has fostered cooperation among the two sectors of these industries and the PLA. Some defense enterprises grew to become conglomerates in the international arms and consumer goods markets, thus developing the national economy. The PLA, while being separated from politics as Deng desired, has gained social respect and tax exemption to make up for the low modernizing priority and loss of political influence. Moreover, without much funding, the PLA concentrated on organizational, operational and administrative improvements.

Besides structural change, a shift in the management system also aided Beijing's development plan. A market-oriented management replaced inefficiency with increased productivity and improved quality. With the endorsement of the contract system and fund allocation procedure, the PLA became a decision-maker instead of a bystander in the military R&D and production process, thereby benefiting the military.

### **The Overall Obstacles**

The narrow defense industrial policy along with the negative by-products of structural and managerial changes have also generated practices and ideas that have hindered military modernization. The policy was not comprehensive enough to tie together the different aspects of the reforms. Its ad hoc style did not apply the strong points of the defense industry to the weaknesses of the civilian sector, a fault that obstructed the development of the proper product-mix for defense

enterprises. The factories were not able to select the appropriate civilian articles that would suit their type of production nor the correct proportion of military-civilian goods. Worst of all, the policy provided no guidance on integrating the rest of the idling third-line enterprises into the national economy. The lack of proper product-mix has undermined the increased productivity and technology transfers of the defense industry which were connected to undesirable products for economic development.

While the policy was less-than-comprehensive, the defense industry has used structural change to add cohesion to the reforms by promoting military-civilian cooperation. However, the beneficiaries of this redirection were the civilian cadres who replaced the military industrial leaders. Being civilians, they favored economic development more than military modernization, a tendency that Beijing had planned. As opportunities grew in the consumer goods market, the civilian defense industrial directors succumbed to the temptation of profits and concentrated on making more civilian articles rather than military hardware. Consequently, the PLA lost its clout in the defense industry.

The change of managerial work habits further increased the negative influence of profit-making. Corruption has nullified the competition, efficiency, and time- and money-saving measures that the market-oriented management has introduced. Even the duty-bound PLA has been affected by corruption. Profit-making has distorted the benefits that the structural and managerial changes generated by the defense industry. This corrupted motive was also responsible for not developing the proper product-mix of the defense industry. The desire to

make a quick profit lured military enterprises into making low-technology, common consumer goods that did not contribute to economic development.

The views of Chinese leaders have provided insights to these contradictory developments. Deng Xiaoping's "four modernizations" stressed national defense the least. In addition, Deng's proclamation in 1985 decreased the threat perception in world affairs, placing more emphasis on making good use of the peace-time and peace-dividend in developing the economy. Military modernization has never been as important as economic construction.

The underlying cause of the military modernization dilemma is the leaders' enthusiastic support for economic development over army-building. Since the defense industry plays both roles, production and protection, the issues concerning military enterprises influence the economy and the PLA. With the priority on economic development, the defense industry concentrated on building the national economy and neglected modernizing the PLA's weaponry. The defense industry has hindered the effort toward military modernization.

Recently the PLA has taken up this view, and it is running out of patience in waiting for the economy to develop. Reform benefits have not substantially improved their positions, especially their standard of living. Furthermore, corruption is deteriorating the virtue of being a soldier. Jiefangjun Bao, the official newspaper of the PLA, has published articles that voiced this dissatisfaction. The PLA has pointed out the idea that economic development must come before military modernization is a misconception; the two must proceed together in a coordinated manner. Therefore, a coordinated system

should be established.<sup>1</sup> This is PLA's way of saying that a comprehensive policy is needed to effectively carry out military modernization and that the reforms are hindering the army-building effort.

Defense industrial reforms have generated many benefits for the PLA; however, corrupt practices and ideas, by-products of the same reforms, have limited military development. If these trends are not corrected before they become institutionalized, military modernization will become more and more difficult. An army that focuses on profit-making, or an entrepreneurial army, is contradictory to good soldiering. The influencing tendency of the defense industrial reforms has threatened the professionalism and modernization effort of the PLA. Contrary to what the Chinese leaders intended, reforms in the defense industry have indeed hindered military modernization.

## NOTES

### Chapter One

<sup>1</sup>Public statements supporting this view that were made by Chinese leaders are cited in Ellis Joffe, The Chinese Army After Mao (Cambridge: Harvard University Press, 1987), 52, 53, 58-62.

<sup>2</sup>Robert Maxwell, M. C., ed., Deng Xiao Ping: Speeches and Writings (New York: Pergamon Press Ltd., 1984), 41.

<sup>3</sup>Karen Berney, "Aspects of Modernisation," in Chinese Defense Policy, ed. Gerald Segal and William T. Tow (Chicago: University of Illinois Press, 1984), 137,139.

<sup>4</sup>"New Policies for Defense Industry Outlined" (text). Beijing Xinhua in English (15 March 1988). FBIS, 15 March 1988, 14.

<sup>5</sup>Paul Humes Folta, The Chinese Defense Industry of the People's Republic of China: Command Structure, Industries, Production, and Foreign Trade (Washington D.C.: National Defense University , 1986), 17-20.

<sup>6</sup>Joffe, 119-121.

<sup>7</sup>Richard J.Latham, "People's Republic of China: The Restructuring of Defense-Industrial Policies," in Arms Production in Developing Countries, ed. James Everett Katz (Lexington: Lexington Books D.C. Heath and Company, 1984), 106-107.

<sup>8</sup>I am using the term "defense industry" to encompass the national defense economy and the military economy. The military economy consists of PLA-owned enterprises. These enterprises mainly supply the PLA with daily-necessities, but some PLA front-companies (see chapter four) deal in arms and consumer products. I will use the term "PLA-owned enterprises" to denote the military economy. See Richard J. Latham, China's Defense Industrial Policy, paper, fifth draft, 16 February 1989, p. 9.

## Chapter Two

<sup>1</sup>Ellis Joffe, The Chinese Army After Mao (Cambridge: Harvard University Press, 1987), 41-46; see also Pan Zhenqiang, The Prospects for the Modernization of China's National Defense, paper prepared for the International Conference "China-Japan-United States Triangle" organized by Mississippi State University, March 1988, p. 1. Pan is a research fellow at China's National Defense University; he was a visiting fellow at Stanford University at the time of the conference.

<sup>2</sup>The term stresses egalitarianism. In the goods and services market it infers production without the responsibility of expanding, innovating or making profits. It also implies the meeting of state directed quotas without trying to cut production cost and time. This attitude stems from an economic system that pays workers the same wage no matter how productive they are, a system that lacks motivation and incentive.

<sup>3</sup>Xiao Min, "Readjustment of Defense Industry Viewed" (text). Beijing Jingji Ribao in Chinese (14 July 1989). Translation by the Foreign Broadcast Information Service. FBIS Daily Report-China, 2 August 1989 (PrEx 7.10: FBIS-CHI-89-147; p. 32-36). Hereafter cited as FBIS.

<sup>4</sup>The region includes the entire provinces of Sichuan, Yunan, Guizhou, Gansu, Qinghai and a portion of Shaanxi, Henan, Hubei and Hunan. Barry Naughton, "The Third Front: Defence Industrialization in the Chinese Interior," China Quarterly, no. 115 (September 1988): 354.

<sup>5</sup>Richard J. Latham, "People's Republic of China: The Restructuring of Defense-Industrial Policies," in Arms Production in Developing Countries, ed. James Everett Katz (Lexington: Lexington Books D.C. Heath and Company, 1984), 103-104.

<sup>6</sup>This was Mao's "People's War," a strategy which stressed guerrilla warfare fought by the PLA and the people as they wore down more powerful enemies while the Chinese fighters gave up ground. For its development see Paul H. B. Godwin, "People's War Revised: Military Doctrine, Strategy, and Operations," in China's Military Reform: International and Domestic Implications, ed. Charles D. Lovejoy, Jr. and Bruce W. Watson (Boulder: Westview Press, Inc., 1986), 1-13; Gerald Segal, Defending China (New York: Oxford University Press, 1985), 46-62.

<sup>7</sup>For a detailed analysis of the third front, see Naughton, 351-386.

<sup>8</sup>Xiao Min, 32-36. Xiao Min cites 485 enterprises in the third front; see also Naughton, 365. Naughton cites that the third front had eighteen hundred large and medium sized enterprises out of a national total of five thousand in

1981. This quantity varies from four hundred to four thousand; the most cited number is about two thousand.

<sup>9</sup>Naughton, 351.

<sup>10</sup>Sun Zhenhuan, "Development of Economy, National Defense Linked" (text). Beijing Zhongguo Jingji Tizhi Gaige in Chinese (23 March 1988). FBIS, 14 April 1989, 40-42; see also Jiang Baoji, "Article Views Problems of Defense Industry" (text). Beijing Jingji Yan jiu in Chinese (20 December 1988). FBIS, 14 February 1989, 44-49.

<sup>11</sup> Karen Berney, "Aspects of Modernisation," in Chinese Defense Policy, ed. Gerald Segal and William T. Tow (Chicago: University of Illinois Press, 1984), 138-139.

### Chapter Three

<sup>1</sup>Jiang Lin and Jiang Yonghong, "Article on Need for Policies in Reform" (text). Beijing Jiefangjun Bao in Chinese (8 February 1988). FBIS, 3 March 1988, 18-19.

<sup>2</sup>Richard E. Gillespie, "The Military's New Muscle: A Strengthened PLA Emerges as the Wild Card in Chinese Politics," China Business Review (September-October 1989): 29-30.

<sup>3</sup>Edward Ross, U.S.-China Military Relations, paper presented to The Heritage Foundation, Asian Studies Center Seminar on "United States-China Relations," 28 January 1986, p. 10-12. Mr. Ross at that time was the Assistant for China in the Office of the Assistant Secretary of Defense. The U.S. has postponed the sale of military technology to China after the Tienanmen Square Incident.

<sup>4</sup>"Military Institute Develops Unmanned Car" (text). Beijing Xinhua in English (23 March 1989). FBIS, 3 April 1989, 51.

<sup>5</sup>"Navy Communication Systems Undergo Improvement" (text). Beijing Domestic Service in Mandarin (24 April 1989). FBIS, 2 May 1989, 117.

<sup>6</sup>"Defense Industry Achievements Reviewed" (text). Beijing Xinhua in English (22 September 1989). FBIS, 29 September 1989, 36.

<sup>7</sup>Qi Hongmin and Xie Songxin, "New Missiles Unveiled at Beijing Arms Fair" (text). Beijing China Daily in English (16 November 1988). FBIS, 17 November 1988, 44.

<sup>8</sup>For a detailed history of this policy, see Joffe, 47-69.

<sup>9</sup>June Teufel Dryer, "Deng Xiaoping and Modernization of the Chinese Military," Armed Forces Society 14, no.2 (Winter 1988): 221.

<sup>10</sup>"New Policies for Defense Industry Outlined" (text). Beijing Xinhua in English (15 March 1988). FBIS, 15 March 1988, 14.

<sup>11</sup>The lack of expertise resulted from the departure of Soviet technicians in 1960 and the thought of depending on second-best technology from other nations also affected the decision of not buying foreign weapons for modernization. However, the primary reason was insufficient funds.

<sup>12</sup>China has provided arms to Third World Countries all along; however, much of the weapons were small arms which had been given away for free to insurgent organizations as part of China's foreign policy to export revolutionary ideas. In the 1980s China shifted its policy from arms aid to arms trade. See Anne Gilks and Gerald Segal, China and the Arms Trade (London: Croom Helm Ltd., 1985); Eden Y. Woon, "Chinese Arms Sales and U.S.-China Military Relations," Asian Survey XXIX, no. 6 (June 1989): 601-618.

<sup>13</sup>Chin Po, "Hong Kong Journal on PRC Army Leaders" (text). Hong Kong Kuang Chiao Ching in Chinese (16 December 1987). FBIS, 7 January 1988, 17.

<sup>14</sup>Tai Ming Cheung, "Disarmament and Development in China: the Relationship between National Defense and Economic Development," Asian Survey XXVII, no. 7 (July 1988): 760-763.

<sup>15</sup>Richard J. Latham, China's Defense Industrial Policy, paper, fifth draft, 16 February 1989, p. 14.

<sup>16</sup>"New Policies for Defense Industry Outlined," p. 14.

<sup>17</sup>Gu Chengwen, "Defense Industries Produce Civilian Goods" (text). Beijing China Daily in English (1 April 1989). FBIS, 3 April 1989, 53; "Defense Industry Meeting Held in Beijing" (text). Beijing Domestic Service in Mandarin (26 June 1989). FBIS, 27 June 1989, 33.

<sup>18</sup>"Shaanxi Defense Firms to Relocate, Diversify" (text). Beijing Xinhua (18 August 1989). FBIS, 22 August 1989, 68.

<sup>19</sup>"Sichuan Military Enterprises Make Civilian Items" (text). Beijing Xinhua (12 April 1989). FBIS, 13 April 1989, 41.

<sup>20</sup>"Switching Military to Civilian Production Urged" (text). Beijing Zhongguo Xinwen She in Chinese (13 February 1989). FBIS, 16 February 1989, 26.

<sup>21</sup>"Defense Industry Achievements Reviewed" (text). Beijing Xinhua in English (22 September 1989). FBIS, 29 September 1989, 36.

<sup>22</sup>"Defense Industry Production Orientation Sought" (text). Beijing Xinhua in English (23 March 1987). FBIS, 24 March 1987, K26.

<sup>23</sup>"PLA Research Institutes Aid Economy" (text). Beijing Xinhua in English (12 October 1988). FBIS, 13 October 1988, 42.

<sup>24</sup>The leadership ordered the PLA to open these military assets for civilian use; however, the PLA charges fees to offset its limited budget. See Gillespie, 30.

<sup>25</sup>"Missiles, Spacecraft Control Technology Advances" (text). Beijing Xinhua Domestic Service in Chinese (28 April 1989). FBIS, 2 May 1989, 116; "Defense Industry Achievement Reviewed," 36.

<sup>26</sup>"Army Develops Advanced Laser Range Finder" (text). Beijing Television Service in Mandarin (16 April 1989). FBIS, 26 April 1989, 40; Liu Jingzhi, "Scientists Complete Missile Training Simulator" (text). Beijing Guangming Ribao (13 April 1989). FBIS, 26 April 1989, 39; Wei Wen, "40th Anniversary of PLA Navy Marked" (text). Hong Kong Takung Pao in Chinese (26 April 1989). FBIS, 5 May 1989, 21.

<sup>27</sup>Clare Hollingworth, "China's Arms Industry," Nato's Sixteen Nations, no. 32 (April 1987): 51.

<sup>28</sup>The PLA's increased combat capability has been extensively documented. See Joffe, 94-118; Larry M. Wortzel, ed., China's Military Modernization: International Implications (Westport: Greenwood Press, 1988); Paul H. B. Godwin, The Chinese Communist Armed Forces (Maxwell Air Force Base, Alabama: Air University Press, 1988).

<sup>29</sup>For a thorough analysis of the balance of power issue, see Robert A Scalapino, Major Power Relations in Northeast Asia (Lanham: University Press of America, Inc., 1987).

<sup>30</sup>Jiang Baoji, "Article Views Problems of Defense Industry" (text). Beijing Jingji Yanjiu in Chinese (20 December 1989). FBIS, 14 February 1989, 44.

<sup>31</sup>Sun Zhenhuan, "Development of Economy, National Defense Linked" (text). Beijing Zhongguo Jingji Tizhi Gaige in Chinese (23 March 1988). FBIS, 14 April 1988, 41.

<sup>32</sup>Jiang Baoji, 46.

<sup>33</sup>Xiao Min, "Readjustment of Defense Industry Viewed" (text). Beijing Jingji Ribao in Chinese (14 July 1989). FBIS, 2 August 1989, 33.

<sup>34</sup>Jiang Baoji, 46; Xu Zhiwu, "Article Examines Military Industry Development" (text). Beijing Jingji Guanli, no. 6, in Chinese (June 1989). FBIS, 21 August 1989, 39.

<sup>35</sup>Xiao Min, 32.

<sup>36</sup>Xu Zhiwu, 43.

<sup>37</sup>Jiang Baoji, 46.

<sup>38</sup>Xiao Min, 33.

<sup>39</sup>Ibid., 35-36.

#### Chapter Four

<sup>1</sup>Sydney Jammes, "Military Industry," in Chinese Defense Policy, ed. Gerald Segal and William T. Tow (Chicago: University of Illinois Press, 1984), 124.

<sup>2</sup>David L. Shambaugh, "China's Defense Industries: Indigenous and Foreign Procurement," in The Chinese Defense Establishment: Continuity and Change in the 1980s, ed. Paul H. B. Godwin (Boulder: Westview Press, Inc., 1983), 47.

<sup>3</sup>Alan J. Johnston, "Changing Party-Army Relation in China, 1979-1984," Asian Survey XXIV, no. 10 (October 1984): 1012-1013.

<sup>4</sup>The First Ministry became the Ministry of Machine-Building Industry; the Second Ministry became the Ministry of Nuclear Industry; The Third Ministry

became the Ministry of Aeronautics (Aviation) Industry; The Forth became the Ministry of Electronics Industry; the Fifth became the Ministry of Ordnance Industry; the Sixth became the China State Ship Building Corporation; the Seventh and Eighth merged to become the Ministry of Astronautics Industry. See Paul Humes Folta, Defense Industry of the People's Republic of China: Command Structure, Industry, Production, and Foreign Trade (Washington D.C.: National Defense University, 1986), 57; see also Shambaugh, 46.

<sup>5</sup>Ellis Joffe, The Chinese Army After Mao (Cambridge: Harvard University Press, 1987), 101; Jammes, 124.

<sup>6</sup>Folta, 17-21.

<sup>7</sup>Harvey W. Nelsen, The Chinese Military System: An Organizational Study of the Chinese Liberation Army, 2d ed. (Boulder: Westview Press, Inc., 1981), 59; Jammes, 124-125.

<sup>8</sup>Nelsen, 62.

<sup>9</sup>Jiang Baoji, "Article Reviews Problems of Defense Industry" (text). Beijing Jingji Yanjiu in Chinese (20 December 1988). FBIS, 14 February 1989, 48; Shambaugh, 46.

<sup>10</sup>Yu Qingtian, "Change in Defense Technology Structure Examined" (text). Beijing Renmin Ribao in Chinese (30 September 1980 [sic]). FBIS, 6 October 1989, 25.

<sup>11</sup>Johnston, 1020-1022.

<sup>12</sup>"Liaoning sets up Military-Civilian Car Company" (text). Beijing CEI Database (1 August 1988). FBIS, 2 August 1988, 50.

<sup>13</sup>Qian Hong, "Military Factories Produce Civilian Vehicles" (text). Beijing China Daily in English (20 February 1989). FBIS, 22 February 1989, 33.

<sup>14</sup>"Army Develops Advanced Laser Range Finder" (text). Beijing Television Service in Mandarin (16 April 1989). FBIS, 26 April 1989, 40.

<sup>15</sup>Liu Jingzhi, "Scientists Complete Missile Training Simulator" (text). Beijing Guangming Ribao in Chinese (13 April 1989). FBIS, 26 April 1989, 39.

<sup>16</sup>"Military Institution Develops Unmanned Car" (text). Beijing Xinhua in English (23 March 1989). FBIS, 3 April 1989, 51.

17"Import Technology Poses Problems" (text). Hong Kong Zhongguo Tangxun She in Chinese (6 March 1989). FBIS, 8 March 1989, 34.

18Xie Songxin, "Largest Arms Producer works to Boost Sales" (text). Beijing China Daily in English (26 December 1988). FBIS, 28 December 1988, 31.

19"Hi-Technology Products Conglomerate Formed" (text). Beijing Xinhua in English (25 December 1988). FBIS, 29 December 1988, 40; "Largest Defense Industry Conglomerate Inaugurated" (text). Beijing Xinhua (24 September 1988). FBIS, 28 September 1988, 45.

20Zhang Yuan, "Corporation Takes Over Beijing Military Plants" (text). Beijing China Daily in English (23 June 1988). FBIS, 23 June 1988, 33.

21The domestic oriented enterprises controlled by the PLA are mainly responsible for supplies and services, such as making quilts and shoes, repairing and maintaining machinery. The General Political Department has only domestic market enterprises. On the other hand, the General Staff Department runs Poly Technologies and the General Logistics Department runs China Xinxing Corporation. See Yi Jianru, "Army Official Stresses Expansion of Production" (text). Beijing Xinhua Domestic Service in Chinese (29 April 1988). FBIS, 3 May 1988, 29-30. For a list of China's military front organizations, see Richard E. Gillespie, "The Military's New Muscle: A Strengthened PLA Emerges as the Wild Card in Chinese Politics," China Business Review (September-October 1989): 31.

22Shaanxi's provincial government has advocated army-civilian cooperation in order to integrate its huge military industrial complex. "Army-Civilian Cooperation Expands in Shaanxi" (excerpts). Shaanxi Provincial Service (17 March 1988). FBIS, 21 March 1988, 77.

23"Preferential Tax Policy for Military Enterprises" (text). Beijing Domestic Service in Mandarin (27 September 1988). FBIS, 4 October 1988, 24-25.

24Liu Zhangle, Wang Shude and Pan Hongxing, "Yang Baibing on 'Major Reform'" (text). Beijing Domestic Service in Mandarin (31 July 1988). FBIS, 2 August 1988, 24.

25"Leaders Hail Defense Industry Achievements" (text). Beijing Xinhua Domestic Service in Chinese (17 October 1988). FBIS, 21 October 1988, 23.

26"Development of Consumer Goods Given Priority" (text). Beijing Xinhua in English (17 March 1989). FBIS, 21 March 1989, 51.

<sup>27</sup>"Official Notes Progress in Technology" (text). Beijing Xinhua in English (30 December 1988). FBIS, 3 January 1989, 39.

<sup>28</sup>"Switching Military to Civilian Production Urged" (text). Beijing Zhongguo Xinwen She in Chinese (13 February 1989). FBIS, 16 February 1989, 26.

<sup>29</sup>Gillespie, 29-30.

<sup>30</sup>Xie Songxin, "Arms Fair Gives Impetus to Defense Industry" (text). Beijing China Daily (Business Weekly Supplement) in English (21 November 1988). FBIS, 22 November 1988, 31.

<sup>31</sup>"Defense Industries Shift to Civilian Products" (text). Beijing Xinhua in English (26 January 1987). FBIS, 5 February 1987, K26.

<sup>32</sup>Shen Shuirong, "Guangzhou Army Cadres Study Economic Laws" (text). Beijing Renmin Ribao in Chinese (12 February 1989). FBIS, 17 February 1989, 56.

<sup>33</sup>Jiang Xiaoyun, "Drive Begins to Improve Logistics" (text). Beijing China Daily in English (15 May 1989). FBIS, 31 May 1989, 92.

<sup>34</sup>Joseph P. Gallagher, "China's Military Industrial Complex: Its Approach to the Acquisition of Modern Military Technology," Asian Survey XXVII, no. 9 (September 1987): 991-1002.

<sup>35</sup>Gillespie, 30.

<sup>36</sup>Chang Chuan, "Army Cadres, Leaders lose Confidence in Reform" (text). Hong Kong Cheng Ming in Chinese (1 August 1988). FBIS, 8 August 1988, 34.

<sup>37</sup>Chin Po, "Military Spending Situation Termed `Serious'" (text). Hong Kong Ming Pao in Chinese (24 April 1988). FBIS, 25 April 1988, 28.

<sup>38</sup>Yu Qingtian, 25.

<sup>39</sup>Jiang Baoji, 48.

<sup>40</sup>Chang Chuan, 33; Gillespie, 30.

## Chapter Five

<sup>1</sup>Since mid-1988, the hardliners have followed an austerity program which has gradually reverted back to centralized planning.

<sup>2</sup>Yang Like, "Zhao Minsheng on Poor Quality of Machinery" (text). Beijing Xinhua Domestic Service in Chinese (9 July 1985). FBIS, 15 July 1985, K21.

<sup>3</sup>"Zhao Speech on Science, Technology Reform" (text). Beijing Xinhua Domestic Service in Chinese (20 March 1985). FBIS, 22 March 1985, K1.

<sup>4</sup>Yu Zhongqing, "Plant Reforms Military Product Inspection" (text). Beijing Jiefangjun Bao in Chinese (17 September 1988). FBIS, 30 September 1988, 33.

<sup>5</sup>Xu Zhimin, "Arms Production Now Under Contract System" (text). Beijing Xinhua Domestic Service in Chinese (23 January 1988). FBIS, 25 January 1988, 16; Chen Zhiqiang, "Weapons Development to be Done by Contract" (text). Beijing Xinhua Domestic Service in Chinese (5 February 1987). FBIS, 11 February 1987, K32.

<sup>6</sup>Chen Zhiqiang, "Liaowang Views Reform of Arms Production Order" (text). Beijing Liaowang no. 13 in Chinese (30 March 1987). FBIS, 16 April 1987, K28.

<sup>7</sup>Xu Zhian, "Contract System Introduced to Military" (text). Beijing Renmin Ribao in Chinese (11 December 1988). FBIS, 19 December 1988, 40.

<sup>8</sup>Xu Jiangyao, "1988 Chinese Army Reform Reviewed" (text). Hong Kong Liaowang Overseas Edition in Chinese (16 January 1989). FBIS, 24 January 1989, 36.

<sup>9</sup>"Defense Industry Benefits from Public Bidding" (text). Beijing Xinhua in English (23 June 1988). FBIS, 24 June 1988, 26.

<sup>10</sup>Karen Berney, "Aspects of Modernisation," in Chinese Defense Policy, ed. Gerald Segal and William T. Tow (Chicago: University of Illinois Press, 1984), 137.

<sup>11</sup>"Government to Intensify Anticorruption Fight" (text). Beijing Xinhua in English (19 December 1988). FBIS, 21 December 1988, 29.

<sup>12</sup>"Li Peng on Supervision in Anticorruption Fight" (text). Beijing Xinhua in English (24 December 1988). FBIS, 27 December 1988, 24.

<sup>13</sup>"Chinese Army Involved in Illegal Reselling of Coal" (text). Hong Kong Zhongguo Tongxun She in Chinese (4 April 1989). FBIS, 7 April 1989, 34.

<sup>14</sup>"Military Commission Punishes Economic Offenders" (text). Beijing Xinhua in English (28 February 1989). FBIS, 1 March 1989, 37.

<sup>15</sup>Ibid., 37.

<sup>16</sup>"Central Military Commission on Corruption" (text). Beijing Xinhua Domestic Service in Chinese (2 April 1988). FBIS, 4 April 1988, 59.

<sup>17</sup>The "ten no's" regulation stipulates that the military shall not use military assets for personal business, shall not use PLA's special privileges, shall not use soldiers' labor without authority, shall not produce, sell and resell goods, shall not go beyond the bounds of regulations. "Army Units Banned from Commercial Activities" (text). Hong Kong Zhongguo Tongxun She in Chinese (25 April 1989). FBIS, 2 May 1989, 116.

<sup>18</sup>"Soldiers Urged not to Conduct Outside Business" (text). Beijing Jiefangjun Bao in Chinese (25 April 1988). FBIS, 16 May 1988, 30.

<sup>19</sup>"PLA Circular Urges Administrative Honesty" (text). Beijing Domestic Service (25 January 1989). FBIS, 1 February 1989, 45.

<sup>20</sup>Guo Chunsheng and Zhang Haiping, "PLA Economic Audit Work Yields Results" (text). Beijing Domestic Service in Chinese (21 October 1988). FBIS, 25 October 1988, 32-33.

<sup>21</sup>Su Shaozhi, "Scholar Says Corruption Could Doom Reform" (text). Hong Kong Zhongguo Tongxun She in Chinese (9 December 1988). FBIS, 13 December 1988, 20.

<sup>22</sup>Congress, Subcommittee on National Security Economics of the Joint Economic Committee, Allocation of Resources in the Soviet Union and China-1987, 100th Congress, Second Session, 13 and 21 April 1988, part 13, p. 148.

<sup>23</sup>"Military Calls for Theft, Vandalism Crackdown" (text). Beijing Xinhua Hong Kong Service in Chinese (18 February 1989). FBIS, 21 February 1989, 27.

<sup>24</sup>Mitchell A. Silk, "Economic Crime in China," China Business Review (January-February 1988): 25.

<sup>25</sup>Guo Chunsheng, "Army Proposes Reform Measures for Logistics Work" (text). Beijing Jiefangjun Bao in Chinese (16 January 1989). FBIS, 25 January 1989, 27; Wang Mengkui, "'Present Stage' of Army Production Viewed" (text). Beijing Jiefangjun Bao in Chinese (21 March 1989). FBIS, 28 March 1989, 37.

<sup>26</sup>Shi Wenting, "Details of Army-Building, Production Forum Noted" (text). Beijing Jiefangjun Bao in Chinese (6 March 1989). FBIS, 21 March 1989, 49.

<sup>27</sup>"Reaction to Army Reform Annalyzed" (text). Beijing Jiefangjun Bao in Chinese (14 March 1989). FBIS, 28 March 1989, 36.

<sup>28</sup>Andrew G. Walder examines four puzzling aspects of managerial behavior that were due to the introduction of the market economy. Andrew G. Walder, "Factory and Manager in an Era of Reform," China Quarterly, no. 112 (June 1989): 242-246.

<sup>29</sup>The term entrepreneurial army is borrowed from Gillespie who use the phrase entrepreneurial military units. Richard E. Gillespie, "The Military's New Muscle: A Strengthened PLA Emerges as the Wild Card in Chinese Politics," China Business Review (September-October 1989): 30-32.

## Chapter Six

<sup>1</sup>Zhang Yining, "Jiefangjun Bao Views National Defense" (text). Beijing Jiefangjun Bao in Chinese (31 January 1989). FBIS, 17 February 1989, 34-35.

## BIBLIOGRAPHY

- "Army-Civilian Cooperation Expands in Shaanxi" (excerpts). Shaanxi Provincial Service (17 March 1988). Translated by the Foreign Broadcast Information Service. FBIS Daily Report-China, 21 March 1988, (PrEx 7.10: FBIS-CHI-89-147; p. 77). Hereafter cited as FBIS.
- "Army Develops Advanced Laser Range Finder" (text). Beijing Television Service in Mandarin (16 April 1989). FBIS, 26 April 1989, 40.
- "Army Units Banned from Commercial Activities" (text). Hong Kong Zhongguo Tongxun She in Chinese (25 April 1989). FBIS, 2 May 1989, 116.
- Berney, Karen. "Aspects of Modernisation." In Chinese Defense Policy, ed. Gerald Segal and William T. Tow, 133-148. Chicago: University of Illinois Press, 1984.
- "Central Military Commission on Corruption" (text). Beijing Xinhua Domestic Service in Chinese (2 April 1988). FBIS, 4 April 1988, 59.
- Chang Chuan. "Army Cadres, Leaders lose Confidence in Reform" (text). Hong Kong Cheng Ming in Chinese (1 August 1988): FBIS, 8 August 1988, 33-36.
- Chen Zhiqiang. "Weapons Development to be Done by Contract" (text). Beijing Xinhua Domestic Service in Chinese (5 February 1987). FBIS, 11 February 1987, K32.
- \_\_\_\_\_. "Liaowang Views Reform of Arms Production Order" (text). Beijing Liaowang no. 13 in Chinese (30 March 1987). FBIS, 16 April 1987, K27-29.
- Cheung, Tai Ming. "Disarmament and Development in China: the Relationship between National Defense and Economic Development." Asian Survey XXVII, no. 7 (July 1988): 757-774.
- Chin Po. "Hong Kong Journal on PRC Army Leaders" (text). Hong Kong Kuang Chiao Ching in Chinese (16 December 1987). FBIS, 7 January 1988, 15-19.
- \_\_\_\_\_. "Military Spending Situation Termed 'Serious'" (text). Hong Kong Ming Pao in Chinese (24 April 1988). FBIS, 25 April 1988, 28-29.

- "Chinese Army Involved in Illegal Reselling of Coal" (text). Hong Kong Zhongguo Tongxun She in Chinese (4 April 1989). FBIS, 7 April 1989, 34.
- "Defense Industry Achievements Reviewed" (text). Beijing Xinhua in English (22 September 1989). FBIS, 29 September 1989, 35-36.
- "Defense Industry Benefits from Public Bidding" (text). Beijing Xinhua in English (23 June 1988). FBIS, 24 June 1988, 26.
- "Defense Industry Meeting Held in Beijing" (text). Beijing Domestic Service in Mandarin (26 June 1989). FBIS, 27 June 1989, 33.
- "Defense Industry Production Orientation Sought" (text). Beijing Xinhua in English (23 March 1987). FBIS, 24 March 1987, K26.
- "Defense Industries Shift to Civilian Products" (text). Beijing Xinhua in English (26 January 1987). FBIS, 5 February 1987, K26.
- "Development of Consumer Goods Given Priority" (text). Beijing Xinhua in English (17 March 1989). FBIS, 21 March 1989, 51.
- Dryer, June Teufel. "Deng Xiaoping and Modernization of the Chinese Military." Armed Forces Society 14, no. 2 (Winter 1988): 215-231.
- Folta, Paul Humes. The Chinese Defense Industry of the People's Republic of China: Command Structure, Industries, Production, and Foreign Trade. Washington D.C.: National Defense University, 1986.
- Gallagher, Joseph P. "China's Military Industrial Complex: Its Approach to the Acquisition of Modern Military Technology." Asian Survey XXVII, no. 9 (September 1987): 991-1002.
- Gilks, Anne, and Gerald Segal. China and the Arms Trade. London: Croom Helm Ltd., 1985.
- Gillespie, Richard E. "The Military's New Muscle: A Strengthened PLA Emerges as the Wild Card in Chinese Politics." China Business Review (September-October 1989): 26-35.
- Godwin, Paul H. B. "People's War Revised: Military Doctrine, Strategy, and Operations." In China's Military Reform: International and Domestic Implications, ed. Charles D. Lovejoy, Jr. and Bruce W. Watson, 1-13. Boulder: Westview Press, Inc., 1986.
- \_\_\_\_\_. The Chinese Communist Armed Forces. Maxwell Air Force Base, Alabama: Air University Press, 1988.

- "Government to Intensify Anticorruption Fight" (text). Beijing Xinhua in English (19 December 1988). FBIS, 21 December 1988, 29-30.
- Gu Chengwen. "Defense Industries Produce Civilian Goods" (text). Beijing China Daily in English (1 April 1989). FBIS, 3 April 1989, 52-53.
- Guo Chunsheng. "Army Proposes Reform Measures for Logistics Work" (text). Beijing Jiefangjun Bao in Chinese (16 January 1989). FBIS, 25 January 1989, 27-28.
- Guo Chunsheng and Zhang Haiping. "PLA Economic Audit Work Yields Results" (text). Beijing Domestic Service in Chinese (21 October 1988). FBIS, 25 October 1988, 32-33.
- "Hi-Technology Products Conglomerate Formed" (text). Beijing Xinhua in English (25 December 1988). FBIS, 29 December 1988, 40.
- Hollingworth, Clare. "China's Arms Industry," Nato's Sixteen Nations, no. 32 (April 1987): 48-52.
- "Import Technology Poses Problems" (text). Hong Kong Zhongguo Tangxun She in Chinese (6 March 1989). FBIS, 8 March 1989, 34.
- Jammes, Sydney. "Military Industry." In Chinese Defense Policy, ed. Gerald Segal and William T. Tow, 117-132. Chicago: University of Illinois Press, 1984.
- Jiang Baoji. "Article Views Problems of Defense Industry" (text). Beijing Jingji Yan Jiu in Chinese (20 December 1988). FBIS, 14 February 1989, 44-50.
- Jiang Lin and Jiang Yonghong. "Article on Need for Policies in Reform" (text). Beijing Jiefangjun Bao in Chinese (8 February 1988). FBIS, 3 March 1988, 18-19.
- Jiang Xiaoyun. "Drive Begins to Improve Logistics" (text). Beijing China Daily in English (15 May 1989). FBIS, 31 May 1989, 92.
- Joffe, Ellis. The Chinese Army After Mao. Cambridge: Harvard University Press, 1987.
- Johnston, Alastair J. "Changing Party-Army Relation in China, 1979-1984." Asian Survey XXIV, no. 10 (October 1984): 1012-1039.
- "Largest Defense Industry Conglomerate Inaugurated" (text). Beijing Xinhua (24 September 1988). FBIS, 28 September 1988, 45.

Latham, Richard J. "People's Republic of China: The Restructuring of Defense-Industrial Policies." In Arms Production in Developing Countries, ed. James Everett Katz, 103-122. Lexington: Lexington Books D.C. Heath and Company, 1984.

China's Defense Industrial Policy. Paper, fifth draft, 16 February 1989.

"Leaders Hail Defense Industry Achievements" (text). Beijing Xinhua Domestic Service in Chinese (17 October 1988). FBIS, 21 October 1988, 22-23.

"Liaoning sets up Military-Civilian Car Company" (text). Beijing CEI Database (1 August 1988). FBIS, 2 August 1988, 50.

"Li Peng on Supervision in Anticorruption Fight" (text). Beijing Xinhua in English (24 December 1988). FBIS, 27 December 1988, 24-25.

Liu Jingzhi. "Scientists Complete Missile Training Simulator" (text). Beijing Guangming Ribao (13 April 1989). FBIS, 26 April 1989.

Liu Zhangle, Wang Shude and Pan Hongxing. "Yang Baibing on 'Major Reform'" (text). Beijing Domestic Service in Mandarin (31 July 1988). FBIS, 2 August 1988, 23-25.

Maxwell, Robert M. C., ed. Deng Xiao Ping: Speeches and Writings. New York: Pergamon Press Ltd., 1984.

"Military Calls for Theft, Vandalism Crackdown" (text). Beijing Xinhua Hong Kong Service in Chinese (18 February 1989). FBIS, 21 February 1989, 27.

"Military Commission Punishes Economic Offenders" (text). Beijing Xinhua in English (28 February 1989). FBIS, 1 March 1989, 37.

"Military Institute Develops Unmanned Car" (text). Beijing Xinhua in English (23 March 1989). FBIS, 3 April 1989, 51.

"Missiles, Spacecraft Control Technology Advances" (text). Beijing Xinhua Domestic Service in Chinese (28 April 1989). FBIS, 2 May 1989, 116-117.

Naughton, Barry. "The Third Front: Defence Industrialization in the Chinese Interior." China Quarterly, no. 115 (September 1988): 351-386.

"Navy Communication Systems Undergo Improvement" (text). Beijing Domestic Service in Mandarin (24 April 1989). FBIS, 2 May 1989, 116-117.

- Nelsen, Harvey W. The Chinese Military System: An Organizational Study of the Chinese Liberation Army. 2d ed. Boulder: Westview Press, Inc., 1981.
- "New Policies for Defense Industry Outlined" (text). Beijing Xinhua in English (15 March 1988). FBIS, 15 March 1988, 13-14.
- "Official Notes Progress in Technology" (text). Beijing Xinhua in English (30 December 1988). FBIS, 3 January 1989, 38-39.
- Pan Zhenqiang. The Prospects for the Modernization of China's National Defense, paper prepared for the International Conference "China-Japan-United States Triangle" organized by Mississippi State University, March 1988.
- "PLA Circular Urges Administrative Honesty" (text). Beijing Domestic Service (25 January 1989). FBIS, 1 February 1989, 45.
- "PLA Research Institutes Aid Economy" (text). Beijing Xinhua in English (12 October 1988). FBIS, 13 October 1988, 42-43.
- "Preferential Tax Policy for Military Enterprises" (text). Beijing Domestic Service in Mandarin (27 September 1988). FBIS, 4 October 1988, 24-25.
- Qi Hongmin and Xie Songxin. "New Missiles Unveiled at Beijing Arms Fair" (text). Beijing China Daily in English (16 November 1988). FBIS, 17 November 1988, 43-44.
- Qian Hong. "Military Factories Produce Civilian Vehicles" (text). Beijing China Daily in English (20 February 1989). FBIS, 22 February 1989, 33-34.
- "Reaction to Army Reform Analyzed" (text). Beijing Jiefangjun Bao in Chinese (14 March 1989). FBIS, 28 March 1989, 35-36.
- Ross, Edward. U.S.-China Military Relations. Paper presented to The Heritage Foundation, Asian Studies Center Seminar on "United States-China Relations," 28 January 1986,
- Scalapino, Robert A. Major Power Relations in Northeast Asia. Lanham: University Press of America, Inc., 1987.
- Segal, Gerald. Defending China. New York: Oxford University Press, 1985.
- "Shaanxi Defense Firms to Relocate, Diversify" (text). Beijing Xinhua (18 August 1989). FBIS, 22 August 1989, 68.
- Shambaugh, David L. "China's Defense Industries: Indigenous and Foreign Procurement." In The Chinese Defense Establishment: Continuity and

Change in the 1980s, ed. Paul H. B. Godwin, 43-86. Boulder: Westview Press, Inc., 1983.

Shen Shuirong. "Guangzhou Army Cadres Study Economic Laws" (text). Beijing Renmin Ribao in Chinese (12 February 1989). FBIS, 17 February 1989, 56.

Shi Wenting. "Details of Army-Building, Production Forum Noted" (text). Beijing Jiefangjun Bao in Chinese (6 March 1989). FBIS, 21 March 1989, 49-50.

"Sichuan Military Enterprises Make Civilian Items" (text). Beijing Xinhua (12 April 1989). FBIS, 13 April 1989, 41.

Silk, Mitchell A. "Economic Crime in China." China Business Review (January-February 1988): 25-29.

"Soldiers Urged not to Conduct Outside Business" (text). Beijing Jiefangjun Bao in Chinese (25 April 1988). FBIS, 16 May 1988, 30.

Su Shaozhi. "Scholar Says Corruption Could Doom Reform" (text). Hong Kong Zhongguo Tongxun She in Chinese (9 December 1988). FBIS, 13 December 1988, 20.

Sun Zhenhuan. "Development of Economy, National Defense Linked" (text). Beijing Zhongguo Jingji Tizhi Gaike in Chinese (23 March 1988). FBIS, 14 April 1989, 40-42.

"Switching Military to Civilian Production Urged" (text). Beijing Zhongguo Xinwen She in Chinese (13 February 1989). FBIS, 16 February 1989, 26-28.

U.S. Congress. Subcommittee on National Security Economics of the Joint Economic Committee. Allocation of Resources in the Soviet Union and China-1987. 100th Congress, Second Session, 13 and 21 April 1988, part 13.

Walder, Andrew G. "Factory and Manager in an Era of Reform." China Quarterly, no. 112 (June 1989): 242-264.

Wang Mengkui. "'Present Stage' of Army Production Viewed" (text). Beijing Jiefangjun Bao in Chinese (21 March 1989). FBIS, 28 March 1989, 36-37.

Wei Wen. "40th Anniversary of PLA Navy Marked" (text). Hong Kong Takung Pao in Chinese (26 April 1989). FBIS, 5 May 1989, 21.

- Woon, Eden Y. "Chinese Arms Sales and U.S.-China Military Relations." Asian Survey XXIX, no. 6 (June 1989): 601-618.
- Wortzel, Larry M. ed., China's Military Modernization: International Implications. Westport: Greenwood Press, 1988.
- Xiao Min. "Readjustment of Defense Industry Viewed" (text). Beijing Jingji Ribao in Chinese (14 July 1989). FBIS, 2 August 1989, 32-36.
- Xie Songxin. "Arms Fair Gives Impetus to Defense Industry" (text). Beijing China Daily (Business Weekly Supplement) in English (21 November 1988). FBIS, 22 November 1988, 31-32.
- \_\_\_\_\_. "Largest Arms Producer works to Boost Sales" (text). Beijing China Daily in English (26 December 1988). FBIS, 28 December 1988, 31-32.
- Xu Jiangyao. "1988 Chinese Army Reform Reviewed" (text). Hong Kong Liaowang Overseas Edition in Chinese (16 January 1989). FBIS, 24 January 1989, 35-37.
- Xu Zhian. "Contract System Introduced to Military" (text). Beijing Renmin Ribao in Chinese (11 December 1988). FBIS, 19 December 1988, 40.
- Xu Zhimin. "Arms Production Now Under Contract System" (text). Beijing Xinhua Domestic Service in Chinese (23 January 1988). FBIS, 25 January 1988, 16.
- Xu Zhiwu. "Article Examines Military Industry Development" (text). Beijing Jingji Guanli, no. 6, in Chinese (June 1989). FBIS, 21 August 1989, 39-44.
- Yang Like. "Zhao Minsheng on Poor Quality of Machinery" (text). Beijing Xinhua Domestic Service in Chinese (9 July 1985). FBIS, 15 July 1985, K21.
- Yi Jianru. "Army Official Stresses Expansion of Production" (text). Beijing Xinhua Domestic Service in Chinese (29 April 1988). FBIS, 3 May 1988, 29-30.
- Yu Qingtian. "Change in Defense Technology Structure Examined" (text). Beijing Renmin Ribao in Chinese (30 September 1980 [sic]). FBIS, 6 October 1989, 24-25.
- Yu Zhongqing. "Plant Reforms Military Product Inspection" (text). Beijing Jiefangjun Bao in Chinese (17 September 1988). FBIS, 30 September 1988, 33.

Zhang Yining. "Jiefangjun Bao Views National Defense" (text). Beijing Jiefangjun Bao in Chinese (31 January 1989). FBIS, 17 February 1989, 34-35.

Zhang Yuan. "Corporation Takes Over Beijing Military Plants" (text). Beijing China Daily in English (23 June 1988). FBIS, 23 June 1988, 33.

"Zhao Speech on Science, Technology Reform" (text). Beijing Xinhua Domestic Service in Chinese (20 March 1985). FBIS, 22 March 1985, K1.

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