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JMS FINAL REPORT 99/1
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MILITARY TECHNOLOGY ADAPTATION AND DEVELOPMENT IN INDIA

by

Tate Nurkin

FINAL REPORT
APPENDIX I

Project on National Technological Competitiveness and the Barriers to the Revolution in Military Affairs

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Executive Summary

The primary goals of this report are to assess the capacity of India to develop and adapt new military technologies as well as what this ability—or lack thereof—says about India's capacity to exploit a future revolution in military affairs. In addressing these issues it is important not only to evaluate the Indian military organizations and their participation in the defense decision-making process, but also to examine the role Indian social beliefs, economic development and political institutions play in the adaptation of advanced technologies. All of these areas reveal—with different levels of clarity—that while India is capable of modest changes, developments and adaptations, it remains unsuited to efficient adaptation of military technologies and hence to a worthwhile exploitation of an imminent RMA.

India's institutions are not built to adapt quickly to change, especially changes in the defense and security arena. India is a nation disposed to subtle changes that require long periods of time to take hold. It is part of the national character to endure difficult conditions—poverty, conflict—and emerge to enact modest changes. This trait is seen in an economy that has undergone liberal reforms almost by stealth. It is seen in an Indian indigenous defense industry far more competent at marketing itself than producing major integrated military hardware. It is seen in the Arjun main battle tank that has taken nearly a quarter of a century to develop, and still is not finished. And it

is seen in a nuclear weapons program that waited twenty-four years between tests.

This is not to say that India has not achieved some important technical successes or that it is absolutely devoid of the potential of developing and adapting military technologies. The Indian software industry, buoyed by a massive reservoir of technically skilled workers, is globally competitive, and has partnerships with many of the world's most regarded MNCs. Furthermore, the Indian Integrated Missile Development Program, spring boarding off the work of the Indian Space Organization, has managed to unlock the closely guarded secrets of the ballistic missile with the development of the *Prithvi* SRBM and *Agni* IRBM.

These successes, though, are merely technical ones. India may be able to produce quality ballistic missiles, but it has shown limited ability in developing appropriate training opportunities, or, more importantly, command and control systems to govern the use of these missiles. The *Agni* project was resurrected in 1994, and the Indian Air Force still has not been provided with a complete strategic bombardment mission. Not that there has not been plenty of talk about the importance of such a mission or the need for an integrated, cogent command and control system. Defense Minister George Fernandes has publicly stated this need on multiple occasions, but, to this point, there have been virtually no formal discussions in the

Ministry of Defense or with the service chiefs. So, the Indian ability to effect subtle, prolonged changes rather than quick, efficient ones is also seen in the development of ballistic missiles with no strategy of how best to use them.

There are two main, broad factors underlying India's inability to exploit emergent military technologies. First is the internal discord that marks the country. Currently, about one-fifth of India's army is on constant deployment on counter insurgency missions, and India has recently made counter insurgency the number one role for its Armed Services. Clearly, such a significant commitment to internal duties takes a massive toll on the organizational focus of Indian Armed Force's. Any adaptation of future technologies will require near total commitment of the armed services to training on and adapting new weapons systems, a commitment that is outside the organizational reach of the current Indian military.

The second factor underlying the Indian inability to efficiently adapt new military technologies is found in the unique relationship between the civil and military authorities. The Indian defense decision-making process is dominated by a manifest distrust of the military born out of both the humanitarian, non-violent ideals of Gandhi and Nehru and centuries of colonial subjugation. Thus, the decision-making process intentionally marginalizes the Indian military, and even sets the services against one another in a competition for

limited resources. This situation has created an environment in which there are several layers of civil servant dominated bureaucracy between the service chiefs and the decision-making centers at the Ministry of Defense, not to mention little coordination between the Indian services.

In short, India's social, political, economic and military institutions are ill equipped to expediently adapt new military technologies. In fact, it appears that the defense decision-making process, based on a fundamental distrust of men in uniform, is designed precisely to be unwieldy and inefficient. This process, though, is but one reflection of a much larger theme in the commentary on India. This is a nation filled with deep divisions of religion, race, wealth and caste. India has been able to avoid being consumed by these divisions, but because of these divisions it is a nation far more prone to slow, modest, improving changes than the rapid, sustained, efficient changes a future RMA will require.

I. Introduction on RMA

The nature of warfare is in the midst of a fundamental change. Societies around the world are becoming more closely linked through advanced technology. Many of these technologies, especially satellite technologies and information technologies, have obvious military uses and implications. These technologies have the capability to change the way in which wars are fought and strategies are developed so that warfare after the technological revolution is "unlike what went on before in profound and significant ways."[1] Railroads, tanks, planes and aircraft carriers all have played significant roles in past revolutions in military affairs. It is important to note that it was not the simple unmasking of these technologies which constituted previous RMAs. The proper use of technology requires an appropriate change in strategy and the structure of institutions within the armed forces and society. In the summer of 1940, the French and British defending the Western Front possessed more tanks and planes than did the Germans, but they lacked a strategy as advantageous as *Blitzkrieg*, and a numerical advantage was squandered.

Certainly, the acquisition and adaptation of advanced technologies is a vital first step, but because an RMA constitutes a fundamental shift in the way wars are fought and won, new technologies must be accompanied by organizational and tactical changes. Thus, in 1871 at the battle of Sedan, the French had in their possession the new

[1] *The Revolution in Military Affairs*, Science Applications International Corporation, page 1, copyright 1996.

mitralleuse machine gun of twenty five barrels sighted to 1,200 meters and with a rate of fire of 125 rounds a minute--clearly a weapon for which the Prussians had no equal. But for reasons of secrecy the gun "was not issued to the army until a few days before the outbreak of hostilities."[2] At Sedan, the decisive battle of the Franco-Prussian War, the gun was used in "a perfectly idiotic fashion", which, as J.F.C. Fuller explains, "is not surprising as no troops had been trained to use it."[3] The French military organization had failed to adapt this new technology effectively, and an opportunity was lost.

It is also more than mere military organizational changes. Understanding future competitors in the RMA requires an understanding of a given country's national character, "what a country is."[4] To understand which nations will move along the path to peer competitor in the RMA, one must endeavor to know that nation's social, political, economic and military institutions and trends and the relations between each.

Currently, much attention is being focused on the capacity of Asia-Pacific nations to join the RMA. One important nation under scrutiny is India. A nation of one billion people, India is a major player in the Asian strategic game sharing borders with Pakistan and China and with a major presence in the Indian Ocean and a less pronounced but increasing presence in the Persian Gulf. In this paper, I will

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[2] Fuller, J.F.C. The Conduct of War 1789-1961. DA Capo Press, New York, 1961, page 119-120.

[3] *Ibid*, page 120.

[4] *The Revolution in Military Affairs*, page 4.

evaluate the Indian social beliefs, economic development, political institutions and their relationship with the military establishment and the nature of the Indian defense industry. All of these areas of interest, to varying degrees, paint a picture of an India capable of modest, enduring changes, developments and adaptations--especially in nuclear and missile technology--but wholly unsuited to move rapidly towards becoming a peer competitor.

II What India Is: History & Social Cleavages

The history of the nation of India, in as much as this polyglot society can be understood as one nation, is a history marked by invasion, subjugation and internal discord. From the Aryans to Alexander and the Greeks to the Scythians, Muslims, Persians, Afghans and finally the Europeans and two centuries of British rule, "people in India have known only tyranny. The idea of liberty is new."[5]

By the end of the Second World War, though, the end of this subjugation was in sight. Britain emerged from the Second World War a thoroughly weakened power, unable to sustain its sprawling Empire. On August 15, 1947 the sun started to set on the British Empire as India gained her long sought independence, and with this independence also a sense of humanitarian purpose which has come to be woven into the fabric of this nation. As Jawaharal Nehru stated on the first day of Indian independence in August 1947:

"A moment comes, which comes but rarely in history, when we step out from the old to the new, when an age ends, and when the soul of a

[5] Naipaul, V.S., "A Million Mutinies Now", *India Today*, August 18, 1997, page 21.

nation, long suppressed, finds utterance. It is fitting that at this solemn moment, we take the pledge of dedication to the service of India and her people, and to the still larger cause of humanity."[6]

Nehru's celebration of Indian independence and his elucidation of the Indian dedication to humanitarian ends are themes that have endured throughout this state's history. India remains a fiercely independent place, dedicated to the preservation of its tenuous security as exemplified by its oft beguiling strategy of non-alignment during the Cold War and its persistent close ties with the Soviet Union despite its much vaunted status as the world's largest democracy.

Perhaps an effect of this non-alignment, but far more likely a necessary condition of it, is that India has long viewed the world differently than the West. Influenced by its Hindu roots, India has committed itself to the noble goals of eradication --or at least lessening-- of poverty throughout India and the world. This is, after all, the nation of Mother Teresa and Gandhi and the "benign socialism" of Nehru.

Even as the contagious air of celebration flowed amongst the Indian people and Nehru's puissant words resonated through the midnight air in August 1947, serious, enduring troubles were starting to play themselves out. India's freedom was not for free. The cost was the partition and formation of Pakistan; a Muslim state designed to provide for the significant Muslim minority within British India.

[6] Adams, Jad & Whitehead, Phillip, The Dynasty: The Nehru-Gandhi Story, TV Books, New York, 1997, pages 115-116.

Perhaps this partition could have been a painless one if every Muslim lived in the area defined by the new state and every Hindu lived outside Pakistan. That, though, was not the case. Nor was it the case that the divisions between what was Muslim and what was Hindu were particularly clear, especially in the area of Kashmir. Nor was it the case that Muslims and Hindus were the only religious groups in the area. Thus, two days after the British left the Indian sub-continent to the Indians the process of partition, "already steeped in blood", started it's morbid decent "into one of the great horrors of the twentieth century."[7]

Over 11 million people crossed the new border between India and Pakistan in either direction in an effort to avoid wholesale slaughter, Hindus attacking Muslims attacking Sikhs.[8] It was a shock to India and, especially, to Nehru who had been convinced that the communal troubles which had plagued India for centuries would recede and eventually disappear once the British were gone.[9] It was a repugnant scene in which "Refugee trains would arrive with all their passengers dead: everyone down to the smallest child had been killed."[10]

Eventually, the dying and the migrations abated, but the antipathy did not. Some 500,000 had been slaughtered in "more than a month-long orgy of killing."[11] This, in the end, was not enough. Pakistan and India have fought three wars in their brief histories as independent

[7] *Ibid*, page 117.
[8] *Ibid*, page 117.
[9] *Ibid*, page 117.
[10] *Ibid*, page 117.
[11] *Ibid*, page 121.

entities, all in some part over the disputed province of Kashmir. Dominated by a Muslim population, but ruled at the time of partition by a Hindu prince and home of Nehru himself, the region joined India rather than Pakistan and has not seen extended peace since.

The conflict with the Muslims in Kashmir, with the Sikhs in Punjab and the numerous other persistent internal security problems within India play a significant role in the ability of India to adapt quickly as a nation to a revolution in military affairs. India's internal problems run deep; far deeper than Kashmir and border tensions with Pakistan, though this is clearly a pressing problem. India is a society divided along many lines even if at first glance some of these divisions are not fully perceptible. For instance, 82% of the population of close to 1 billion is united by the common faith of Hindu with only a 12% minority of Muslims and roughly 6% being Sikhs, Christians and a tiny minority of Jews. This overwhelming Hindu majority, though, is a "census fallacy."[12] As the age old adage goes: "only cricket and war can unite the people of India."[13]

The hard fact that such an overwhelming portion of the population is Hindu belies the underlying reality that there are different sects with different values and interpretations that clash with that of other Hindus within the faith. Like any great religion, Hindu is not a uniform body devoid of strife or disagreement. Much of India's internal strife is an example of this. But India, and thus Hindus, is also divided along

[12] Gupta, Shukar, *India Redefines Its Role*, Adelphi Paper293, Oxford University Press, 1995,page 3.

lines of caste, ethnicity, economic well being, region and language. India is possessed by deep social divisions stemming from a centuries old caste system. Technically, society is divided into four general classes--Brahmans, or priests, at the top, Kshatriyas, or warriors, on the second rung, Vaisya, or agricultural settlers and merchants, on the third rung and Sudra, or serfs, at the bottom. But just as society as a whole is divided into a ranking order, so to are these divisions divided into literally hundreds of sub-castes which often compete with one another for resources or prestige.[14] For example, in 1990 then ruling party Jamata Dal attempted to play a populous sort of caste card by announcing the implementation of the Mandal Commission Report which recommended that 25% of all government jobs be reserved for members of the intermediate classes and other backward classes (OBCs). The Indian Constitution already has in place an affirmative action policy which reserves 28% of jobs for lower classes. With the invocation of the Mandal Commission Report, over 50% of jobs were unavailable to upper classes. A violent public protest ensued with 159 upper class students attempting to burn themselves. Sixty-three died.[15]

Economic disparity, too, is a source of division in India. Forty percent of India's massive population remains in absolute poverty, living in overcrowded, miserable conditions. V.S. Naipaul describes the scene driving through Bombay:

[13] *Ibid*, page 23.
[14] *Ibid*, pages 20-22.
[15] *Ibid*, page 21.

"Bombay flats on either side of the road now, concrete buildings mildewed at their upper levels by the Bombay weather, excessive sun, excessive rain, excessive heat; grimy at the lower levels, as if from the crowds at pavement level, and as if that human grime was working its way up, tide mark by tide mark, to meet the mildew ... from time to time depressed looking, dark people could be seen sitting down on this dirt and eating, indifferent to everything but their food."[16]

This India, the India of poverty, indifference, over-population and social fragmentation, is greatly at odds with what Naipaul calls "The Continental Ideal" of India, "the India of the independence movement, the India of great names. It was also the India of the great civilization and the great classical past."[17]

This Continental Ideal, while a reflection of the majesty of episodes of India's past and the potential of her future, is not a reflection of India's present troubles. For the millions upon millions living in the dirt of cities like Bombay, there is little use in this ideal. People "needed to hold on to smaller ideas of who they were; they found stability in the smaller groupings of region, clan or caste."[18] This sense of particularism, this class or group stability, has enabled Indians "while remaining whole themselves, to do work-- modest, improving things, rather than *revolutionary things* (italics added) --in conditions which to others might have seemed hopeless."[19]

The idea of changes in India being modest rather than revolutionary is an idea with particular salience to the question of

[16] Naipaul, V.S., India: A Million Mutinies Now, Heinemann, London, 1990, page 1-2.
[17] *Ibid*, page 7-8.
[18] *Ibid*, page 8.
[19] *Ibid*, pges 8-9.

whether the Indian social institutions are capable of adapting to anything with great speed. The answer is an emphatic "no," a theme which will be repeated in the examinations of the economy, political institutions and defense industry. India is a place of tremendous potential, a place dedicated to improvement of itself and to the cause of humanity in general. Yet, it is also a nation marked by religious, social, caste, regional and linguistic divisions which are inherent in the Indian way of life. These divisions are not going away. They may be taped together by chanting the "unity through diversity" mantra, but the fact remains that Indian society, with its hundreds of millions of impoverished, its oft complicated, unrelenting caste system, its religious and regional tensions, is fundamentally divided.

III. The Economy: Reform & Restraint

While Nehru and those that followed saw India's security as a priority in the years after independence, the most fundamental goal of the new Indian government was the eradication of the massive problem of poverty in India through economic development.[20] In the minds of the Indian elite there was little doubt over the best means of achieving this goal. A small but significant business class was left from the British occupation on which any free-market reforms could be centered. India shunned free market shock therapy, though, partly due to a profound prejudice against the business class engendered by centuries of occupation and exploitation, but more fundamentally because such an

[20] Bhagwati, Jagdish, India in Transition, Clarendon Press, Oxford, 1993, pages 8-9.

open economy ran counter to the tenants of the Indian philosophy so skillfully elucidated by Nehru:

"Right through history the old Indian ideal did not glorify political and military triumph, and it looked down upon money and the professional money making class. Honor and wealth did not go together, and honor was meant to, at least in theory, to the men who served the community with little in the shape of financial reward."[21]

With such acute problems of poverty and scarcity growing worse, and with such a strong moral and philosophical mandate to alleviate these problems at the expense of market growth, India was destined --or in more Indian terms, fated-- to a planned, highly centralized economy. Impressed with the Soviet Union's rapid industrialization and technological mastery, Nehru proposed similar policies eventually resulting in an economic framework that accepted the principle of private enterprise but only as a clearly secondary citizen. The state played the primary role in directing the economy as core sectors were reserved for the expanding public sector.

The Indian economy, then, for the first forty plus years after independence was one nearly defined by its self-imposed inefficiency. The government was overprotective of Indian industry; particularly small-scale industry that it feared would get lost if large-scale industry were not explicitly limited. Foreign investment was kept at an absolute minimum and a "byzantine regime of controls" known as the 'license raj' system was instituted which made attempts at further investment from without as well as within exceedingly difficult and time-consuming. The

[21] Meng, Tan Teck et al., Business Opportunities in India, Nanyang Technological University, Singapore, Prentice Hall, New York,

industrial sector was globally uncompetitive and growth was disturbingly low: an average of 3.59% in the 1950s, 3.13% in the 1960s, 3.62% in the 1970s.[22] So consistent was the lackluster growth of the Indian Economy that economist Raj Krishna would condemn India to a "Hindu rate of growth" of around 3.5%, an idea which grabbed the attention of an Indian populous pre-disposed to fatalism.[23] To make matters worse, even the benign socialist goal of alleviating the living conditions of the lowest levels of society was failing. Without significant growth, the idea of redistribution of wealth seemed empty.

Despite the general poor-performance of the Indian economy and failure to remove the poverty problem, India refused to admit its policy was fundamentally flawed. With each new bit of evidence of failure, the government would merely strengthen the controls rather than look at scrapping the entire system. Rajiv Gandhi made attempts at some limited reforms in the 1980s, but these were short-lived and ineffectual and were undone by corruption and a lack of political will. India was not ready for reform.

Whether it was ready or not, India was forced into massive reforms by the crisis of 1991. That summer foreign exchange reserves sunk as low as $1 billion. With the prospect of an embarrassing default on debt payments, India sold 90 tons of gold from its national reserve to remain liquid. Annual inflation reached 16.7 %. India's credit was

1996, page 6.

[22] Bhagwati, page 39.

[23] *Ibid*, page 3. The "Hindu Rate of Growth" is also found in Gupta.

worthless and Indians abroad began a run on their deposits in Indian banks. The situation was desperate, and the response was to finally engage in worthwhile reform of the Indian economy.[24]

Under the guidance of Minister of the Treasury, Manmohan Singh and former Prime Minister Rao, India has reduced the restrains on its economy by dismantling the infamous 'license raj' system, making investment easier and reducing controls and corruption. The rupee has been devalued, quotas have been nearly abolished, freeing captive industries such as steel, taxes have been slashed, joint venture controls reduced and capital markets and the industrial sector have been liberalized. Foreign investment is now courted rather than shunned. These reforms resulted in a growth rate of 7 % from 1995-1997.

Still, problems exist in the Indian economy that have hindered its further expansion and, most importantly, have hindered the continuation of foreign investment. Perhaps the most pressing obstacle to continued investment in India is its infrastructure. Unlike China, India did not pursue its reforms with much in the way of an ideological blueprint. The overhaul to the Indian economy was pragmatic and, in many ways, limited, and very few people have been hurt by the reforms. Some industries were liberalized while others continued to receive heavy subsidies, another manifestation of the concern of India's government with the plight of less fortunate Indians. The increased

[24] Gupta, page 8.

subsidies meant reduced spending on exhortative infrastructure and education reforms which has subsequently threatened the balance of the more general economic reforms. While some areas of India with sound infrastructures have been established as technology parks and economic zones, others are mired in an underdeveloped infrastructure which makes the relocation of industry and foreign investment difficult if not impossible. In Delhi, for instance, travel from factory site to factory site on the narrow, dirt roads can take up to two hours. Furthermore, communication can be quite rudimentary in these areas as evidenced by a button factory just outside Delhi that has no phones and relies on a messenger boy on a motorbike as its connection to the doings of the outside world.[25]

Bureaucracy is another significant hindrance to the ability of India to consistently court investment. While there is no doubt that the amount of red tape that muddled through by foreign companies looking to invest in India has been reduced, the bureaucracy is still a significant obstacle. As Mr. R. Alletru, Zone director, Telemecanique--India Group notes:

"On account of being isolated for too long, the industry in India is not able to withstand foreign competition particularly on account of the quality and cost. One of the major problems in India is the existence of too many decision centers. The bureaucracy in India is a major hurdle. Absence of clear guidelines and advance information with regard to various permissions to be obtained for opening a branch or setting up an industry is indeed a heavy burden on foreign investors."[26]

[25] Tan et al, page 31.

[26] *Ibid*, page 26.

The foreign investment totals coming to India are "undeniably impressive", worth almost $40 billion last year, but very little of this potential investment money is ever making it "on the ground."[27] This delay is due to "bureaucracy created clearance snarls and a damaging lack of confidence."[28] The longstanding dispute between Suzuki Motor Company and the Indian Ministry of Industry over control over the Indian Maruti Udyog Limited is a prime example of the stifling nature of India's bureaucracy. Despite owning 50% of MUL, any move made by the Japanese car company can be scuttled by the vote of MUL's chairman, an Indian government appointee. This situation has resulted in a dispute between Suzuki and the Indian government over who should serve as chairman of MUL, and has created an air of caution in other foreign auto companies looking to enter the Indian market.[29]

A third pressing problem which may hinder reforms and thus foreign investment in India is corruption. Perhaps a function of the extensive bureaucracy, corruption has not been conquered by reforms. As the number of steps and procedures one must endure to obtain approvals is reduced so too is the corruption, but until the system is streamlined even more significantly-- a prospect that is unlikely until Indian industry can compete globally without the props of its government-- corruption will remain a major problem. Companies will remain tempted to give "tea money" to ensure their approval is given

[27] Chakravarti, Sudeep, "Now Show Us The Money", *India Today International*, October 13, 1997.
[28] Chakravarti, Sudeep, "Now, Show Us The Money", *India Today International*, October 13, 1997.
[29] Mitra, Sumit, "On A Crash Course:, *India Today International*, page 42.

immediately rather than waiting the months to years before a legitimate application is approved.

The final major obstacle to increased foreign investment in India is the uncertainty of where these reforms are going. India has been careful in her reforms not to cause pain to any major interest or segment of the population. Certainly, there have been those who have been adversely affected by the changes, but India's liberalization has been a far less traumatic journey than that of its neighbor and great competitor, China where the livelihoods of "100 million Chinese peasants" have been destroyed as a result of the 1979 reforms.[30] The need to make the reforms palatable for all is partly due to very real political considerations, India is already a nation divided along many lines, what good can come out of further accenting any of these divisions especially those between the haves and have-nots. Also, the idea that few Indians have suffered from liberalization is rooted in the strong moral foundations that have so influenced the Indian social, political and economic institutions. Former Prime Minister Rao, for example, refused to extract the government from its numerous inefficient industries in the early 1990s, because he feared the backlash of organized labor, but also because he firmly believed he "did not have the moral right to throw large numbers of people out of work."[31] Rao and Singh orchestrated the reforms with great skill, keeping the changes

[30] Manor, James & Segal, Gerald, "*Taking India Seriously*", *Survival: The IISS Quarterly*, Summer, 1998, page 57

[31] *Ibid*, pages 56-57.

modest, not revolutionary, and nearly always one at a time so that concurrent shocks did not rouse different groups of India's population at once. It was a strategy of reform by stealth, the result of which has been politically sustainable to this point. Still, resistance is beginning to mount as the Indian economy stumbles. There is a sense that "India is in two minds about foreign investment"[32] and reforms.

One main concern is that the influx of more multi-national corporations and foreign money will serve as a new form of colonization of India. As an editorial in *India Today* asks: "Should all mediocre Indians give way to competent foreigners?"[33] Again, the sense that efficiency and growth should not be bought at a high or even moderate price in the currency of the suffering of any large segments of Indian society is very much at work.

The reform agenda is currently facing growing resistance from both sides of the political spectrum. Indian industry is running for cover from excess competition and dumping. The BJP and the Congress Party still favor the protection of Indian industry for at least five more years, with the in-power Hindu nationalists BJP espousing a return to a cautious economic nationalism. The socialist left still defends organized labor, a segment of the Indian working population poised to lose out to any

[32] Chakravati, Sudeep, "Now, Show us the Money", *India Today*, October 13, 1997, page 32.
[33] Aiyar, Mani Shankar, "Globalizing Swadeshi", *India Today International*, October 13, 1997, page 25.
[34] Bouton, Marshall, "India's Problem Is Not Politics", *Foreign Affairs*, May / June, 1998, page 91.

further or more dramatic reforms.[34] The political will for continuing the reforms has narrowed, and this trend threatens to continue both as a reaction to sanctions against India and as the Asian economic crisis deepens.

Despite these significant hindrances to increased foreign investment (and, potentially, increased transfers of civilian, dual use, technologies), India has managed to compete quite successfully in one vital industry relevant to any imminent revolution in military affairs, software. As Dewang Mehta writes in *The Hindustan Times*, "Just as the Gulf has its natural resources in crude oil and South Africa in diamonds, India's natural resource lies in its abundant, technically skilled manpower. And this natural resource easily transforms India into a software superpower."[35] There are an estimated 700 software firms in India with an estimated 1,000 start-ups just getting their legs under them. Currently, many of the world's largest multi-national corporations—General Electric, AT&T, IBM, Reebok, Levis, Citibank, American Airlines, British Aerospace, General Motors, just to name a few—are already in partnerships with Indian software houses. By the year 2000, the Indian software industry will be exporting over $3.5 billion (US) worth of software, primarily to the United States. Furthermore, India has a reservoir of 4.1 million technically trained

[35] Mehta, Dewang, "Indian Software Industry: A Model Of Strength", *Digital Age, The Hindustan Times*

[36] *Ibid.* All information on the Indian Software industry is taken from the above article. The author, Dewang Mehta, is Executive Director, National Association of Software Services Companies (NASSCOM)

personnel, with an estimated 55,000 people graduating from the 1,670 educational institutions annually. India's large population and its world class training centers at the Indian Institutes of Technology ensure that the Indian software industry—a field invaluable to the adaptations and developments of new technologies--will continue to compete, grow and excel in the global market.[36]

Indian economic reform courting more foreign investment is at a crossroads. Where it goes from here will help determine whether or not India is capable of accomplishing significant transfers of technology or to spin-on advanced civilian technologies into advanced weapons systems. The opening of the economy in 1991 was a significant step that has been followed by several important smaller steps. When taken as a whole, these steps have been plentiful enough to have brought about a legitimate, limited opening of the Indian economy. The will to continue is curtailed by an unwillingness to do harm to any sector of the Indian society or economy and by political instability brought about by the nature of the BJP's recent victory and thirteen party coalition government. It is unlikely the reforms will be rolled back and India returned to a centrally planned economy-- what is done is done-- but the answer to the more pertinent question of whether and at what pace the reforms will be continued is not as certain.

IV. Political Institutions & Civil-Military Relations

If Nehru's main social and economic goal was embodied by benign

socialism stressing economic development, his main goal concerning political institutions was the establishment of a stable, secular democratic system. India is a nation literally defined by its Hindu majority, just as Pakistan is defined by its nearly exclusively Muslim population. Yet, the fissures within Hindu and between Hindu and the other religious minorities in India were significant enough to limit the idea of a Hindu nationalist government. The key was the establishment of a secular government, a sound political process, which could keep India's divisions in check. Despite recent political instability as power shifts from the Congress Party dynasty to a far more splintered coalition centered on the BJP, the process of democracy has endured and remains the "main ingredient in the glue that has kept the country together."[37] The Indian democratic system is "vibrant" and "durable" and is a "key source of underlying stability"[38] with a higher voter turnout in general elections than that of the United States. The electorate of 600 million, despite the levels of poverty and lack of education among lower castes, is described as sophisticated and independent. Only one out of 4 incumbents have been returned to office since 1947, and there is a strong tendency for voters to split their votes in the parliamentary system to check a preponderance of one party. The diverse nature of the Indian population and the voting trends described above have required that Indian political parties in the post Congress era become deft in coalition building which eventually pushes even the extreme parties

[37] Bouton, Marshall M., "India's Problem is Not Politics", *Foreign Affairs*, May / June, 1998, page 82.

towards the center.[39]

Thus, while Indian politics have been inconsistent and unstable since the mid-1980s, the democratic system has endured and emerged as a vital part of the Indian identity. Even the recent victories of the BJP have yet to see the fabric of the secular democracy seriously stretched. The strength of the Indian democratic institutions is reflected in its unique relationship with the Indian military institutions. The relationship is unique in that, "in no other democracy in the world are the armed forces given so insignificant a role in policy-making as in India. In no other democracy in the world do they accept it with the docility evident in India."[40]

Much of this civilian-dominance is a result of India's past, both in the history of British occupation and in the strength and ideals of the Congress Party. Throughout their two hundred-year colonization of India, the British strove to put a great emphasis on the separate spheres of military and civilian influence with the primacy of civilian control implicitly acknowledged. Ultimately, though, this goal was seen as being betrayed by Indians due to a lack of clarity or guidelines in defining what qualified as the military sphere and what qualified as the civilian sphere when military issues were charged with political overtones. The Indians saw that whenever such cross-over issues raised their heads, military and civilian institutions began to clash-- as

[38] *Ibid*, page 82-83.
[39] *Ibid*, page 82-84.
[40] Gupta, page 34.

they did with the Lord Curzon-General Kitchener rift in 1904-1905--and just as in that debate between the Viceroy and the Commander-in-Chief the military seemed to matter for a great deal.[41]

The manifest distrust of the military is also rooted in the philosophies, strengths and types of institutions that emerged from the process of Independence. Samuel Huntington writes that institutionalism is defined by a series of characteristics including, "adaptability, complexity, autonomy and coherence"[42] of its organizational procedures. According to Huntington, India after independence ranked high "not only in comparison with other modernizing countries in Asia, Africa and Latin America, but also in comparison with many more modern European countries"[43] in the strength of their political institutions.

At least in the first forty years after independence this strength rested with the Congress Party. Formed for the noble end of a free India, the Congress Party made a successful transition from protest party to ruling party after the end of British occupation. Buoyed by tremendous support throughout India, the Congress party acted as "a unifying agent" in both a horizontal sense of bringing together different views and backgrounds and a vertical sense in "that it brings into contact and interpretation all levels of politics from the most

[41] Cohen, Stephen P., The Indian Army, Oxford University Press, Delhi, 1990, page 29.
[42] Kukreja, Veena, Civil Military Relations in South Asia: Pakistan, Bangladesh and India, Sage Publications, New Delhi, 1991, page 186.
[43] *Ibid*, page 186.

sophisticated to the most simple and traditional."[44]

Because the Congress Party acted as an umbrella institution holding together so many diverse opinions, it emerged not as an undemocratic monolith, but as precisely the sort of party which could prop up and develop a more lasting sort of democracy. Much of this was due to the sort of leaders who climbed to the top of the Congress Party ladder: the Nehru-Gandhi dynasty. Charismatic and dedicated to the higher cause of India and humanity discussed above, India's leaders moved away from militarism. A significant and influential segment of the Congress Party held true to the legacy of Mahatma Gandhi, and therefore had a dim view of the military in general.[45] Others saw the military and security issues as a "guns and butter" debate: any money spent on guns was money that was not being spent on development. It is important to note that the democratic sensibility and the democratic process as well as the fear of men in uniform have long outlived Gandhi and Nehru. India's democracy, born out of the strength of the Congress Party, has been nurtured and protected by that same party creating an environment in which the national institutions were made to be much larger than the individuals who led them.

The Congress party, then, did not face the "decline in party strength, the fragmentation of the leadership, the evaporation of mass support, the decay of organizational structure, the shift of political

[44] *Ibid*, page 189.

[45] Louscher, David J., *Assessment of the Capacities of the Indian Military Organizations to Adapt to Change*, Joint Management Services, April, 1993, page 2.

leaders from party to bureaucracy and rise of personalism" that Huntington believes "herald the moment when colonels occupy the capital."[46] Democracy won out over militarism and with this victory came the triumph of politicians over officers.

The nature of this control is also important to understand, for the relationship between a democratic society and the men designated to protect that society is usually quite complex and can take different forms. In *The Soldier and the State*, Huntington writes:

> "The military institutions of any society are shaped by two forces: a functional imperative stemming from the threats to the society's security and a societal imperative arising from the social forces, ideologies and institutions dominant within the society."[47]

In democratic societies these two forces can come into direct conflict as the "conservative realism of the professional military ethic also contrasts dramatically with the Lockean liberalism . . ." upon which the idea of democracy is fundamentally built.[48] To help explain how effective civilian control of the military is achieved given this ideological conflict, Huntington lists two essential means of control: Objective and subjective.[49] The first involves a legitimate civilian elite that respects and encourages differences between it and the military professionals. The latter are devoted to their profession and maintain a conservative ethic, restricted by the preeminence of civilian control. Subjective control is achieved via a merging of values. The military reflects its

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[46] Kukreja, page 188.
[47] Goodpaster, Andrew & Huntington, Samuel, Civil Military Relations, American Enterprise Institute for Public Policy Research, Washington, DC, 1977, page 5.
[48] *Ibid*, page 7.

conservative realism less and less, instead absorbing the values of the civilian leadership and society at large.

While Stephen Cohen argues that the Indian Army has been moving from objective towards subjective control-- from isolation of the military ethic to the fusing of the civilian and military values—it appears that the military is still an institution courting professionalism and lacking the specific social and ideological goals of their civilian leaders. The Indian military fights not because they are enthused by a grand cause necessarily; they have little of such ideological ethos. The Indian army will go to war because the civilian leadership tells it to. They will go to war because "it is their function to fight successfully for whatever ends the government wishes to pursue."[49]

The strong civilian control of the military establishment manifests itself primarily in the organizational set up of the Indian Armed Forces. India possesses three separate services: Army, Navy and Air Force, and each is run by an individual service chief. These three services operate independently of one another. There is no overall chief of Indian Armed Forces, though there has been a long and fruitless debate over whether or not to introduce this position.

Historically, there is precedence for such a post. The British Commander-in-Chief was an integral part of the ruling mechanism in colonial India and was second only to the Viceroy of India in overall political rank, a situation which led to the power struggle between

[49] Cohen, page 225.

Curzon and Kitchener in 1904-1905. The post of Commander-in-Chief of Armed Forces survived independence, but only just. It was eliminated in 1955 in favor of the current three-headed organizational beast.

The arguments for an overall military commander of the Indian Armed Forces are convincing from a functional point of view. Nearly every other major military power has some sort of Chief of Staff or similar position. This fact is not lost on Indians who are desperately seeking recognition as a great power. What army can be taken seriously when its organization is lacking such an important means of coordination and command? Furthermore, the Armed Services are pushing hard for the post because they feel that they are not sufficiently integrated into the decision making process. There can be little doubt that such a post could improve strained communications and relations between the services and allow all three services a greater presence in a convoluted, civilian controlled decision-making process.

The arguments against the post, though, have won the day to this point, and there is no sense that this will change in the near future. Certainly, there are practical reasons for the lack of such a post---inability of the oft-bickering services to settle on a properly qualified individual, a potential redundancy of offices--but the primary reason the Chief of Defense Staff office has been resisted is that it runs counter to the Indian instinct to distrust military officers and to the long-standing tradition of overriding civilian control of the military. As Chris Smith

[50] Kukreja, page 215.

points out in India's Ad Hoc Arsenal, "Responsibility for conventional defense in India, as established by the Constitution, is vested in the Union Government that is responsible for all aspects of national security. This includes not only the prosecution of war, but also defence preparedness and defence production."[51] Civilian control of the military establishment is institutionalized, codified even, in the very Constitution that gave rise to the nation of India. Anything that is seen as threatening to this control is unlikely ever to be implemented.

The vertical relationship between the civilian and military authorities is seen explicitly in the complex, three tiered, top-heavy policy decision-making procedure.[52] The first level is the political level consisting of elected representatives, civil servants and to a lesser extent military chiefs. This level is headed by the Minister of Defense and his secretary and staff, and its chiefs. Its chief mode of representation was, until the late 1970s, the Defense Committee of the Cabinet (DCC). This committee was overhauled and its responsibilities and agenda expanded in the late 1970s. The new committee, known as the Political Affairs Committee of the Cabinet, concerned itself with the whole spectrum of internal and external political and security issues, which often means that the views of the armed services are downplayed or ignored. While service chiefs are expected to attend meetings, the number of meetings that deal exclusively with issues of defense is

[51] Smith, Chris, India's Ad Hoc Arsenal, Oxford University Press, Oxford, 1994, page 205.

[52] Thomas, Paul, India's Security Policy, Princeton University Press, Princeton, 1986. The discussion of India's decision-making process is mainly taken from Chapter 4 of Thomas's book: *The Political System and the Security Decision-Making Process*. Some

small, and often, according to Lt. General S.K. Sinha, the service chiefs have not been invited to attend "even when the committee is considering matters pertaining to defense."[53] The opinions of the services are represented by the defense secretary, a civil servant. The military's input at the highest level of defense decision making is nearly completely eliminated.

The second level of the decision making process is at the bureaucratic level and involves interaction between the civil servants of the Ministry of Defense and the military chiefs. It is important to note that the Indian Ministry of Defense is an institution separate from that of the three services. The MoD provides more insulation from the three service chiefs as it consists of civil servants rather than officers or experts, and functions separately from the service headquarters. This situation creates a general lack of cooperation and coordination, and has raised suspicions and mistrust between civil servants and military officers.

The military officers see the problem as one of inefficiency. The service chiefs cannot simply request money and support from the Ministry of Defense as they would supplies from a quartermaster, rather they must approach the Defense Secretary and all of the layers of bureaucracy that are found in between the MoD and the Services. While General Sihna notes that the services could conceivably approach the defense minister directly, "the fact remains that all papers referred to

information on the process was taken from Kukreja.

the Ministry by the Service Chiefs have to be processed by civil servants headed by the Defense Secretary."[54]

Of course, the civil servants in the MoD disagree with the assessment of the officers, and instead point to the nature of resource allocation and the structure of the Indian government as the main culprit causing the Service Chief's dissatisfaction. Under the Indian system, "once allocations are made to the services for various expenses, substantial deviations from the programs proposed or extra amounts demanded beyond that approved for the year must be approved by the relevant higher political authorities."[55] This process invariably leads to the Ministry of Finance, and, specifically, to the Financial Advisor. This vital position is responsible not only for *how much* to spend on defense, but, just as critically, *on what* to spend the limited resources allocated to defense. The Financial Advisor, a civil servant, holds veto authority over weapons purchases and can so act even after procurement decisions have been reached by the Ministry of Finance and Parliament. In short, "the system allows the Finance Ministry to control the Defense Ministry, and the Defense ministry to control the Armed Services headquarters-- all through resource allocation."[56] The final result is that these allocation decisions are made with little regard to the expert advice from the three services.

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[53] Thomas, page 122.
[54] *Ibid*, page 126.
[55] *Ibid*, page 127.
[56] *Ibid*, page 127.

The final, lowest, level of the defense decision-making process is that of the military itself. The Chief of Staffs Committee is made up of the three service chiefs, and is the highest policy making body within the Armed Forces. Yet, its authority is nearly exclusively that of recommendation, and thus the Committee has little to no final say in the defense planning decision-making process.[57]

The Indian defense decision-making process does not lend itself to quick, flexible adaptation of new technologies and systems. It is a process that is purposefully inefficient and almost intentionally puts the services in direct competition with one another for resources and influence. Without one unified voice from the services the three are left to drown out each other's screams. Certainly, the system was very much intentionally designed to maintain emphatic civilian control of the military establishment, and as much as there may be subtle reforms as tensions rise in relations with both China and Pakistan, there is no sense that the fundamental institutional structure or philosophy will ever be retooled to the point where the Armed Services' wishes will-be streamlined or their advice transformed into policy. In fact, it seems that the political interference is running in the exact opposite direction. As *India Today International* reported in the fall of 1997, "In the past two years, say Army officials, political and bureaucratic manipulation of Army affairs has reached an alarming high."[58] The current structure of the defense decision-making process and the strong civilian distrust of

[57] Louscher, page 6.

the military that has inspired the process "have seriously affected the adaptability of the armed forces to likely changes, and are likely to be obstacles for future adaptability."[59]

V. Counter Insurgency, The Indian Defense Industry & Organizational Focus

India's ability to become a peer competitor is also seriously hampered by the reliance on the armed forces to quell much of the internal security threats that accompany the deep divisions prevalent in India.

The conflict between India and Pakistan over Kashmir dates back to the formation of both states in 1947, and the Indian Army still defends an active Line of Control in the region. Since 1984, over 10,000 soldiers on both sides of the LoC have died in what is known as the Siachen War, a brutal mid-intensity conflict in which the greatest foe is more often the harsh conditions of life at 10,000 to 23,000 feet. The Siachen War is a major drain on the Indian Army's resources as well as its readiness to combat an external threat. Fighting at such high altitudes is quite a different challenge than standard mountain warfare. While India initially looked abroad to Austria and West Germany for clothing for its men in the Siachen passes, it found that the wind and the cold of the Glacier was too much. The Indian Army and the Defense Research and Development Organization have subsequently spent valuable time and money developing indigenous clothing to meet the

[59] Joshi, Manoj, "In the Hot Seat", *India Today International*, October 6, 1997, page 37.
[60] Loustcher, page 2.

unique demands of this war. The result is that "some of the cold weather clothing systems manufactured by the DRDO are the best of their kind in the world."[60] Still, the mere fact that the DRDO has had to expend energy developing these clothing systems rather than on more technologically advanced and relevant projects gives an idea of one minor way in which this one conflict acts as a diversion to the Indian Armed Forces and the defense industry.

India is plagued by internal violence as well as quite tenuous borders with not only Pakistan, but also China, and the Army is being called on more and more rather than the paramilitary forces to quell any uprisings. Under the current system, local authorities as low as a "sub-divisional magistrate" have the authority to call out the Army for a period of 10 days, an authority that is often abused.[61] As former Army Chief K. Sundarji states, the Army is called out "at the drop of a hat" since it is politically inconvenient to involve the police."[62] Currently, 6.5 of the Army's 33 divisions, or just under 20%, are committed to internal security duties.[63] So draining are the counter insurgency and internal security concerns on the Army that in April of 1997, *Jane's International Defense Review* reported that the Indian Army had made COIN operations their number one priority, taking precedence over external security or power projection.[64] Clearly, with the testing of nuclear

[60] Sawhney, Pravin, "Kashmir's Cold War", *Jane's International Defense Review*, December, 1997, page 61.
[61] Joshi, page 37.
[62] *Ibid*, page 37.
[63] *Ibid*, page 37.
[64] *Ibid, page 37.*

weapons and recent acquisitions by all three services, power projection has again become a high priority, but the problem still remains that, "given preoccupation with internal troubles, the defense forces have had neither the time or money to pursue regional power projection."[65]

The use of the Army in COIN and internal security operations has also damaged the view of the Indian Army in the eyes of other Indians, further reducing the Army's readiness and ability to adapt to any RMA. The Indian government has accepted that the Army alone is short some 13,000 officers needed to lead soldiers into battle. A massive recruitment campaign is in place, but there is a significant circular problem. Few want to sign up for an Army that is suffering from a major lack of *Izzat*, or respect, of the uniform "by the bureaucrats and society at large."[66] Yet, the Army cannot expect to gain the respect of the citizenry when it spends a good deal of its time fighting them. What motivation is there to join an Army that offers the possibility of near constant deployment either in the frozen passes of the Siachen or against other Indian citizens. Thus, the concentration on internal security issues has a two-fold effect on the readiness of the Army and on their ability to become part of any RMA. First, it is a diversion which "compromises efficiency through a lack of training opportunities"[67] and by draining limited resources. Second, it has a huge effect on the organization of the Army. Armies cannot fight nor can they affect

[65] "India: COIN Now No. 1 Priority", *Jane's International Defense Review*, April, 1997.
[66] Gupta, page 37.
[67] *Jane's Defense Weekly*, "India: Striking a Balance in Pursuit of Progress", February 12, 1997, page 23.

meaningful change without leaders. India's army is short 13,000 officers and the morale of those in the Army is often low. The approaching revolution in military affairs, whatever form it may finally take, will most certainly involve the introduction of sophisticated weapons systems. An army trying to adapt these systems must be fully pre-occupied with the development and maintenance of these systems, the training of soldiers to use them effectively and the necessary organizational changes. The present over-riding security concerns in India act as a severe drain on organizational focus and seriously hinder the ability of the Indian Armed Services, the Army in particular, to devote the time and resources to the development of new weapons systems.

The preparedness of the Armed Forces is also suffering from shortages of cash and spares. In line with the preeminence of economic development, the eradication of poverty after independence and the fundamental concern of non-violence espoused by Gandhi and Nehru, there is a moral cap on defense spending in India at 4% of Gross Domestic Product. The fiscal year 1998-1999 budget allocated 2.54% of GDP to defense, unchanged from that of the previous year.[68] As the wage bill continues to increase to help recruit new officers and keep the old in place the only place where expenses seem to be cut is in modernization, maintenance and replacement of old equipment. Furthermore, the Indian Armed Services has been constrained in its acquisitions since the 1991 fall of the Soviet Union:

[68] Manor & Segal, page 55.

"Practically all of the army's front line armor and mechanized units use soviet-made equipment. This also forms an important part of the artillery and constitutes the entire anti-aircraft artillery including the panoply of surface to air missile batteries. All but 7 of the 43 IAF squadrons use versions of the MiGs, Ilyushins and the Mi-series helicopters, and most of the Navy's submarine and destroyer / missile boat division is built around Soviet equipment."[69]

The fall of the USSR has, until recently, been a major hurdle for the Indian defense sector. Hard currency shortages once overlooked by the USSR can no longer be tolerated by a Russia suffering its own economic trials. Still, the ties between Russia and India do remain strong as evidenced by the recent ten-year defense cooperation agreement between the two countries set to go into place in 2000. The agreement does bode well for India as it shifts the focus from outright purchases, which India simply cannot afford, to joint development that is likely to lead to some form of technology transfer. The focus of the deal are six s-300V ATBM systems, the upgrading of around 125 Mig-2 bis fighters, joint development of the Su-30 MKI fighters, and improvements to the Akash low to medium altitude surface to air missile. The program also includes upgrading the T-72 tanks in service in India and the outright purchase of T-90 tanks and airborne early warning systems as well as the purchase of the refitted *Admiral Gorshkov*, a 44,000 ton aircraft carrier.[70] India has also reached a deal for joint development of military hardware with South Africa.[71]

As promising as these deals are, especially the one with Russia,

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[69] Gupta, page 41.

[70] Bedi, Raul, "India to Sign New 10-year Defense Deal With Russia", *Jane's Defense Weekly*, July 1, 1998.

[71] Bedi, Raul, "India, South Africa Set For Major Military Co-operation Activity", *Jane's Defense Weekly*, August 12, 1998.

there are still kinks to be worked out. In June of 1998, the delivery of the second batch of multi-purpose Su-30MK1 fighters to India was delayed due to Indian Air Force indecision on the specifications of avionics and weapons systems to be integrated into the aircraft, a clear indication that the services themselves are having a difficult time deciding exactly what they want their specific forces of the future to look like.[72]

Indiginization of the Indian defense industry has been a longtime goal of the government, despite the recent deals with Russia and South Africa. From independence, India has favored some form of indigenous development of defense production both for practical and political reasons. Practically, the fact that the rupee is a soft currency creates limitations on foreign exchange reserves which has constrained procurement of arms and technologies from nations who understandably prefer to deal in harder currencies. Politically, India has pursued indigenous development as an extension of their Cold War policy of non-alignment and self-reliance.

But India did not have the resources to undertake a serious commitment to indigenous development of the arms industry, and relied on sales from the Soviets and licensing agreements from whomever would grant them. In 1995, the longstanding desire for an indigenous arms industry finally became policy in the form of the Self-Reliance Plan or Plan 2005. According to this ambitious plan, India was to reduce the

[72] Bedi, Raul, "Indian Indecision Halts Next Su-30 Delivery", *Jane's Defense Weekly*, 24 June, 1998.

amount of imported parts and equipment to 30% from its 1995 level of 70%. This involved a doubling of the share of the defense budget dedicated to research and development. [73]

At the core of this push for an Indian defense industry was the public sector. Defense production in India is almost completely state run with private sector accounting for only 6-7% of domestic arms production.[74] The main actors in domestic arms production are the eight Defense Public Sector Undertakings (DPSU): Hindustan Aeronautics, Ltd. (Manufacture and overhaul of jets), BEL Electronics, Bharat Earth Movers, Magazon Dock, Ltd., Garden Reach Ship building and Engineers, Bharat Dynamics (guided missiles and allied equipment), Goa Shipyard and Mishatz Dhatu Nigam, Ltd. The public sector defense production is "inefficient and over dimensioned and constitutes a burden on the economy."[75] Furthermore, "India relies to a great extent on foreign technologies particularly through major programs of licensed production... the R&D resources to meet this goal (Plan 2005) may become an unacceptable burden for the Indian economy."[76]

The other main organization in the Indian defense production industry is the Defense Research and Development Organization (DRDO). Established in 1958, the DRDO, with fifty labs under its purview, is the government agency responsible for the development of the weapons systems that the DPSUs produce. Currently, the DRDO is

[73] Sipri Yearbook, 1996, page 387.
[74] *Ibid*, page 445.
[75] *Ibid*, page447.

working on several main projects, the progress of each, or lack there of, gives insight into the troubles India has had in her ambitious plans for self-reliance.

The most expensive and frustrating of the DRDO's current projects is the Main Battle Tank, Arjun. Tank production has been a longstanding major area of interest of the Indian Defense sector. In 1961, the British firm Vickers-Armstrong agreed to supply India with manufacturing capability to produce a modified *Chieftain* tank known as the Vijayanta. By the late 1960s, the Vijayanta had been integrated into the Army in significant numbers. By 1974, the decision was made that India's next MBT must be produced by India, and thus work began on the Arjun MBT. Twenty-four years later, the Arjun is still in the early testing stages and is years away from being produced in mass quantities. In the summer of 1998, India's Comptroller and Auditor General criticized the program "for continued technical difficulties and poor operational mobility."[77] Most notably, the fire control system has performed "erratically and with unpredictable accuracy,"[78] and the Arjun has a disturbing tendency to overheat in desert conditions. The tanks overall reliability was listed as "far from satisfactory"[79] by the Army, and is said to be "far from a world class tank."[80] Furthermore, the tank's excessive width has caused it to be declared an over-dimensioned

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[76] *Ibid*, page 447.

[77] Bedi, Rahul, "Arjun Suffers More Criticism", *Jane's Defense Weekly*, 15, July, 1998.

[78] *Ibid.*

[79] *Ibid.*

[80] Joshi, Manoj, "Way Off Target", *India Today International*, November 24,1997, page 39.

consignment on the Indian Rail and thus is subject to 150% costs over the normal rate. This has forced the Ministry of Defense to develop prototype wagons to carry the Arjun. The tank's size would also require additional men and equipment to sustain operational mobility. There is now the threat that by the time the Arjun is truly ready it will be obsolete.

The Arjun, billed as an indigenously designed MBT, also faces severe criticism for its lack of Indian parts. In the last 11 years alone the imported content has risen from 27% to 60%.[81] South Africa's LIW turret system was recently adopted for the Arjun after tests with similar systems from the UK, the Slovak Republic and the T-72 were unsuccessful. While the agreement between India and South Africa may allow licensed production of the turret, it is a far cry from India developing the technology itself.

The poor performance of the Arjun project has also produced a bit of a necessary paradox in military spending. At the same time that the DRDO is spending money on developing the Arjun, the Army is left having to upgrade T-72s and Vijayanta tanks to maintain some semblance of battle readiness.

Despite the terrible problems of the Arjun, the Army has ordered 124 of the MBT. The order is estimated to be completed by 2002/2003, though there are many who find this prediction ambitious. The mere fact that the Army has ordered these tanks, tanks it openly regards as

[81] Bedi, "Arjun Suffers More Criticism."

less than "world class" is significant for it shows a fundamental flaw in the institution of the defense production industry. The DRDO produces these items for sale to its own armed forces making the relationship between the three services and the DRDO one of buyer and seller rather than partners. This relationship has led to tension as the soldiers, whose lives depend on having the best possible equipment, meddle in the design of new projects and in the activities of the DRDO.

The separation of the DRDO from the public sector DPSUs presents another structural problem of the Indian defense industry. As one analyst argues, "most producers of equipment, be it McDonnell Douglas or Teledyne, have their research and production under the same boss."[82] The result of the split is inconsistencies and inefficiencies and bickering between the designers and producers.

The story of the Light Combat Aircraft is similar to that of the Arjun. Begun in 1983, the project is several years overdue and thousands of crore rupee over budget with uncertain prospects as to its completion and, in the end, quality. There is a fear that the "massive 10,000 crore rupee plus investment that the country has made since the mid-1980s may end up as junk."[83] The LCA, too, has become overly reliant on foreign technologies, particularly American technologies that are vulnerable to sanctions arising from India's nuclear tests.

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[82] Joshi, "Way Off Target", page 41.

[83] *Ibid*, page 39.

[84] Joshi, Manoj, "Way Off Target", *India Today International*, November 24, 1997, page 39.

The DRDO has also been delayed in their development of surface-to-air missiles known as Trishul and Akash that were to have replaced the Russian-supplied OSA-AK and Kvadrat systems. These current Russian SAMs should have been replaced in the early 1990s, but because of the delays in indigenous development are still in use. The project is already six years behind and the cost is roughly twice what it was initially estimated.[84]

Where the DRDO has met with success is in its more advanced missile projects known as the Prithvi and Agni missiles. The short-range ballistic missile, Prithvi, is currently in production, and work is being done on an air force version to increase the payload from 500kg to 1,000kg for a range of 250 km. The army's version of the missile has a range of 150 km.

The intermediate range ballistic missile, Agni, is the system that has drawn the most attention, though. Tested twice before-- May, 1989 and February 1991 --the Agni was termed a "technology demonstrator" and shelved after the second test due to strong American pressure. With the recent nuclear tests and the increasingly tense security environment in South Asia and the Indian Ocean, India has seen the necessity of reviving the Agni program. The missile has been tested to a range of 1,450 km and will be billed as having a range of 2,500 km, though it is uncertain whether further tests will be required. The Agni will be capable of delivering a nuclear payload that brings India a certain

amount of political leverage with China and Pakistan.

In this last statement is found the primary difference between the ballistic missile programs and other DRDO projects. There is an importance placed on the Indian missile program, a multi-partisan understanding and support, that pushes these projects forward. India sees missile strength as "the idiom" of a country's political and strategic diplomacy.[85] Rarely, do the missile programs not receive the necessary financial investment from the government. Thus, the Parliamentary Standing Committee on Defence recently "urged the government to build and deploy Agni quickly to meet the changing security environment in the region."[86]

As much support as these missile programs receive, they still do not always produce results. Prithvi is the only missile to go into production, and even then it has been in small numbers. Agni is said to be ready, but now it is reported that more tests are needed to confirm its accuracy at its fullest range. The SAM missiles will be aided by the new agreement with Russia that goes into effect in 2000, but already are well past due. Thus, the missile program in India still suffers from "paucity of crucial component supplies, technology and doctrinal problems, and, indeed, financial constraints."[87] Furthermore, while the Agni and Prithvi have been successes in a technical sense, there appears to be little attention to the second, and arguably most

[85] Bedi, Rahul, "Tests Give Impetus to Agni Ballistic Missile", *Jane's Defense Weekly*, May 20, 1998.
[86] *Ibid.*
[87] Gupta, page 43.

important, aspect of exploiting a new technology: absorption.

With the adoption of any new technology, it is always an imperative to develop sufficient training mechanisms for those charged with using these new technologies. In the case of the Prithvi SRBM, this exigency is underscored by the exceptionally volatile nature of its liquid propellant that must be loaded immediately prior to launch. While a sophisticated simulator has been developed to help train the men of the 333rd Missile Group, the outfit with which the Prithvi has been deployed, the training process seems to suffer from the fundamental lack of military participation in the design. The absence of military input resulted in a series of training exercises with the Prithvi in which users "complained of the warheads being difficult to change."[88]

The issue of command and control of both missiles has also been a sensitive one. While the input of the military (Air Force and Army) have been courted towards the final stages of production and, now, deployment, the truth remains that the services are being asked to use a weapon which they had little input designing or developing. Not unlike the example of the French and the *mitralleuse*, the Indian services are being handed these missiles with little knowledge of what is to be done with them. When the Agni project was resurrected in 1994 it was reported that, "the Indian Air Force has not been given a strategic or nuclear bombardment mission for which it might use Agni."[89]Defense Minister George Fernandes has publicly stressed the overriding need to

[88] Gerardi, Greg J., "India's 333rd Prithvi Missile Group", *Jane's Intelligence Review*, August 1, 1995, page 361.

develop a coherent plan of use for both Indian indigenous ballistic missiles, but as of July of 1998, no formal discussion had taken place within the Ministry of Defence on the formation of a command and control structure.[90]

In the mixed record of success of the DRDO and the Indian Defense sector in general, even in the strongly supported missile programs, is found the weakness of the Indian Defense Production community. The truth is that the DRDO has proven itself better at marketing its potential than delivering on it. The DRDO is a government agency and is subject to the same deficiencies of other government agencies throughout India and the greater part of the world. That is, the public sector creates and courts inefficiency. There is little to no competition or private sector ethos to push the DRDO forward, and there is often a lack of fundamental coordination and communication between the DRDO, the services and the DPSUs. Furthermore, while India has a tremendous technological base and reserve manpower in technology related fields, it possesses a poor research and development culture. Virginia Foran explains:

> "Indian scientists and engineers have demonstrated that they can conduct high-quality theoretical research, develop modern components and produce working prototypes of simple systems. Yet, when it comes to making a large number of components work together ... the record of Indian applied science, engineering and project management is less impressive ... Indigenous military R& D may boost the prestige of the DRDO and arguably the country, but indigenously designed major

[89] Arnett, Eric, "Just What Is A Plan", *Business Standard*, July 19, 1997.

[90] *Times of India*, "No Move Yet to Set Up Nuclear Command", July 2, 1998.

weapons systems are seen as low-status goods by the armed services who would rather have the highest technology available."[91]

And, as *India Today* notes, "those who expect these (DRDO products) to be world class systems need to be reminded that a poor and backward country cannot create such weapons overnight."[92]

VI. Conclusion

India's ability to become a peer competitor in the upcoming Revolution in Military Affairs is severely limited. Much of this has to do with what may be described as part of the national character, though it manifests itself in India's numerous social, economic, political and military institutions. Namely, the ability of this nation and the individuals within to rise above difficult, inhibiting restrictions of their surroundings and achieve modest rather than revolutionary change. It is an oft-repeated theme throughout the commentary on India that this is a nation disposed to more subtle changes that require periods of time to take hold. The intentionally top-heavy, often inefficient, civil servant dominated defense decision-making process as well as the philosophy of civil-military relations that dominates this process is particularly inhibiting. Still, whether it be hesitant economic reforms done nearly by stealth or indigenous weapons production which takes twenty five years to develop or a nuclear program which waited twenty-four years between tests, India's institutions are not built to adapt quickly to change, especially changes in the defense and security arena.

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[91] Feran, Virginia, "The Case for Indo-US High Technology Cooperation", *Survival:The IISS Quarterly*, Summer, 1998, Volume 40, Number 2, page 86.

Moreover, the ability of India to compete in the next RMA is hampered by the numerous chasms within the Indian society. While the institution of democracy is sound, the persistent battles throughout the country, especially in Kashmir and Punjab present a serious impediment toward full focus on adapting new technologies. Socially, it is a drain on the nation's character and energy to be confronted by the possibility of communal violence and the reality of a fifteen- year war on Indian soil. Militarily, it is a tremendous drain on very limited resources. Any RMA will involve advanced weapons systems that will, in turn, require extensive training of soldiers, maintenance and development. That almost one-fifth of the Army is engaged in COIN operations makes it impossible for the Army to concentrate its full attention on adapting new technologies and engineering the appropriate organizational changes. The nature of civil-military relations and the inefficiency of the defense sector also pose serious obstacles to India meeting the organizational and strategic demands of a revolution in military affairs.

India, though, has proven its ability to develop some forms of advanced technologies. The limited successes of the Indian Space Organization, the Indian Integrated Guided Missile Development Program and India's ascension in May of 1998 to the ranks of unofficial nuclear power all demonstrate India's ability to, given time, achieve *technical* successes with high technology systems. Even in areas such

[92] Joshi, "Way Off Target", page 41.

as indigenous ballistic missile development, though, that are considered high priorities and have strong multi-partisan support, there are still enduring, fundamental problems with the issue of absorption and deployment. In the Prithvi and Agni missiles India appears to have unlocked the technical secrets to the ballistic missile, but without a cogent plan of command and control and worthwhile training opportunities for the soldiers charged with the use of these missiles this technical victory and all those which may come after will ring very hollow.