

**ARMS PRODUCTION IN INDIA : A STUDY OF THE  
INTERACTION OF DEFENCE AND DEVELOPMENT**

ARMS PRODUCTION IN INDIA : A STUDY OF THE  
INTERACTION OF DEFENCE AND DEVELOPMENT

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## P R E F A C E

The recent move to modernize our airforce - with British Jaguars, Soviet swing wing strike and interceptor aircrafts, MIG-23s, and An-32 medium transports - makes it evident that we are prepared to meet new challenges in the field of defence as well as other strategic areas where such equipments are required. Similarly, our navy and army have also been updated with new frigates, destroyers, submarines, torpedo boats, etc. on the one hand, and with new hand guns, a new version of Vijayanta tanks, missiles etc. on the other. The need to acquire sophisticated weapons was generally accepted with the deterioration in Sino-Indian relations. It has been rightly stated that defence forces have to be kept in fine fettle even if relations with neighbours are cordial and war seems to be a remote possibility.

The abovementioned policy of our successive governments has met with severe criticism from some quarters which hold the view that the expenditure on arms acquisition and production is a very expensive proposition, and that it plays havoc on the economy by diverting resources from more important sectors of production. Thus, according to such criticisms, defence production has an adverse effect on development.

This dissertation is a modest effort to understand the interaction between defence and development. We have to understand development, in the context of India, keeping in mind the serious problems we are faced with, e.g. poverty, unemployment, and the problems of industrialization and urbanization. The various dimensions of development have been spelt out in the first chapter of this work.

Before dealing with economic consequences of arms production, we have to keep in mind that territorial integrity and independence are of supreme importance. All developmental work will be meaningless without territorial integrity and independence, and our armed forces play an important role in this regard. The second chapter of this study focusses on the threats we have faced in the last thirty odd years, and also on the performance of our defence forces. This chapter also spells out some potential threats we must guard against. The growing awareness of potential threats has led to the demands for better military equipment for the armed forces. The acquisition of arms has been discussed in the third chapter which divides the whole process of arms acquisition in three stages: direct purchase, production under licence, and indigenous design and development of weapons. It has been shown in this chapter that one stage led to the other with a view to acquire self-reliance in the area of arms production.



Arms production, apart from meeting the requirements of our armed forces, caters<sup>to</sup> the needs of other important sectors, e.g. mining, oil exploration etc. Moreover, defence requirements demand a solid infrastructure of basic industries like steel, equipment goods, instruments, power generation, etc. On the other hand, they initiate the modernization of transportation facilities and communication networks along with scientific and technological expertise to aid various industries. The fourth chapter deals with such side-effects of arms production. In the concluding fifth chapter, problems of investment, employment generation, regional development and role of science and technology have been discussed in order to show the correlation between defence and development. Defence requirements lead to the acquisition of technology from developed countries, and the industrialization process helps in absorbing such technologies and mould them to cater to our needs.

This work has gained tremendous amount of intellectual, moral and academic assistance from different distinguished scholars in the field. To bring in by name all those who have contributed in their own way is a difficult task. But there are some in the absence of whose guidance and scholarly advice, this work would not have found the ultimate fruition.

Chiselling and sharpening invariably add perfection and completion to any chunk of writing, and my work warranted more of it. This has been ably done by Mr. M. Zuberi, my supervisor, with whom I have spent more than two years discussing this and many other problems of national and international nature. The inspiration behind my choosing this particular topic for my dissertation was nobody else than him. I have developed my ideas discussing things with him and certainly given him a good amount of trouble.

Dr. T.T. Poulouse and Miss Harpreet Mahajan, who is presently away in the United States, have been the two with whom I have had the creditable opportunity of discussing things, both academic and non-academic in nature. Their helping hand at different points of time undoubtedly lessened the problems which I encountered.

The staff members of all the libraries I have frequented on my mission of collecting material, viz. the Central Library, JNU, the Science Library, JNU, the ICWA Library, Sapru House, the IDSA Library, Sapru House, the American Library, the United States Information Center and the Teen Murti Library, have all been kind and helpful to me.

New Delhi,  
1979.

  
( KISHORE KUMAR )

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CHAPTER I

## CHAPTER I

### DEVELOPMENT : SOME THEORETICAL ASSUMPTIONS

Whatever tension already exists in the third world countries due to political instability, poverty, underdevelopment and conflict with neighbouring countries, is further aggravated by the arms trade and aid policies of the big powers.<sup>1</sup> The increasing demand for weapons among the third world nations has been inducing many of them to establish their own defence production base. This has generated political and economic controversy in recent years in the form of defence versus development debate. In India, this debate has taken place in the context of poverty and the need for rapid economic development. One side of the argument is that a developing country like India cannot afford to divert its 'scarce resources' to the defence sector. This is countered by the argument that defence spending stimulates economic development.<sup>2</sup>

Some of the adverse growth effects of defence spending are listed by Emile Benoit on the basis of which

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1 Lewis A. Frank, Arms Trade in International Relations (New York: Praeger, 1969), p. 1; see also Frank Barnaby and Ronald Huisken, Arms Controlled (Harvard: SPRL, 1975), pp. 35-46

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2 Raju G.C. Thomas, The Defence of India (Delhi: Macmillan, 1978), p. 126.

he investigates the cases of 44 developing countries.<sup>3</sup> The first one is the Investment Effect; defence may absorb resources which might otherwise have gone into investment which is the primary engine of growth. The second one is the Productivity Effect which arises from the fact that government and defence sector show little productivity increase because government services, with their routinized character, are deficient and do not give rise to salable products. The third one is the Income Shift or Reallocation Effect which means an implied reduction in the size of civilian product when a part of Gross Domestic Product (GDP)<sup>4</sup> is reallocated to the defence sector. This is not a cumulative or continuing effect as Investment and Productivity Effects; but if all the three effects are taken as cumulative, the adverse growth effect would be very high. There are also some unquantifiable adverse growth effects like shifting government attention from economic to military problems, danger of takeover of the government by the military etc.

During the fifties, there was a general tendency in India to subscribe to the view that defence and development make competing claims to the scarce economic resources of the

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3 Emile Benoit, Defence and Economic Growth in Developing Countries (Lexington, Mass: D.C. Heath & Co., 1973), pp. 1-16.

4 GDP measures the value of all the goods and services produced within the country during a year, and GNI equals GDP minus net income payments abroad such as income on foreign investment.

country (Investment Effect). It was considered prudent to adjust the foreign policy of the country so as to require a minimum of defence spending. Even after the military pact between the United States and Pakistan, and the American decision to arm Pakistan, the defence expenditure of India was maintained around 2 per cent of the Gross National Product (GNP).<sup>5</sup> The view of the Indian Government at that time was that defence build-up was unnecessary in view of India's non-involvement in military alliances, friendship with China and the American assurance that the arms supplied to Pakistan would not be used against India; and so, the efforts and resources were to be diverted to the five-year development plan. But, the failure of our China policy in the sixties led to a higher defence budget - the expenditure in the budget year 1963-64 was 4.5 per cent - and it was felt that all efforts towards development would prove futile if the country's territorial integrity was undermined. This change in the attitude towards military spending was due to the changed military circumstances, but the government still acknowledged the adverse effects of military spending on the economy, and diversion to defence was not to exceed a certain level where long term development programme would be jeopardised.

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5 K. Subrahmanyam, Defence and Development (Calcutta: Minerva, 1973), pp. 2-3.

The third viewpoint constituted a break from the traditional approach to the economic consequences of defence spending, and emphasized that defence and development were complementary rather than competitive. Defence expenditure adds to the development efforts by generating additional demand and economic activity all round.<sup>6</sup> The growing popularity of this new approach in the late sixties in important sectors of the Ministry of Defence and the Armed Service headquarters led to a new awareness that defence and development were not necessarily opposing objectives competing for scarce resources.<sup>7</sup>

Before discussing the interaction of defence and development, it is essential to clarify the concept of 'development'. The meaning and process of development is a subject of controversy among historians, economists and social scientists. The Marxists regard class-struggle as a dynamic force in development, whereas Max Weber saw the driving force for economic development or change in ideological transformation.<sup>8</sup> Some pragmatist economists like Hoselitz and Rostow

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6 Thomas, n. 2.

7 Gen. J.N. Chaudhuri, "The Defence Expenditure", The Indian Express, 11 May 1973.

8 I.R. Barnes, "A Plea for a New Philosophy in the Study of Development", Journal of International Studies (Millenium: London School of Economics), vol. 5, no. 2, Autumn 1976, p. 181.



have endeavoured to identify and distinguish past stages of economic history without committing themselves to a view of the causes of transition. They have asserted that the process of industrialization repeats itself from country to country, and those countries which failed to conform to the postulated Western model were deviant or pathological.<sup>9</sup> Their theories were conditioned by the politics of the cold war and were attempts to provide blueprints for the process of development in the non-industrialized world along the evolutionary path.

Some writers maintain that an analysis of underdevelopment is inseparable from that of development, and that it demands intense theoretical attention which should focus on types of structural factors which warp underdevelopment. Barrington Moore has proposed a set of generalizations by studying economic, social and political interrelationships through the study of comparative history. He studied the transformation of agrarian societies into modern industrial ones which is a process of economic, social and political change, and that it implies the commercialization of agriculture, development of a powerful industrial sector and widespread order produced by a complex central government.<sup>10</sup> Gunder

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9 See B.F. Hoselitz, Theories of Economic Growth (New York: Free Press, 1967); and W.W. Rostow, Stages of Economic Growth (London: Cambridge University Press, 1965).

10 C.D. Ness, "Review of Barrington Moore, Jr.,", American Sociological Review, vol. 32, 1967, p. 818.

Frank, for instance, has tried to establish links between the development of the Western world and the simultaneous process of underdevelopment in the colonial or semi-colonial world.<sup>11</sup> The two processes were, according to him, closely integrated. Development of one part of the globe resulted in the underdevelopment of the rest. The process of underdevelopment in the contemporary phase takes the form of structural distortions in the economy and consequently distorted political systems - foreign ownership of sectors of economy, export orientation giving the recipient a buyers' monopoly over supply and rigid social structures.

Scholars whose main focus is on the process of modernization have also indirectly contributed to the discussion of development. S.P. Huntington attempted to uncover the causal nexus which underlies the tendency for modernization from stable-traditional societies into unstable-developing ones. He tried to delineate the close interconnection of social and economic forces in the creation of political stability.<sup>12</sup> According to him, political participation, created by socio-economic process of modernization, has to be absorbed by political institutionalization. The

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11 Andre Cunder Frank, On Capitalist Underdevelopment  
(Bombay: Oxford, 1975).

12 S.P. Huntington, Political Order in Changing Societies  
(New Haven: Yale, 1968).

level of this institutionalization depends on adaptability, autonomy and coherence of a political system, organization and procedure. Rajni Kothari also gave a consensus model when he emphasized that "developing collective commitment and organizational discipline needed for large scale enterprises are important correlates of modernization".<sup>13</sup>

Thus a theoretical comprehension of development and underdevelopment as historical processes emphasize that economic, political, sociological and psychological variables in society are inextricably intertwined in reality. Development is not an event, but a process. It is the admixture of past achievements and failures, present endeavours and future expectations. Its goal is the enrichment of the quality of life and its availability, at minimum levels, to all sectors of the population. Development is growth plus change; change, in turn, is social and cultural as well as economic, and qualitative as well as quantitative.

The effort to reduce the widening gap between rich and poor countries has made economic growth a major objective of the developing countries. The historical legacy of underdevelopment has complicated the task of development. Underdevelopment, as it exists in India, has various dimensions; and influences/almost all aspects of society. But we have some problems that are more acute and immediate than others;

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<sup>13</sup> Rajni Kothari, Politics in India (New Delhi: Orient Longman, 1970), p. 291.

and the most important one is that India is groaning under abject poverty and unemployment even after decades of planned development. Our entry into the fourth decade of independence is "overshadowed by constellation of forces of high population, low income, low saving, low industrialization, low urbanization, heavy unemployment and massive poverty".<sup>14</sup> So, the most important part of India's development is economic growth which is "an essential condition for overcoming acute poverty and backwardness inherited from the colonial era".

Various scholars have tried to highlight different indices of economic growth, but the task we are faced with is that of finding out some common factors which are more relevant for a society like ours. According to some economists the real per capita national income or output represents the most reliable indicator of economic achievement, and any increase in the real per capita income connotes economic growth.<sup>15</sup> In other words, economic development is a process whereby an economy's real national income increases over a long period of time.<sup>16</sup> The commonly adopted measure of output is the GDP at producer's value and the increase in the GDP

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14. Hannan Ezekiel, Second India Studies : Overview (Delhi: Macmillan, 1978).

15. Gustav Ranis, "Economic Growth : Theory", International Encyclopaedia of Social Sciences, vol. 4, p. 408.

16. Gerold M. Meir and Robert E. Baldwin, Economic Development : Theory, History and Policy (Bombay: Asia, 1976), p. 2.

per capita is, therefore, the commonly accepted measure of economic growth. And for a rapid increase in the GDP, it is essential to use the economic resources of the country in a meaningful way. This is possible only when the economy manages to save and accumulate capital and invest them in meaningful projects.

But in the short run, while an economy may be growing in terms of real per capita income or total output, it may not be developing because the per capita income might have resulted from better terms of foreign trade or good monsoon.<sup>17</sup> On the other hand, an economy may be developing in terms of more investment without growing in terms of per capita income because of long gestation periods and low income yields of these investment projects.<sup>18</sup> In both the cases, national income does not percolate down to the grass roots of the economy and an average man is not benefitted. It has been correctly stated that "the real aim of the efforts of economic development are a discernible rise in the total and per capita income of a country, widely diffused throughout occupational and income groups, and continuing large enough to become cumulative".<sup>19</sup> And the diffusion of per

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17 Hollins B. Chanery, "Patterns of Industrial Growth", American Economic Review, September 1960, p. 624.

18 S. Stanley Katz, External Assistance and Indian Economic Growth (Bombay: Asia, 1968), p. 7.

19 Benjamin Higgins, Economic Development : Principles, Problems and Policies (Allahabad: Central Book Depot, 1963), p. 432.

capita income is also hampered by population growth which provides the economy with labour force but also diminishes the surplus available to enhance per capita capital stock for the next stage.<sup>20</sup> To the extent the growth of GDP is offset by the growth of population, the goods and services available to the average household will not increase in volume and thus, there will be little improvement in the general standard of living. The proper strategy of development in the context of rapid population growth would be the participation of the maximum number of people in the economic activities of the nation. A great mass of producers, including farmers, artisans etc., can be involved in contrast to the policy of concentrating investment in a small number of capital-intensive endeavours. Thus, apart from efficient use of economic resources, the goal of development policies ought to be the creation of jobs for the exploding labour force.<sup>21</sup>

The third important dimension of economic growth is technological change which, in effect, means the cumulative effect of interaction between changes in the quality of an economy's human agents, material agents and overall efficiency in output. The initial impetus for economic growth in the industrialized portion of the globe was provided by the Industrial Revolution. Since then, the ever increasing pace

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20 Ranis, n. 15, pp. 408-9.

21 Edgar Owen and Robert Shaw, Development Reconsidered : Bridging the Gap between Government and People (New Delhi: Oxford, 1972).

of scientific-technological growth has been the main feature of the modern era. The developing countries have also to establish and sustain the process of scientific-technological growth in order to have the necessary sources for overall development. Nicholas Kaldor has introduced a so-called technical progress function intended to summarize the twin impact of a large stock of capital per capita and technological change on the index growth, i.e. the per capita income.<sup>22</sup> Robert M. Solow suggests a three factor production function with constant return to scale - capital, labour and technology. According to him, only 15 per cent of per capita output growth can be explained by increase in capital stock while 85 per cent must be ascribed to technological change.<sup>23</sup> Some economists argue that technology plays the role of a regulatory agent in the transformation process converting input into output and thus realises the potential output as actual.<sup>24</sup> Thus, technological progress permits output to increase at a higher rate without any additions to the stock of capital goods. Unless people become technologically minded, acquire higher levels of training and skills, put potential resources to optimum use and accept changes in

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22 Nicholas Kaldor, "A Model of Economic Growth", Economic Journal, vol. 67, 1957, pp. 591-629.

23 Robert M. Solow, "Technical Change and Aggregate Production Function", Review of Economics and Statistics, vol. 39, August 1957, pp. 312-20.

24 Ajit K. Dasgupta, Economic Freedom, Technology and Planning for Growth (New Delhi: Associated Publishing House, 1973), p. 3.

institutional and social organizations, the objectives of social welfare cannot be achieved.

We, therefore, come to the conclusion that poverty in India is due to the failure to develop the productive resources of the economy and the existence of obsolete modes of production. The productive resources of an economy consist of (i) natural resources, (ii) human resources or the labour force, and (iii) capital resources in the form of machines, plants etc., which form an essential part of saving and investment. On the other hand, economic development requires efficient use of all productive resources of the country which is possible only when there is rapid technological progress, skilled labour force and efficient management.

There are, therefore, mainly three dimensions of economic growth or development on the basis of which we can evaluate whether defence efforts contribute to development process or retard it. The first is the use of natural and capital resources for which investment is essential. We have to judge whether defence spending diverts resources and capital from other essential sectors of production. The second dimension is the proper use of human resources; and in a vastly populated country like India it is imperative that more and more jobs are created to employ maximum number of people. The third dimension is the improvement in the quality



of human capital or labour force in order to improve the quality and quantity of output. This is an essential corollary to the acquisition of sophisticated technology and training of a skilled labour force. It is, therefore, to be evaluated whether defence spending involves the acquisition of sophisticated technology for better production.

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CHAPTER II

## CHAPTER II

### SECURITY IMPERATIVES

Expenditure on defence, especially on arms production, in relation to the threats facing the country has been the subject of debate. The Western view is that in the face of the difficult problems of population growth, economic development and political stability, countries like India cannot afford the diversion of their precious resources for weapons acquisition and production.<sup>1</sup> It has also been argued that since our relations with neighbouring countries have improved in recent years, the expenditure of huge amounts of money in the defence sector cannot be justified. Sometimes the Gandhian legacy is referred to when talking about the acquisition of sophisticated weapons and technical know-how to produce them indigenously. But it has been correctly said that "no nation can afford to be generous at the cost of its integrity".<sup>2</sup> Nehru had said in the late fifties that "every country's foreign policy is concerned with its own security".<sup>3</sup>

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1 Stephen P. Cohen, "Security Issues in South Asia", Asian Survey, vol. 15, no. 3, March 1975, p. 202.

2 V.P. Menon, The Story of the Integration of the Indian States (Delhi: Orient Longman, 1956), p. 389.

3 India, Lok Sabha Debates, pt. 2, vol. 23, 8 December 1958, col. 3959.

He further said: "The government may respect the doctrine of Ahimsa, but as a government it is not capable of adopting the doctrine."<sup>4</sup> He exposed the shallow understanding of international politics on the part of those who put forward the abovementioned arguments, and said that a friendly approach must necessarily be allied with watchfulness and vigilance.<sup>5</sup> We may desire to live in friendship with all countries, but we can never be certain that they will leave us alone because we do not mean them any harm. Expenditure on defence cannot be judged merely by imminence or remoteness of war; the strategic realities of the present-day world should be understood because it takes time to choose and acquire new weapons systems and to train the forces in their use.<sup>6</sup> Moreover, it can be argued that if there is any diminution of threats to India's freedom or frontiers, it is precisely because the Indian armed forces are better prepared to deal with them.

Well-equipped armed forces today form the integral part of a whole mix of instruments which a modern state uses in its overall strategy to protect its vital interests both in war and peace. There are two major roles that defence

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4 India, Lok Sabha Debates, pt. 2, vol. 1, 15 February 1956, cols. 814-15.

5 Ibid., series 2, vol. 36, no. 17, 8 December 1959.

6 Times of India, 6 April 1978.

forces have to play in relation to the problems of national security.<sup>7</sup> The first is to help the civilian government to maintain the unity and integrity of the country. This task, obviously, cannot be done only through the use of force. Threats to the unity of the country have to be tackled at the socio-economic level so that genuine grievances of peoples and regions can be removed and a national commitment to the cause of unity is brought about. In this process there may arise situations in which the civilian government, however reluctantly, may have to seek the support of the armed forces.

The second function is to deter external aggression and save the country's territorial integrity. The external threats to India could be seen in two dimensions: threats from Pakistan and China. The impact of the Soviet Union and the United States on the sub-continent in view of their economic and military investment and their political stakes is also to be considered.<sup>8</sup> The strategic balance is more in favour of India in relation to Pakistan since 1971, but not to the point where India has an overwhelming predominance making war a remote possibility.<sup>9</sup> Pakistan has successfully

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7 Cohen, n. 1, pp. 203-4.

8 Ashok Kapur, "Indian Military Policy and Strategy" in Frank B. Horton and others, ed., Comparative Defence Policy (London: John Hopkins University Press, 1974), pp. 272-8.

9 Cohen, n. 1, pp. 203-4.

tried to internationalize its conflict with India and has managed to persuade the United States, China and some states of West Asia to provide weapons and diplomatic support. China's military presence along the northern frontier, its territorial claims and its close links with Pakistan have ominous implications for India's defence.<sup>10</sup> India thus has a hostile frontier of 2,500 miles with China and 1,500 miles with Pakistan. Moreover, in view of the changing balance of naval force, the security of our sea lanes cannot be taken for granted.

#### Territorial Integrity

Territorial integrity and national independence are the primary concerns of all the countries. Since certain internal problems arose which threatened the territorial integrity of our country, such as the problem of the integration of princely states in the Indian Union, the problem of Portuguese enclaves in Goa, Daman & Diu etc., and the volatile tribal situation in the North-East India. The Indian Government had to use its military apparatus in dealing with these threats.

The princely states covered nearly 45 per cent of the territory of pre-partition India and 24 per cent of the

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<sup>10</sup> Kapur, n. 8.

population. They were of varying sizes ranging from Hyderabad with a population of 14 million and an annual income of Rs.85 million, to the state of Bilbari with a population of 27 and an annual income of Rs.27 only.<sup>11</sup> Many of these states had their own police and armed forces, currency and tariff barriers; failure to integrate them into the Indian polity would have had disastrous consequences. The Cabinet Mission Plan of 1946 had conceived the constitutional structure of independent India as being a single federal state embracing the various provinces of British India as well as the princely states with the centre having the responsibility of foreign affairs, defence, communications and the power to raise finance. Later, it was decided to set up the States Department to deal with matters of common concern, divided into two sections ready for the partition of the country. Sardar Patel, who was assigned the task of dealing with the princely states, expressed the hope that the princes would bear in mind that the alternative to co-operation was anarchy and chaos in the country. A special meeting of the Chamber of Princes was summoned on 25 July 1947 and negotiations were concluded in a week's time with most of the princely states acceding to the Union.<sup>12</sup> But Sir C.P. Ramaswamy Iyer announced

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<sup>11</sup> Indian Oxygen Limited, Twenty-Five Years of National Independence (New Delhi: Oxford, 1972), p. 7.

<sup>12</sup> Menon, n. 2, pp. 88-89.

before the meeting that Travancore had decided to set itself up as an independent state; and on the next day a similar announcement was made on behalf of the Nizam of Hyderabad. The general tendency among the rulers was to make the best of the bargaining position in which the lapse of British paramountcy placed them. The Dewan of Travancore went to the extent of announcing his intention to appoint a Trade Agent in Pakistan. On 14 June 1947, the All India Congress Committee protested against the impending Balkanization of the country, and refused to admit the right of any princely state to declare its independence and to live in isolation from the rest of India.

Junagarh was a premier state in the group of Kathiawar states bounded almost entirely by other Indian states. It had no contiguity with Pakistan and its distance from Karachi by sea was about 300 miles.<sup>13</sup> Over 80 per cent of the population was Hindu there, and its railway, post and telegraph lines were an integral part of the Indian system, and were administered by the Government of India. Indian access to other states of Gondal, Bhavnagar, Nawanagar and certain areas of Baroda, which had already signed instruments of accession with India, was possible only through Junagarh. On 15 August 1947, Junagarh announced its accession

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13 Menon, n. 2. The details of the accession of princely states are taken from this book which gives full account of military operations collected from the press, published official and unofficial reports, personal observations and interviews.



to Pakistan. After ignoring some letters from the Government of India, the Pakistani authorities sent a telegram on 13 September 1947 saying that they had accepted the Junagarh accession. The rulers of Kathiawar states demanded immediate action on the part of the Government of India to ensure their protection. The Junagarh troops were sent to Babariawad and Mongrol, the states which wanted to accede to the Indian Union. In retaliation, the troops of the Indian Army and forces of the acceding states were suitably disposed in the states of Kathiawar for the protection of the acceding states. The Nawab fled to Karachi; his council requested the Government of India to take control. A referendum was held on 20 February 1948 in which out of 190,870 valid votes only 91 were cast in favour of accession to Pakistan. Thus the state was integrated into the Indian Union with the approval of an overwhelming majority.

The State of Hyderabad occupied a pivotal position in the heart of India. It had the annual revenue of 3.26 crores and its area was over 82,000 square miles; out of 16 million people in the state more than 85 per cent were Hindus, but the police, civil service and the army were the close preserve of the Muslims. The Nizam wanted to secure dominion status for his state within the British Commonwealth of Nations. He also appointed a Public Relations Officer in Karachi without reference to the Government of India. Supported

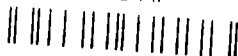
by the Razakars, the Muslim ruling clique in Hyderabad became ready for war; Kasim Razvi said in a speech that 45 million Muslims in the Indian Union would be their fifth column. Nehru and Patel denied the rumours that the Indian Government had any intention to invade Hyderabad or to impose any economic boycott, but they emphasized that nothing short of accession could be tolerated. The police and the Razakars started harassing the Hindus and there was a complete breakdown of administrative machinery. The Government of India was eventually forced to take police action. 'Operation Polo' was commanded by Major-General J.N. Chaudhuri under the direction of Lt. General Maharaj Shri Rajendra Singhji. On 17 September 1948 the Nizam's troops surrendered. There was not a single communal incident throughout the military operation. The state was fully integrated into the Indian Union.

The area of Kashmir had the preponderance of Muslims but most of the Government and army posts were held by the Hindus. The Maharaja was toying with the idea of an independent state and announced his intention of negotiating standstill agreements with both India and Pakistan. In an effort to coerce Kashmir into accession, the Pakistan Government cut off the supply of food, petrol and other essential commodities, and stopped the railway services. The entire border from Gurdaspur to Gilgit was threatened with invasion which had already started in Poonch. The full-scale

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Invasion of Kashmir started on 22 October 1947 by frontier tribesmen and soldiers of Pakistani army 'on leave' led by some regular officers. Two days later, the Government of India received a desperate appeal for help from the Maharaja. The airlift of Indian troops began on 27 October 1947 after Kashmir acceded to the Indian Union. In an effort to resolve her dispute with Pakistan the Government of India referred the matter to the Security Council. A ceasefire was arranged, but the United Nations failed to bring about a lasting solution to the problem. Since then the problem of Kashmir has bedevilled Indo-Pakistan relations.

#### Liberation of Goa

The presence of foreign enclaves in independent India was an anachronism and this reminder of an unhappy colonial past could not be tolerated by the people. About 1,500 square miles of Indian territory with a population of 638,000 remained under Portuguese control divided under three main districts of Goa, Daman and Diu.<sup>14</sup> The Portuguese persistence in maintaining colonial role in India was all the more striking in view of their contention that 'financially Goa has always been a burden on the metropolitan treasury and, almost from the beginning, was considered by

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<sup>14</sup> R.H. Parker, "The Portuguese and French Settlements in India", Political Quarterly, vol. 26, October-December 1955, pp. 389-90.

many to be ruinous to Portugal".<sup>15</sup> The Indian Union accounted for about 20 per cent of Goa's imports and over 40 per cent of her exports, whereas an incredibly low figure of 0.5 per cent of Goa's trade exports and less than 10 per cent of imports were registered with Portugal. The economic dependence of Goa on India is fully brought out by the fact that Indian currency circulated freely there and was two-thirds of the total money in circulation.<sup>16</sup> Nehru said that whatever justification such islands of foreign authority had when India herself was a subject country, disappeared with the independence to India.<sup>17</sup> The freedom movement was not confined to any part of the country; its objective was freedom of the country from every kind of foreign domination.<sup>18</sup> As in the case of French enclaves, Nehru preferred peaceful transition, but the Portuguese Government rejected the Indian proposals in August 1950.<sup>19</sup> There were satyagrah demonstrations by prominent Goan citizens, but the Portuguese

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15 Oliveira Salazar, "Goa and the Indian Union : The Portuguese View", Foreign Affairs (New York), vol. 34, April 1956, p. 425.

16 Arthur Rubinoff, India's Use of Force in Goa (Bombay: Popular Prakashan, 1971), p. 30.

17 New York Times, 2 October 1951, p. 5.

18 Nehru's Speeches : March 1953 to August 1957 (New Delhi, 1958), p. 372.

19 Rubinoff, n. 16, p. 49.

Government took harsh measures and many people were killed in Dadra. Public opinion in India was in favour of strong action by the Government to overthrow Portuguese rule from the Indian soil. The Africans wanted positive action because they maintained that the collapse of the Portuguese empire in Africa would be hastened by the overthrow of Portuguese rule in Goa. The discrepancy in India's policy of sending Indian troops to the Congo while doing nothing in Goa was commented on at the Belgrade Conference of non-aligned countries.<sup>20</sup> Soon after the Belgrade Conference, Nehru announced at a four-day seminar in Bombay on Portuguese colonialism that "if some other steps were necessary for security, India would take them".<sup>21</sup> After this seminar official attitude regarding the Portuguese enclaves underwent a profound change. A shot fired from the Portuguese-occupied island Anjadev wounded a crew member of S.S. Sabarmati on 17 November 1961 and two days later a fisherman was killed in the same area. There was a state of emergency in Goa and curfew was imposed from dusk to dawn.<sup>22</sup> "Operation Vijay" commenced at mid-night on 17 December 1961 and 30,000 Indian soldiers, under the overall command of Lt. General J.N. Chaudhuri and the field

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20 Ibid., p. 82.

21 The Hindu, 21 October 1961, pp. 1 and 8.

22 Link (editorial), "Goa Liberation", 3 December 1961, p. 1.

direction of Major General Kenneth Candeth, poured into Goa, Daman and Diu. The Portuguese offered virtually no resistance in almost all areas and within 36 hours all opposition was overcome. Nehru later stated that India derived no satisfaction from taking armed action but the "Portuguese ultimately left no choice open to us".<sup>23</sup>

### Tribal Insurgency

The process of the integration of the tribes in the north-eastern region was disrupted by British colonial rule in India. The continuation of ethnic, religious, and socio-cultural factors which contribute to divisive forces in tribal areas has been analysed by experts.<sup>24</sup> External forces have also played their role in sharpening tensions in the north-eastern region. The problems of Naga and Mizo tribes have been aggravated by foreign-aided insurgencies. During the Second World War, part of the Naga hills fell into the hands of the Japanese advancing from Burma; thousands of Nagas joined the British Indian Army to fight the Japanese and thus became well-versed in the handling of modern arms. When A.Z. Phizo's suggestion of an Interim government for

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23 New York Times, 19 December 1961, p. 1.

24 L.P. Vidyarthi, "Approaches to the Problem of Integration of Tribals in India", in M. Rafiq Khan, ed., National Integration : Its Meaning and Relevance (New Delhi: Navchetna Prakashan, 1970), p. 110.

ten years followed by independence of Nagaland was rejected by the Advisory Committee on Aboriginal Tribes in May 1947, the Nagas mobilized men and material for armed resistance after boycotting the general election of 1952, refused to pay taxes, and withdrew from schools, government offices etc. They collected arms from the arms dump left behind by the British and bought some more from the Karen rebels of Burma. The core of the Naga Homeguards was provided by demobilized Naga soldiers who were five to six thousand strong.<sup>25</sup> The Chinese strategy in this region was to join together the geographically contiguous pockets of tribal insurgencies of north-east India and north Burma, and this strategy was manifested in aiding and abetting restive Nagas living astride the India-Burma border.<sup>26</sup> As the resistance increased, the Indian Government reinforced the Assam Government's armed police force with the paramilitary Assam Rifles and later, in August 1955, the Indian Army moved in. By 1957, various Naga tribes demanded that all Naga areas be placed under the External Affairs Ministry. This demand was accepted. A separate state of Nagaland was formed in 1963 and elections were held. Yet, the Naga National Council sought active support of China in terms of guerrilla training and

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25 Myron Weiner, The Politics of Scarcity (University of Chicago Press, 1968), p. 44.

26 Dilip Mukerjee, "India's Defence Perspective", International Affairs, vol. 44, no. 4, October 1968, pp. 667-8.

supply of arms. When the rebels tried to kill Chief Minister Hokisha Sema in August 1972, the Indian Army and para-military forces were sent to solve the problem. After the victory of the United Democratic Front in 1974, they stepped up their demand for independence.<sup>27</sup> Patient handling of the insurgency problem requires a keen awareness of the cultural and psychological factors which aggravate tensions. A balanced economic growth of the region can contribute to the removal of tensions in the tribal region. In 1968-69 the Nagaland State's treasury collected Rs.1.03 crores in taxes and levies, but it spent Rs.24.39 crores on education, hospitals, and civil service etc. and the difference was covered by grants and loans from the centre,<sup>28</sup> so as to bring Nagas into the national mainstream.

The Mizo political consciousness and expertise in handling modern arms, like that of the Nagas, dates back to the Second World War. The United Mizo Freedom Organization, supported by tribal chiefs, raised the demand for merger with Burma. The Mizo National Front, originating as a famine relief organization, raised the slogan of independence in 1961. It began training an armed volunteer force and held Aizawl for six days in March 1966 after over-running police posts and administrative centres. Three senior police

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27 Dilip Hiro, Inside India Today (London: Routledge and Kegan Paul, 1978), p. 228.

28 Statistical Handbook of Nagaland (Kohima, 1968), p. 166.



officials were killed by Mizo hostiles in 1975.<sup>29</sup> The Indian Government took punitive action in the form of a massive counter-insurgency drive which lasted for one year.

Political concessions in the form of more autonomy were given and, in January 1972, the Mizo Hill District was separated from Assam and was given the status of Union territory.

In dealing with internal threats to the unity and integrity of our country, our armed forces had to be reluctantly used. While the long-term process of integrating a continental society like ours cannot be done by the use of force alone, it has to be recognized that inability to deal firmly with the problems enumerated in this section of the chapter would have meant the disintegration of India. Thus it can be said that defence, by maintaining the unity and integrity of India, has contributed to the involvement of the physical and human resources of the whole country in the process of development.

### External Threats

A study of India's relations with her neighbours is an essential preliminary to assess the problems that face those responsible for securing India's defence.<sup>30</sup> An analysis

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29 Hiro, n. 27, p. 229.

30 P.V.R. Rao, Defence Without Drift (Bombay: Popular, 1970), p. 20.

of our relations with Pakistan and China is important in the sense that the consciousness about self-sufficiency in weaponry came after the conflict with the Communist China in 1962 and the subsequent war with Pakistan in 1965. The tension with Pakistan arose from the process of decolonization, which led to the partition of British India and the communal conflict, whereas the conflict with China resulted from the colonial legacy of a vaguely defined Himalayan frontier. As the policy of non-alignment involved rejection of military alliances which represent one method of dealing with other states, policy-makers in India had to accommodate a military programme to ensure the security of the nation within the broader framework of the socio-economic development of the country.<sup>31</sup>

#### Sino-Indian Relations

In order to study our relations with China, it is essential to bear in mind that both India and China became fully independent around the same time but India chose non-alignment as a policy whereas China ideologically leaned on one side. The Chinese leaders were very critical of India's policies. Mao Tse-tung categorically said that "sitting on the fence will not do nor is there a third road....we opposed

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<sup>31</sup> Raju G.C. Thomas, The Defence of India (Delhi: Macmillan, 1978), pp. 30-31.

the illusion about a third road".<sup>32</sup> Acknowledging the greetings of the Secretary General of the Communist Party of India, on the occasion of the establishment of the People's Republic of China, Mao expressed the hope that under the leadership of the Communist Party a free India, like free China, will emerge.<sup>33</sup> Various articles in the Chinese press written around September-October 1949 commented that the Anglo-American designs against Tibet were being realized through India. Nehru was being described as the Chiang Kai-Shek of India who, by becoming the lackey of imperialism, was undermining the interests of the nation by his reactionary domestic and foreign policies and was making attempts to interfere in Tibet which belonged to China.<sup>34</sup>

In January 1950, China proclaimed that one of the basic tasks of the People's Liberation Army was to liberate Tibet and stand guard at the Chinese frontier.<sup>35</sup> Nehru wondered from whom they were going to liberate Tibet.<sup>36</sup> In the fifties, relations became more cordial and India agreed

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- 32 Mao Tse-tung, "On the People's Democratic Dictatorship", Selected Works (Peking), vol. 4, 1971, p. 415.
- 33 Indian Communist Party, Documents : 1930-1956 (Bombay, 1957), p. 48.
- 34 Girilal Jain, Panchasheel and After (Bombay: Asia, 1960), pp. 6-11.
- 35 K. Raman Pillai, India's Foreign Policy : Basic Issues and Attitudes (Meerut: Meenakshi Prakashan, 1969), p. 126.
- 36 Jawaharlal Nehru, India's Foreign Policy; Selected Speeches : September 1946 - April 1961 (New Delhi: Publication Division, 1961), p. 302.

to dispense with the privileges in Tibet which the British Indian Empire had acquired. The preamble of the agreement between India and China signed in 1954 referred to the "Tibet region of China". This agreement also declared, for the first time, the five principles of peaceful co-existence. The Chinese authorities expressed the view that, after a consideration of the actual situation on the frontier, a friendly settlement could eventually be worked out.<sup>37</sup> But the outbreak of an anti-Chinese revolt in Tibet in 1959 became the catalyst of rapid deterioration in Sino-Indian relations. China resented the sympathy shown by India to the Tibetan insurgents and viewed the trouble as having been engineered by upper strata reactionaries in Tibet under instigation from imperialists and foreign reactionary elements. Nehru said that laying the responsibility on a handful of upper strata reactionaries was an over-simplification of a complicated issue, since the basis of revolt must have been a strong feeling of nationalism.<sup>38</sup> A series of allegations and counter-allegations were made by both sides. In June 1959, the Chinese charged that Indian troops were actually in collusion with the Tibetan rebels.<sup>39</sup> Earlier, India had

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37 White Paper I, 16 May 1959, Ministry of External Affairs, India, p. 53. Statement by Chinese Ambassador to Indian Foreign Secretary.

38 India, Lok Sabha Debates, vol. 30, no. 55, 27 April 1959, col. 15501.

39 White Paper I, Chinese Note, 23 June 1959, p. 34.

sent a note drawing the Chinese attention to the fact that a motorable road linking Sinkiang with Tibet was completed in 1957 through the Indian territory of Ladakh; the note also asked the whereabouts of an Indian patrol party which had been lost in the area; and it also drew attention to a Chinese map which included some parts of NEFA, northern Uttar Pradesh and large areas in eastern Ladakh as part of Chinese territory.<sup>40</sup> An agreement could not be reached to settle the dispute due to disagreement on border lines and the areas of vital importance.<sup>41</sup> China complained that Indian troops had pushed forward and were setting up new posts, whereas India maintained that the boundary had long been settled till the Chinese disturbed it in 1957, and that a Chinese withdrawal from the territory was an essential step for creating a favourable climate for negotiations.<sup>42</sup> Reversing their earlier stand that they were willing to accept the existing realities on India's eastern frontier, the Chinese rejected the McMahon Line as a product of British imperialism. The border situation worsened towards the end of the summer of 1962 when both sides complained of troops movements and provocations. Prior to the final clash in 1962

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40 Ibid., p. 27.

41 White Paper III, 21 December 1959, pp. 53-56. Letter from Prime Minister of India to Prime Minister of China.

42 T. Karki Hussain, The Sino-Indian Conflict (Faridabad: Thomson Press, 1977), p. 19.

there were armed conflicts and incursions in the Chip Chap river area and NEFA, and China had extended in the eastern sector by crossing from the Thagla Ridge into Indian territory.<sup>43</sup>

The causes of the disaster of 1962 have been the subject of great controversy. Lt. Gen. Kaul attributed the reason to Chinese superiority in number, weapons, logistics, organization and training.<sup>44</sup> Mankekar wrote that we were outnumbered, out-weaponed and out-generalled.<sup>45</sup> Kuldip Nayar mentions the human wave tactics of the Chinese and the inadequacy of India's Lee enfield 303 rifles against the automatic weapons of the Chinese.<sup>46</sup> But a participant observer of the war, Lt. Col. J.R. Saigal, has recently revealed that, as regards terrain, we were placed at a positively more advantageous position in relation to the Chinese in the actual area of operation - Sela and Bomdila (NEFA) - in November 1962. He asserts that never in history have well-prepared defences on dominating ground been abandoned as was done at Sela and Bomdila while the junior officers were itching for

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43 White Paper VII, Indian Note, 19 October 1962, p. 121.

44 Lt. Gen. B.M. Kaul, The Untold Story (Bombay: Allied, 1967), p. 446.

45 D.R. Mankekar, Guilty Men of 1962 (Bombay: Tulsishah, 1968), p. 75.

46 Kuldip Nayar, Between the Lines (Delhi: Hind Pocket Books, 1970), p. 156.

a fight.<sup>47</sup> Saigal maintains that besides diplomatic and domestic factors, the British colonial legacy in the Indian armed forces led to the disaster. "The destiny of the post-independence Army was thus placed in the hands of a Western-oriented top brass lacking the necessary experience, background and national commitment".<sup>48</sup> Saigal also refers to the role of foreign agencies which wanted to get Krishna Menon removed from the centre of power and to discredit Jawaharlal Nehru's international policies along with non-alignment.<sup>49</sup>

The Sino-Indian war of 1962 became an important watershed in Indian history. The disastrous retreat of Indian troops in the eastern sector, the controversy regarding the respective roles of civilian and military leaderships, the apportioning of blame for the disaster, and the rude awakening to the realities of international politics - all these contributed to a heightened sense of awareness of the problems of national defence. The trauma of military disaster thus indirectly paved the way for national preparedness for future dangers.

#### Indo-Pakistan Relations

Although relations with Pakistan had been tense ever since partition and the Kashmir problem remained unresolved,

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47 Lt. Col. J.R. Saigal, The Unfought War of 1962 (New Delhi: Allied, 1979), pp. 113, 115.

48 Ibid., p. 8.

49 Ibid., pp. 158-9.

many prominent leaders believed up to 1954 that Pakistan's political and economic weakness would eventually compel her to some kind of confederal union with India.<sup>50</sup> There was a qualitative change in Indo-Pakistan relations after 1954 when the United States decided to give military assistance to Pakistan and to rope her into her military pacts.<sup>51</sup> Pakistan became the medium through which the United States played its balance of power game in South Asia; military assistance to Pakistan was used as a "counterforce to the confirmed neutralism of India".<sup>52</sup> In 1954, the value of infra-structural support in the shape of logistic facilities, communication system, training facilities and other assistance totalled over \$1.3 billion bringing the level of American military assistance to Pakistan to over \$2 billion.<sup>53</sup> During 1954 to 1965, a total of American military investment in Pakistan was placed at \$1,500 million.<sup>54</sup> Pakistan received twenty F-104 fighters, 120 F-86 Sabres, thirty B-57 bombers,

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50 Sisir Gupta, Kashmir: A Study in India-Pakistan Relations (Bombay: Asia Publishing House, 1966), pp. 74-75.

51 Ibid., pp. 277-85.

52 Ralph de Toledano, Nixon (London, 1957), p. 164.

53 Thomas, n. 31, p. 33.

54 Russel Brines, The Indo-Pakistani Conflict (London: Pall Mall, 1963), pp. 126-7.



1000 tanks including M-47 and M-48 Patton tanks, Sherman and Chaffes, and medium and heavy field artillery.<sup>55</sup>

With the deterioration in Sino-Indian relations, there was a convergence of Chinese and Pakistani policies towards India; this made the problem of Indian security even more acute. Pakistan found the situation opportune to drive a hard bargain with India over Kashmir, and in this respect, found China an ideal lever against India. The stalemate in Indo-Pakistani relations provided China with an opportunity to exploit Pakistan's susceptibilities against India.<sup>56</sup> Earlier, in an effort to improve relations with India, President Ayub Khan proposed joint defence with India, but this offer was not acceptable to India as common defence with Pakistan implied membership of a military alliance;<sup>57</sup> it was also not clear which threat Ayub had in mind when he made the proposal. American military assistance to Pakistan was also viewed with suspicion by China which accused the United States of having turned Pakistan into a military springboard in South-East Asia. Pakistan's membership of US-sponsored military alliances

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55 Lewis A. Frank, The Arms Trade in International Relations (New York: Praeger, 1969), pp. 102-3. See also Col. R. Rama Rao, "Pakistan Rearmed", India Quarterly, vol. 27, no. 2, April-June 1971, p. 141.

56 Karki Hussain, n. 42, pp. 88-89.

57 India, Rajya Sabha Debates, vol. 25, no. 11, 4 May 1959, col. 1676.

threatened, according to China, the security of the Soviet Union, China, India, Afghanistan and other Asian countries.<sup>58</sup> The Sino-Indian boundary dispute and the general deterioration of relations between the two major countries of Asia provided Pakistan an opportunity to cultivate China. Later, Ayub Khan dissociated himself from Western strategy in South Asia and became highly critical of the Western military aid to India.<sup>59</sup> In 1962, China and Pakistan reached a provisional agreement on a provisional border alignment of the Pakistani-occupied territories in Kashmir. This agreement was denounced by India as an infringement of her sovereignty over Kashmir.<sup>60</sup> Thus, India faced hostility on two fronts and Nehru said that this was due to a common policy among them which was a certain dislike for India.<sup>61</sup> The Foreign Minister of Pakistan went so far as to admit that "India is an adversary of Pakistan and has a dispute with China...it is in China's national interest to support Pakistan and it is in Pakistan's national interest to develop friendly relations with China".<sup>62</sup>

Pakistan had made Kashmir the main issue to solve its internal problems, i.e. a sense of separatism that had

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58 Karki Hussain, n. 42, p. 47.

59 K. Sarwar Hasan, ed., Documents on the Foreign Relations of Pakistan (Karachi, 1966), p. 369.

60 White Paper VI, Indian Note, 10 May 1962, p. 96.

61 India, Rajya Sabha Debates, vol. 40, no. 12, 22 August 1962, p. 96.

62 Z.A. Bhutto, The Myth of Independence (London: Oxford University Press, 1969), p. 148.

precipitated the crisis of 1954 over East Pakistani demands for semi-independent status.<sup>63</sup> It was relentlessly clamouring for a settlement of the matter and the Chinese had also supported Pakistani stand on Kashmir. But India held that the Chinese attack had changed the whole situation in Kashmir - China was in possession of about 15,000 square miles of land there and Pakistan had handed over 2,000 square miles to China. So, recovering the occupied territory as well as resisting future Chinese aggression was possible only through Kashmir.<sup>64</sup> After the Sino-Pak border agreement in 1962 over Kashmir, the Indo-Pak talks failed in 1963. Further efforts to reach a settlement appeared promising in early 1964 until extinguished suddenly by Nehru's death. In March 1965, the Sino-Pak boundary protocol was signed which India condemned as "unlawful seizure of parts of Kashmir".<sup>65</sup>

Ayub Khan was applying every kind of diplomatic pressure through rapprochement with China and efforts to win support from other Afro-Asian nations. Later, military pressure was maintained along the front because he concluded that the Indian Government was unlikely to take any steps

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63 Russel Brines, n. 54, pp. 126-7.

64 Karki Hussain, n. 42, p. 70.

65 Indian Note, White Paper XII, 7 April 1965, pp. 2-3.

to solve the Kashmir question. The conflict in the Rann of Kutch in April 1965 provided the first test of Pakistan's revived course of direct action and a low-cost test of Indian will and capabilities to fight.<sup>66</sup> There had been a skirmish in January 1965 when the Indian police expelled Pakistani guards from one and a half miles within Indian territory. Later, on 9 April 1965, units of regular Pakistani troops attacked Indian positions near Kanjarkot and, on 24 April 1965, four more positions, using Patton tanks and 100-pound guns which forced Indian army to bring out some heavy equipment too. The clash in the Rann of Kutch was a precursor of, and preliminary to, the more ambitious operations four months later. In May-June 1965, an assault force of the guerrilla campaign - given the high-sounding name 'Gibraltar force' in commemoration of an early Muslim conquest of the Mediterranean outpost - was organized in Murree. These guerrillas worked with regular troops of the Azad Kashmir army, a Mujahid (crusader) force of lightly trained civilian reserves, and Razakar irregulars. They were instructed to destroy bridges and vital roads, attack police stations and supply dumps, army headquarters and important installations, inflict casualties on Indian forces and attack important public figures in Jammu and Kashmir. Using the Chinese pattern,<sup>67</sup>

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66 Brines, n. 54, pp. 287-89.

67 Ibid., p. 315.

the Pakistan-controlled guerrillas entered into Indian Kashmir at widely separated points and headed for Srinagar, but were repelled.

The Indian authorities were aware of the guerrilla threat, but were quite oblivious of the potentialities for conventional attack which Pakistan was planning. The first commitment of a regular Pakistani army came on 14 August 1965 when a considerable force crossed the cease-fire line into Jammu. Four days later, Pakistani artillery began shelling villages and Indian troops concentration near Tithwal, Uri and Poonch. On 1 September 1965 they attacked far too south in the Bhimber-Chhamb area in south western sector in order to sever Kashmir. In a meeting with the Chiefs of Staff, Prime Minister Shastri said that there was no room for indecision and the generals must go ahead.<sup>68</sup> One logical response was a thrust into Pakistani Punjab - into Lahore and Sialkot - in order to prevent an anticipated Pakistani attack across the same border. General Chaudhuri decided that the attack could only be halted by air support; and so, a limited air warfare played an important role in the 1965 conflict. The Indian MIGs were inoperable that time, but the subsonic fighter plane Gnat proved its versatility and effectiveness under prevailing battle conditions. China sternly condemned India for its "criminal aggression" and expressed firm

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68 Ibid., p. 325.

support to Pakistan.<sup>69</sup> During subsequent phase of cease-fire and Tashkent Agreements China persisted in its diplomatic support to Pakistan over the Kashmir question,<sup>70</sup> and Kashmir figured in the Sino-Pakistan joint communique when President Liu Shao Chi visited Pakistan in March 1966.<sup>71</sup>

Apart from diplomatic support, China supplied arms and helped Pakistan in many other ways. With the withdrawal of the American arms supplies to the sub-continent in 1965, Pakistan turned to China and in 1966, signed an agreement with Peking for arms valued at \$120 million which included the purchase of 100 T-59 tanks, thirty MIG-19 fighters, and ten IL-28 transport planes.<sup>72</sup> In the Spring of 1967, the US resumed the sale of military spare parts to Pakistan; and in October 1970, there were reports that Pakistan was supplied with bombers, fighters and armoured personnel carriers.<sup>73</sup> Apart from that, Italy was authorized by the United States to sell surplus M-47 tanks, and Iran was allowed to sell surplus transport aircrafts to Pakistan.<sup>74</sup>

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69 Peking Review, no. 37, 10 September 1965, p. 6.

70 Ibid., no. 40, 10 October 1965, p. 28.

71 Ibid., no. 15, 8 April 1966, p. 6.

72 The Military Balance (London), 1967, p. 68.

73 Robert H. Donaldson, "India : The Soviet Stake in Stability", Asian Survey, vol. 12, no. 6, June 1972, pp. 477-8.

74 Thomas, n. 31, p. 54.

When the United States suspended its credit for the Dacca airport, China offered a \$60 million interest-free loan to Pakistan in July 1964.<sup>75</sup> At the same time there were reported moves to construct a highway between Peking and Rawalpindi; other agreements provided for issuance of free visas, round-the-clock telephone service and shipping facilities.<sup>76</sup>

Apart from the intentions of the neighbouring countries, their military capability is the most important factor which determines the military spending of a country.<sup>77</sup> The rapid rate of arms acquisition by Pakistan and China in the recent past has created an alarming situation for India. There have been increasing defence outlays in the countries beyond the subcontinent, particularly in West Asia. In the past, Jordan and Iran had transferred American F-86 Sabres and F-104 Star fighters to Pakistan, while Saudi Arabia and some of the Gulf Sheikhdoms had threatened to aid their co-religionists in Rawalpindi during the 1965 and 1971 wars.<sup>78</sup>

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75 Asian Recorder, vol. 10, 1964, p. 6008.

76 B.L. Sharma, The Pakistan-China Axis (Bombay, 1968), p. 108.

77 See Appendix III.

78 Howard L. Endman, "The United States, India and India's Neighbours", in David A. Baldwin, ed., America in an Interdependent World (New Hampshire, University Press of New England, 1976), p. 249.

The Bangladesh crisis of 1970-71 demonstrates how there cannot be any development without adequate defence. Yahya Khan's attempt to suppress the Bangladesh movement with force resulted in the influx of refugees into India threatening its socio-economic fabric. India wanted to internationalize the issue of Bengali refugees not only because it affected her but also for humanitarian reasons; Pakistan wanted the problem to be regarded as an internal matter; the Soviet Union criticized Pakistan for its actions; Britain and the United States treated it as an internal matter of Pakistan but pressed the latter to accept outside aid for the Bengalis; and the Chinese condemned India for its gross interference in the internal matters of Pakistan.<sup>79</sup>

The massive exodus of refugees from East Bengal into the Indian States of West Bengal, Assam, Tripura and Meghalaya continued. By mid-May, 30 per cent of the local population in these four states was of refugees, and the rate of influx was 60,000 per day; and the Government had spent Rs. 100 million on the shelter, food and clothings of the refugees.<sup>80</sup> Throughout April and May, Indian official and unofficial agencies along the East Bengal border were preoccupied with the reception and settlement of refugees.

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79 Robert Jackson, South Asian Crisis (London: IISS, 1975), p. 150.

80 Bangladesh Documents, Government of India, New Delhi, pp. 675-6.



Early in May, the authorities in Islamabad started co-operation with the international agencies and it seemed that political settlement in East Bengal was possible. But, Nixon's announcement about his proposed visit to China opened way for redoubled pressure on India through the United Nations which threatened to force Delhi either into reluctant abdication or into a desperate war.<sup>81</sup> This clarified the issue for both India and the Soviet Union, which had to re-examine its call for a 'collective security system in Asia'; and against this background, the Indo-Soviet Treaty of Peace, Friendship and Co-operation was signed. At the same time, the Bangladesh movement remained irrevocably committed to the goal of complete independence, and the Mukti Bahini was directed to sabotage the by-elections which were to be held in East Pakistan early in December.<sup>82</sup> India had also committed itself to the movement of independence and the situation became tense in East Bengal.<sup>83</sup> Pakistan took a threatening posture on the West front, while defensive operations were taken in the East; and they finally took the fateful decision to launch attack in the West.<sup>84</sup>

India recognized the provisional government of Bangladesh on 6 December, thereby finally committing itself

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81 Jackson, n. 79, p. 71.

82 The Statesman, 17 October 1971.

83 Jackson, n. 79, pp. 92-94.

84 Ibid., pp. 94, 111.

to the complete expulsion of Pakistan from East Bengal; and the Mukti Bahini was placed under the command of Lt. General Aurora on 10 December 1971.<sup>85</sup> Apart from land and air battles, India fought a full-scale naval war for the first time and maintained an effective blockade against both East and West Pakistan. The Pakistani submarine Ghazi was detected off the Vishakhapatnam harbour on the late afternoon of 3 December and was sunk by depth charge. From the forward naval base at Okha in Gujarat, the first Indian raid on Karachi harbour was mounted on 4 December; and a second raid by cruiser Mysore was mounted hitting oil installations and sinking a Pakistani destroyer, minesweeper etc. The Indian navy also had its setback when anti-submarine frigate Khukri was sunk by Pakistani submarines immediately after Indian navy squadrons withdrew.<sup>86</sup> The excellent performance of the army, the navy and the airforce and their masterly co-ordination led to the completion of the Indian mission on 16 December 1971 when the instrument of surrender was signed in Decca, after which a unilateral ceasefire was declared on the Western front.<sup>87</sup>

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85 Ibid., pp. 127, 136.

86 Ibid., p. 122.

87 Ibid., p. 144.

After the Bangladesh war, the balance of power in the sub-continent was tilted in India's favour, but we cannot ignore the experience of the past 25 years during which India faced external aggression on five occasions.<sup>88</sup> In Tibet, Chinese logistics have greatly improved since 1962 with the construction of air field and lateral roads running along the border.<sup>89</sup> Another development has been the growing solidarity between the United States and China since the visit to Peking by President Nixon in February 1972, and Sino-American friendship 'appears to be the cornerstone of both the Republican and Democratic administrations in Washington'.<sup>90</sup>

We cannot take the security of our sea lanes for granted. The presence of big powers in the Indian Ocean, in the Persian Gulf and in the Eastern Mediterranean pose a threat to Indian security. In 1967, several members of the Indian Parliament were dissatisfied by the role of the Indian Navy and wanted more expenditure on naval build-up. They felt that while the Navy was geared to the Pakistani threat on the West Coast, the Chinese threat would come through the Bay of Bengal.<sup>91</sup> The Red Chinese naval build-up could also threaten the straits of Malacca and the South China Sea,

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<sup>88</sup> Annual Report, 1972-73 (New Delhi: Ministry of Defence, 1973), p. 9.

<sup>89</sup> Dilip Mukerjee, n. 26, p. 669.

<sup>90</sup> New York Times, 30 June 1977.

<sup>91</sup> Times of India, "Summary of Debates", 27 June 1967.

and a Rawalpindi-Peking-Jakarta joint naval threat was also envisaged.<sup>92</sup> Apart from security needs, there are maritime and other economic interests for which the strengthening of our Navy is of prime importance. The control of the Arabian Sea and the Bay of Bengal, and the security of our ports as well as 1,200 odd islands and ocean territories, are of great importance today. Some 200 Korean, Taiwanese, Thai and Russian fishing trawlers steal away a catch of about Rs.75 crores annually.<sup>93</sup>

Despite improvement of relations with our neighbours in the recent past, the basic issues have not been resolved and so the existing situation can turn explosive any time.<sup>94</sup> There were casualties suffered by the Indian Army in the Nathu La shooting in September 1967, but the Indian leadership played it down. In the United Nations, we relied less on the rightness of our cause and more on Soviet veto which proves that, to a certain extent, we want to play down the threat posed by the Sino-Pakistan alliance which prevents us from consolidating our unity upon which rests our hopes of emerging as an independent power factor.<sup>95</sup> Internal instability and

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92 Ibid.

93 K.C. Khanna, "Indian Navy's New Horizons", Times of India, 23 November 1978.

94 Pandit Yagya Datt Sharma, "Defence Debate in Parliament", in Vikrant, vol. 3, no. 7, April 1978, p. 10.

95 Sisir Gupta, "Living with Problems", Seminar, April 1964, p. 27.

extra-regional pressures, etc., make future wars a likely possibility and this view is shared by the officer corps in India, Pakistan and Bangladesh.<sup>96</sup> And in such a situation when Pakistan needs to maintain a climate of confrontation to hold its "disparate people together",<sup>97</sup> and China wants to exploit this situation for its own interests, it is essential to maintain vigilance and to be prepared for any future threats.

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96 Stephen P. Cohen, "Military Ideology : South Asia", in Horton and others, eds, n. 8, p. 73.

97 Dilip Mukerjee, n. 26, p. 672.

CHAPTER III

## CHAPTER III

### ARMS ACQUISITION

Arms acquisition by developing countries from the developed world is a factor which works as a link between the two worlds of development. The third world countries suffer from chronic political instability; and poverty, under-development and conflicts with neighbours have contributed to tension and wars. Since the Second World War an overwhelming majority of military conflicts have occurred in the developing world. Wars of national liberations, guerrilla warfare, wars resulting from foreign intervention - these are some major types of military conflicts which the developing countries have had to face since 1945. The colonial legacy (disputed frontiers, etc.) has also generated conflicts. Expenditure on defence has thus become an important item.<sup>1</sup> A major portion of this expenditure is on arms acquisition which is defined as a process of designing, developing, producing and buying military hardware for use in a state's force postures.<sup>2</sup>

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1 Frank Barnaby and Ronald Huiskens, Arms Uncontrolled (Harvard: SIPRI, 1975), pp. 35-46. See also Mary Kaldor, "The Military in Development", World Development vol. 4, no. 6, June 1976, p. 459.

2 Ian Belly, "Military Aircraft Procurement and the Small State: The Australian Case", in Frank B. Horton and others, eds., Comparative Defence Policy (London: John Hopkins, 1974), p. 412.

India's policy of arms acquisition can be divided into three phases. Although there have been overlapping between phases, but there has been a definite shift in the methods of arms procurement which corresponds with the strategic environment, we were faced with, and the internal developments. The time span of the first phase was from the time of independence to the mid-fifties when we looked at the problem of defence in the limited context of confrontation with Pakistan. The main source of supply was Britain and some other West European countries. The second phase was from the mid-fifties to the time of the Sino-Indian war in which there were efforts to develop a base for an indigenous capability in defence production. Attempts were made to obtain necessary licenses and know-how from the developed countries. By 1959, we started diversifying the sources of weapons supply by moving towards the Soviet Union and some East European countries. The third phase, from 1962 onwards, saw the expansion and diversification of resources for defence production and we started designing and developing weapons in India.

In the early fifties, the demand for weapons had been dominated by the tension arising from the process of decolonisation which led to Partition. Defence purchases were made in the context of relations with Pakistan. We acquired some weapons which had prestige value, e.g. modern



jet aircrafts, an aircraft carrier and anti-submarine frigates.<sup>3</sup> The main aircraft suppliers in this period were Britain, France and Canada, and items purchased were mainly fighters and trainers. Among naval vessels, Britain supplied destroyers and minesweepers whereas Italy sold us one oiler. Some armoured cars were given by Britain, and the United States gave us a large number of Sherman battle tanks.<sup>4</sup>

The situation changed after 1954 when Pakistan joined SEATO and the Baghdad Pact (later called Central Treaty Organization 'CENTO'), and received a substantial amount of American military assistance. Pakistan attempted to offset India's manpower superiority with greater fire power.<sup>5</sup> Therefore, purchases of major weapons between 1954 and 1958 - Canberras, Hunters and Ouragons - followed reports that Pakistan was to receive Sabre fighters and some bombers from the United States.<sup>6</sup> The blueprint of American military assistance to Pakistan was secured by the Intelligence Bureau in 1956 and purchases were made mainly from Britain and France.<sup>7</sup> From Britain, we got fighters, bombers, monoplanes

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3 SIPRI, Arms Trade with the Third World (Stockholm, 1971), p. 454.

4 For details see Appendices IVA, IVB, IVC and IVD.

5 SIPRI, n. 3, pp. 55-56.

6 Ibid., p. 475.

7 B.N. Mullik, The Chinese Betrayal (Bombay: Allied, 1971), p. 539.

and transports; France gave Ouragons and Mysteres; Canada sold some transport planes and the United States supplied trainers, helicopters and transport planes. Twenty five Gnats were bought in 1956; their local assembly started in 1959 when we received fifteen aircrafts in component form.<sup>8</sup>

Among naval vessels, in this period, Britain gave us some coastal minesweepers, cruisers, anti-aircraft frigates and anti-submarine frigates; Italy gave Seaward defence crafts and another one came from Yugoslavia. When Pakistan received, from the United States, some Bulldogs, Chaffe and Sherman tanks and, later, some Patton tanks also, they prompted Indian orders for Sherman, Centurian and AMX-13 tanks from the United States, Britain and France respectively.<sup>9</sup>

During this period, India relied mainly on Britain for arms because our armed forces were trained in the British tradition, and consequently preferred British weapons.<sup>10</sup> Moreover, in keeping with its policy of non-alignment, India avoided military aid from either of the super powers. Acquisition of some weapons of prestige value presumably had some deterrent effect on Pakistan.<sup>11</sup> In addition to

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8 For details see Appendix IVA; see also Lorne J. Kavic, India's Quest for Security : Defence Policies, 1947-65 (University of California Press, 1967).

9 For details see Appendices IVB and IVC.

10 SIPRI, n. 3, p. 474.

11 Ibid.

that, our swelling foreign exchange reserves in the mid-fifties facilitated the direct purchase of British and French weapons.<sup>12</sup> But, dwindling foreign exchange reserve in the British banks, after 1959, restricted our ability to make outright purchases and also contributed to the diversification of sources of supply.

In the political sphere, the pro-West slant, discernible in the early years of freedom, gave way to an increasingly independent policy in the international field.<sup>13</sup> This necessitated the diversification of military suppliers, so that dependence could be spread over a number of supplying countries.<sup>14</sup> This also enhanced the freedom of action on the part of India in a number of ways. Defence Minister Chavan, for instance, stated in 1965 that the dependence of the air-force on external sources was inevitable in the early stages of its formation, but it subjected the country to political pressures of foreign powers.<sup>15</sup>

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12 After the Korean war in the early fifties, the international trade boom enabled India to accumulate a sizeable foreign exchange reserve. For details see P.C. Jain, Economic Problems of India (Allahabad: Chaitanya, 1972), pp. 371-4.

13 K.P. Karunakaran, India in World Affairs : February 1950- December 1955 : A Review of India's Foreign Relations (New Delhi, 1958), pp. 237-40.

14 SIPRI, n. 3, p. 63.

15 India, Lok Sabha Debates, series 3, vol. 40, no. 23, 30 March 1965, cols. 6827-8. A major Indian experience in this field has been regarding the attempts to obtain Lockheed F-104 Star fighters from the United States.

Another weakness of outright purchases was the problem regarding the maintenance of aircrafts. Chavan said that since the usefulness of such aircrafts was much longer in India than in the supplier countries, it became difficult to obtain spare parts and repair facilities at a later date because they were no longer needed in the supplier countries. He further stated that some suppliers would offer their planes at low prices and then make it up with high prices for the supply of spares when India needed them later.<sup>16</sup> In addition to the solution of the problem of maintenance through diversified sources of supply, competition between the suppliers of military equipments enables the purchasing country to have a wider choice and to strike a better deal.<sup>17</sup>

Thus, India has been quite careful to spread its technical dependencies quite widely so that crucial defence build-up is not affected at the whim of one country or a group of countries.<sup>18</sup> The requirements of defence of the northern frontier made India turn to the Soviet Union and the other East European countries for the supply of major weapons.

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16 India, Lok Sabha Debates, series 3, vol. 16, no. 37, col. 8478.

17 SIPRI, n. 3, p. 63.

18 Wilcox A. Wayne, "Indian Defence Industry : Technology and Resources", in Horton and others, eds., n. 2, p. 480.

Apart from helicopters and transport planes from the Soviet Union, we bought naval fighters from Britain; helicopters and transport planes from the United States, anti-submarine aircrafts from France and some fighters from Indonesia too.<sup>19</sup> In armoured vehicles, we received some tanks from Czechoslovakia and, later, obtained licence from Czechoslovakia to produce armoured personnel carriers in India.<sup>20</sup>

The Soviet Union was the main supplier of naval vessels in the sixties and the seventies. We received various types of landing crafts, fast patrol boats, submarines, frigates, torpedo boats, missile patrol boats, ASW destroyers etc. Chavan informed the Lok Sabha in November 1964 that the Government was examining the possibility of buying one submarine each from the United Kingdom and the Soviet Union.<sup>21</sup> These requirements were justified on the ground that apart from the growing Chinese navy, Pakistan and Indonesia had acquired submarines which some day could result in a Rawalpindi-Peking-Jakarta naval threat to India.<sup>22</sup> In April 1965, Chavan said that in the event of

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19 For details see Appendix IVA.

20 See Appendix IVC.

21 India, Lok Sabha Debates, series 3, vol. 36, no. 11, 30 November 1964, cols. 2323-8.

22 Times of India, 3 February 1964.

failure of negotiations with Britain, India would have to think of some other alternative, indicating Soviet Union as the other nation which had offered help.<sup>23</sup> On 6 July 1968, India entered the submarine era when the Soviet-built I.N.S. Kaveri, with its 70-men Indian crew, sailed into the naval base of Vishakhapatnam.<sup>24</sup> On the other hand, British Harriers were found politically acceptable and economically and technically more viable replacement for the Vikrant strike force, the Seahawks.<sup>25</sup> Britain was also the supplier of anti-aircraft frigates, anti-submarine frigates, aircraft carrier, ASW helicopters; and gave us license to produce 'Leander' class frigates in India.<sup>26</sup>

In the field of missiles, we depended heavily on the Soviet Union. We bought 'Atoll' missiles in 1963 to arm MIG-21 fighters and, in 1967, obtained license to produce it in India - along with some supplies from France and Britain.<sup>27</sup>

After the Sino-Indian border conflict, India got assistance from Britain and the United States under the Nasseau Agreement which was worth \$50 million each from both

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23 India, Lok Sabha Debates, series 3, vol. 41, no. 32, 5 April 1965, col. 7573; see also The Hindu, 6 April 1965.

24 National Herald, 7 July 1968.

25 Admiral A.K. Chatterjee, "Fighters for Vikrant", The Hindustan Times, 7 December 1972.

26 See Appendix IVB.

27 See Appendix IVD.

the countries, and the Commonwealth countries also contributed to the British share.<sup>28</sup> In this period, there was general expansion of the airforce and the navy for which assistance was sought from a number of countries. It has been mentioned earlier that attempts to obtain Star fighters were not fruitful despite the fact that Lockheed had put forward proposals for final assembly and production under licence in India. Its main reasons were India's link with the Soviet Union and the American reluctance to offend Pakistan by giving India identical equipment.<sup>29</sup> In 1962, the United States turned down three requests to supply data on Hughes HM-55 air-to-air missile system because it was afraid that the information might fall into Chinese hands.<sup>30</sup> In 1965, the purchases of submarines and frigates from the Soviet Union were made after negotiations with Britain and the United States had fallen through. The Soviet Union promised to establish in India a \$42 million SA-2 anti-aircraft missile complex as well as a complex to produce MIG etc., with credit payable in rupee over ten years at an interest rate of two per cent which it could use to buy Indian tea, jute and cashew nuts.<sup>31</sup>

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28 The Times, 5 March 1963.

29 SIPRI, n. 3, p. 484.

30 Aviation Week and Space Technology, 26 November 1962.

31 SIPRI, n. 3, p. 483.

On the other hand, Britain offered three "weapon" class destroyers whereas India had requested for three "Daring" class destroyers. In the same year, Britain offered an obsolete second world war model submarine; and the terms of construction of an "Oberon" class submarine were not favourable.<sup>32</sup> The United States offered India in 1967 \$17 million loan to complete the air-warning system project which had been started after 1962, but insisted on a limitation on India's expenditure on arms.<sup>33</sup>

Thus Britain and the United States either refused to provide us sophisticated weapons or offered obsolete ones. We sought Soviet assistance only after being rebuffed by the Anglo-Saxon powers, and obtained it on favourable terms. Once Soviet assistance was available, Britain and the United States were willing to provide certain facilities; this new-found willingness was part of an attempt to limit our purchases from the Soviet Union and East European countries. It can thus be stated that our policy of diversification of the sources of supply enabled us to exploit competition between the suppliers in order to get better facilities from them.

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32 Ibid.

33 Ibid. Mr Kuss gave this information on 20 June 1968 to the Senate Foreign Relations Committee on the 1968 Military Sales Act.



### Licensing Agreements for Arms Production

The policy of diversification of the suppliers of weapons enabled us in getting licence to produce certain weapons in India. We got the benefit of the competition between the suppliers, and some manufacturing companies abroad were willing to supply design specifications and technical know-how. In comparison with the policy of outright purchase, licensed production carries several advantages. Direct purchase "makes a country economically or strategically dependent on external sources for its essential defence needs, and so it must be severely discouraged".<sup>34</sup> An important step to reduce this dependence is to secure the collaboration of a technologically advanced country to set up weapon production facility, and to use such collaboration facilities as take-off points to develop further needed facilities on its own. Initially while there might be a sizeable expenditure of foreign exchange on the purchase of license, plant, machinery components and raw material, these costs are expected to be progressively eliminated. Defence preparedness is a long-term programme and its initial expenditure, however big that may be, is a step towards greater self-reliance because the problem of future price fluctuations and adverse changes in financial terms can be avoided.<sup>35</sup>

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<sup>34</sup> Rama Rao, "Arms Transfer", USI Journal, April-June 1975.

<sup>35</sup> Raju G.C. Thomas, The Defence of India (Delhi: Macmillan, 1978), p. 18.

The second advantage of licensed production is the utilization of an abundant raw materials. India is one of those third world countries which have important raw material deposits - oil, uranium, iron ore etc. Instead of exporting raw materials it can develop manufacturing capability including military hardware as part of the larger development of the economy as a whole.<sup>36</sup> There are other economic arguments also, i.e. budget savings, employment to workers, and lowering of the individual unit cost of weapons through large-scale production.<sup>37</sup> Licensing agreements provide employment as well as training to our workers, technicians and managers.<sup>38</sup> The initial dependence on overseas manufacturers for the supply of design specifications, components and know-how can be progressively reduced until such time as all production would be in the hands of Indian engineers.<sup>39</sup> The civilian spin-off from military technology can be utilized for general economic development. The education and training of the labour force will benefit the civilian sector, as will the infrastructure of roads, railways and harbours.<sup>40</sup>

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36 Sigrun Landgren-Backstorm, "Transfer of Military Technology to the Third World Countries", Journal of Peace Proposals, vol. 2, 1977, p. 112.

37 Ibid., p. 111.

38 Rama Rao, n. 34.

39 Thomas, n. 35, p. 180.

40 Landgren-Backstorm, n. 36, p. 111.

The development and growth of indigenous production through licensing agreements can be summarised as follows:

### Aircrafts

In 1940, the first aircraft plant was set up at Bangalore to produce British aircraft under license. But manufacture of that aircraft was postponed till 1946 because the British preferred that the Indian factory should concentrate on repair, over-haul and assembly of the American Vultee Vengeance bomber in service of the Royal Air Force. Between 1947 and 1950, about fifty British Percival Prentice basic flight trainers were assembled at the Hindustan Aeronautics, Bangalore plant.<sup>41</sup> Subsequently the company undertook, with British collaboration, the assembly and manufacture of Vampire fighters; and later, between 1950 and 1960, HAL produced 150 DH-82 Tiger Moth primary trainer under a licensing agreement with de Havilland of Canada.<sup>42</sup>

In 1956, the licence was acquired from Folland Aircrafts and Bristol-Siddeley Aero-Engines of Britain to produce the Folland Gnat light-weight fighters and its power plant, the Orpheus - 701 turbojet.<sup>43</sup> The production of air

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41 For details see Kavic, n. 8, p. 131.

42 India, Committee on Public Undertakings (1967-68), 8th report, 4th Lok Sabha, "Hindustan Aeronautics Limited", Ministry of Defence, pp. 21-22.

43 SIPRI, n. 3, pp. 750-53.

frames commenced in 1961 from imported components. The first Orpheus-701 engine came off the production line in November 1960. By 1963, deliveries of the Gnat fighters to the Indian Air Force had commenced.<sup>44</sup> Of the components of the Gnat air frame, 85 per cent or more are locally manufactured and indigenous content of the engine is more than 60 per cent. On the transport side, an agreement was concluded in 1959 with Hawker-Siddeley and Rolls Royce for the production of the AVRO (HS-748) aircrafts powered by the Dart RDA-7 turbojet engine. The air frame was manufactured at the aircraft maintenance depot in Kanpur and the engine at the HAL works in Bangalore. The HS-748 transport planes had been started because its predicted unit cost was \$320,000 compared with \$630,000 for its main competitor, the Friendship.<sup>45</sup> Between 1961 and 1967, 14 aircrafts were completed, 10 for the IAF and four for the Indian Airlines. The Indian Airlines placed further order for 14 HS-748 aircrafts, four of which were delivered during 1967-68.<sup>46</sup> For helicopters, an agreement was made with the Sud-Aviation of France in 1962 for manufacture of SE-3160 Alouette III general purpose helicopter powered by Artouete III B engines.<sup>47</sup> The HF-24 Marut project was

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<sup>44</sup> Kavic, n. 8, p. 132.

<sup>45</sup> SIPRI, n. 3, p. 750.

<sup>46</sup> India, Annual Report : 1967-68, Ministry of Defence, p. 50.

<sup>47</sup> Kavic, n. 8, p. 132.

undertaken in 1958 under the direction of the German engineer Dr. Kurt Tank. The initial plans were to use two orpheus-703 turbojet engines for the transonic Mk.I version and a single orpheus-12 for the supersonic Mk-2 air frame. Assembly of the first proto-type began in 1960 and was completed in eleven months after which ground trials were held and the aircraft took its maiden flight in June 1961, powered by two Orpheus-703 engines.<sup>48</sup> But the British company Bristol-Siddeley gave up the development work on the improved engine Orpheus-12 because the NATO countries lost interest in that engine; and India also refused to assume the cost of its further development,<sup>49</sup> and did not even ask a British subsidy which the company was willing to offer.<sup>50</sup>

In our agreement with the Soviet Union, there was initially a failure to modify the Soviet Klimov VK-7 turbojets. The Soviet Union later agreed to modify RD-9F-axial flow engine to fit the existing HF-24 air frame and an agreement was concluded in Moscow, in July 1962, for the licensed manufacture of Mach. 1.4 in India.<sup>51</sup> But the modified Soviet engines were eventually found to be 30 per cent below specification. Then India tried to use E-300 turbojet of Egypt; but after the

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48 CIPRI, n. 3, pp. 750-53.

49 India, Public Accounts Committee, 17th Report, Third Lok Sabha, 1966-67.

50 Aviation Week, 23 July 1962, p. 24.

51 The Statesman, 14 July 1962.

cancellation of the Egyptian programme the supersonic version did not materialize.<sup>52</sup> Due to the huge expenditure of \$3 million on the abortive programme and the unsatisfactory state of affairs in the aircraft industry, the government appointed a high powered Aeronautics Committee headed by C. Subramaniam.<sup>53</sup> The Committee submitted a summary of its report in May 1969. Its two main recommendations dealt with the future of the HF-24 Marut and the optimum utilization of other aircrafts required or being produced under licence.<sup>54</sup> The Committee felt that the development of HF-24's successor was the most important task of the aeronautical industry in India over the next ten years.<sup>55</sup>

The proposal to produce engines for HF-24 led to an interest in MiG-21 when the Soviet Union proposed that the whole air frame and the engine of a supersonic fighter should be provided.<sup>56</sup> India was initially interested in an American aircraft, but the latter's reluctance to give India a high performance aircraft caused the IAF to come round to the view that the MiG project was the only answer.<sup>57</sup> Instead of F-104 Star fighters, the State Department of the United States

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52 The Hindustan Times, 7 April 1968.

53 Ibid., 11 November 1967.

54 The Statesman, 22 May 1969. See editorial.

55 Ibid., 16 May 1969.

56 Aviation Week, 23 July 1962, p. 24.

57 India, Ministry of Defence, Annual Report : 1965-66, p. 47.

offered India surplus Skyrays or F-5s. But India signed an agreement in 1965 with the Soviet Union according to which the latter agreed to provide technical aid and plant to facilitate the establishment of factories by the end of 1965.<sup>58</sup> The factories were set up at Nasik for the manufacture of the airframe and allied equipment; at Koraput for engines; and the third one at Hyderabad for the manufacture of electronic equipment. The Nasik division was to assemble the final product.<sup>59</sup> The first MiG-21, built entirely from Indian components, was handed over to the IAF on 19 October 1970.<sup>60</sup> Its indigenous content is more than 80 per cent now. In 1970, India signed an agreement to produce an improved version of MiG-21 (M), whose indigenous content was 60 per cent in 1975.<sup>61</sup>

### Naval Vessels

Among the third world countries only Argentina and India have undertaken the construction of ships in the destroyer-frigate class since 1950.<sup>62</sup> In India, the production of heavy ships - corvettes, destroyers, frigates and

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58 Ian C.C. Graham, "The Indo-Soviet MiG Deal and Its International Repercussions" Asian Survey, vol. 3, no. 5, May 1964.

59 Thomas, n. 35, pp. 190-91.

60 SIPRI, n. 3, p. 749.

61 SIPRI, World Armaments and Disarmament : Yearbook 1975, pp. 208-9.

62 SIPRI, n. 3, pp. 733-4.

submarines - is confined to licensed agreement.<sup>63</sup> In 1955, an order was placed locally for a survey vessel and there were proposals to build a working vessel, seaward patrol crafts and some mine sweepers.<sup>64</sup> In 1960, the government acquired the Garden Reach Workshop Ltd. and the Mazagaon Docks Ltd. intending to expand the manufacture and overhaul facilities of the naval fleet. It was also planned to build small naval vessels like mine sweepers and destroyers. Orders were subsequently placed with these yards for various yardcrafts and six seaward patrol craft. During his visit to Britain in November 1964, Defence Minister Chavan accepted the British Government's offer of a special defence credit of \$13.1 million to cover the external cost of three 'Leander' class frigates in collaboration with Vickers and Yarrow.<sup>65</sup> The frigate programme was allotted to the Mazagaon Docks which formally laid the keel of the first Indian naval warship on 15 October 1966.<sup>66</sup> In the field of commercial shipyards the only one was the Hindustan Shipyard of Vishakhapatnam until 1975, after which the new Cochin Shipyard, built in collaboration with the Mitsubishi Heavy

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63 Landgren-Backstorm, n. 36, p. 116.

64 Lok Sabha Debates, vol. 1, pt. 1, 1 March 1955.

65 India, Annual Report : 1965-66, Ministry of Defence, p. 22.

66 India, Ministry of Defence, Committee on Public Undertakings, 1968-69, 42nd Report, (Lok Sabha Secretariat, New Delhi), 1969, pp. 4-6.



Industries of Japan, commenced production in 1976.<sup>67</sup> There are two other shipyards proposed to be built in collaboration with A & P Appledore of Britain to enable the Ministry of Shipping to complement the ship-building activity under the Ministry of Defence.<sup>68</sup>

### Armoured Vehicles

Much of the equipment of the army comes from the ordnance factories which produce armoured vehicles also. We concluded a licensing agreement to produce the Indian version of Chieftains from Vickers-Armstrong called 'Vijayanta' at Avadi, near Madras.<sup>69</sup> By 1976, its indigenous content was more than 75 per cent with the prospects of reaching 95 per cent in the next three to five years.<sup>70</sup> An agreement with Czechoslovakia was concluded in 1969 to produce OT-62A APC under licence.<sup>71</sup> Apart from these, the Jabalpur factory is producing Nissan Jeeps in collaboration with Japan, and Shaktiman trucks in collaboration with West Germany. These two have indigenous content of more than 75 per cent.<sup>72</sup>

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67 Thomas, n. 35, p. 209.

68 Ibid.

69 For details see Appendix V.

70 Chanskya Defence Annual (Allahabad), 1977, p. 187.

71 See Appendix V.

72 Thomas, n. 35, p. 159.

### Missiles

India undertook the licensed production of K-13 'Atoll' air-to-air missiles together with the licensed production of MIG-21s. In 1970, an agreement was signed with France for the production of S-11 anti-tank missiles at the Bharat Dynamics.<sup>73</sup> There was another agreement with France to produce R-550 Magic air-to-air missiles under licence at the Hindustan Aeronautics Limited.<sup>74</sup>

### Electronic Equipment

Development of any kind of sophisticated weapon whether it is artillery, aircrafts, ships or missiles, requires substantial reliance on the electronics industry.<sup>75</sup> Bharat Electronics undertook the manufacture of valves and transistors on a large scale. Electronic equipments and radars were neglected in the 1950s, but after the 1962 war, the Bhabha Committee was constituted which prepared a detailed plan for the future development of the electronics industry in India.<sup>76</sup> The Bhabha Committee Report, while accepting the need of production through collaboration emphasized the

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73 SIPRI, World Armaments and Disarmament : Yearbook 1978, pp. 215-16.

74 SIPRI, n. 3, p. 753.

75 Kamala Chowdhry, ed., Science Policy and National Development (Delhi: Macmillan, 1974), p. 99.

76 Ibid.

urgency of indigenous production.<sup>77</sup>

Thus we see that in the period after 1962, major purchases of Soviet tanks, aircrafts, artillery and naval vessels were made. These were seen as intermediate generation of weapons that would be supplanted with Indian weapons over the next decade. The earlier pattern of off-the-shelf arms acquisition or the end-item purchase in the more complex weapon system field gave way to licensing arrangements - a move towards a more viable defence industry.

#### Indigenous Design and Development of Arms

Indigenous effort for the production of arms enables a country to gain greater independence in defence and foreign policy decisions without any worry about reactions among prospective military suppliers and manufacturing collaborators.<sup>78</sup> Success in this policy enables the decision makers to plan according to the economic and technological capabilities within the country.

During the Second Five Year Plan (1956-61) the HAL got official approval for the development of the HJT-16 two-seat basic jet trainer in December 1959. This was the first jet engine undertaken in India without any assistance from foreign consultants.<sup>79</sup> Its detailed design work began

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77 Ibid., p. 100.

78 Thomas, n. 35, p. 181.

79 See Appendix VI.

in April 1961 by a team of engineers under Dr. V.M. Ghatge, HAL's chief aeronautic engineer. Alongwith the trainer, the design work on the HJE-2500 turbojet engine was started to power the trainer.<sup>80</sup> The problems connected with the HF-24 fighter bomber highlighted the difficulties of achieving self-reliance in a sophisticated aircraft. The German engineers had lost interest in that project because they did not train a succeeding team of Indian engineers when they left.<sup>81</sup> Despite that we succeeded in developing light-fighter bomber. We also developed some trainers, Marut MK-III strike fighters, armed light helicopters and aero-engines.<sup>82</sup>

We have developed a ship-to-ship missile which was successfully tested in December 1975, but has not reached the stage of production.<sup>83</sup> In the field of naval vessels, we completed the design of a Seaward defence boat in 1974 which was first in the series of eight and was launched in 1977.<sup>84</sup>

In the field of army equipment, we achieved success to a great extent because such equipment is more labour-intensive, as compared with the equipment for the airforce and the navy. A former Cabinet Secretary, S.S. Khera,

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80 Thomas, n. 35, p. 182.

81 Ibid.

82 SIPRI, n. 73, pp. 205-6.

83 Landgren-Backstorm, n. 36, p. 116.

84 SIPRI, n. 73, pp. 205-6.

estimated that for every uniformed man in the army there was a civilian employee.<sup>85</sup> Moreover, the British legacy of a large standing army in India and the strategic environment since independence also emphasized land defence.<sup>86</sup> We, therefore, moved towards self-sufficiency in this field faster than in any other field. One year before the United States and Britain withdrew assistance from Ambajhari and Chandrapur projects respectively, due to the Indo-Pakistan war of 1965, Defence Minister Chavan had said in the Lok Sabha that as far as the requirements of the Indian army were concerned, dependence on Western military assistance was relatively insignificant.<sup>87</sup>

As the situation along the Himalayan frontier deteriorated from 1959 onwards, efforts were made to replace the older rifle, Lee Enfield-303, which the Indian army used in the two world wars. With the encouragement of Defence Minister Krishna Menon, semi-automatic Ishapore rifles with indigenous design were preferred to the American Colt A.R.15 rifles.<sup>88</sup> At the Avadi R & D department, we

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85 S.S. Khera, India's Defence Problems (Bombay: Orient Longman, 1968), p. 55.

86 Thomas, n. 35, p. 144.

87 Times of India, 24 March 1964.

88 SIPRI, n. 3, p. 481.

completed the design of main battle tank in 1970; and large-scale production of APC is also planned whose proto-type trials were conducted in 1973.<sup>89</sup> We successfully standardized small arms on a single calibre, the 7.62 mm, to ease the problem of ammunition production and supply.<sup>90</sup>

It can, thus, be concluded that after initial direct purchases of military hardware, the emphasis shifted to licensing agreements. These agreements, coupled with the already developed capability to produce indigenously small arms etc., contributed to the growth of indigenous arms production. We can now produce all the seven categories of weapon systems, viz. aircrafts, aero-engines, missiles, tanks, warships, small arms and electronic equipment.

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89 SIPRI, n. 73, pp. 205-6.

90 India, Ministry of Defence, Annual Reports : 1963-64, pp. 37-38.

CHAPTER IV

## CHAPTER IV

### PRODUCTION BASE

There are political, economic and strategic factors which contribute to the establishment of a domestic arms production base. Such a production base is vital to the truly independent status of a country as failure to secure self-sufficiency ultimately leads to alliances, military pacts or dependence on others for the supply of strategic materials and equipment. So, the essential corollary of defence preparedness is to have a base of defence production commensurate with the extent of a country's size, its population and the areas of its vital interests - economic and political.<sup>1</sup> This is why self-sufficiency is a relative term and is sometimes defined as viability of a country in defence requirements. It is not possible for a country like ours, at this stage, to produce every kind of equipment required by our armed forces; and so viability means that "the items produced by us cover crucial aspects, and that we are not placed in a situation of being held to political, financial or military ransom

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<sup>1</sup> Rajesh K. Agarwal, Defence Production and Development (New Delhi: Arnold Heinemann, 1978) "Foreword by Suresh J. Desai".



to meet, what we consider, our reasonable needs".<sup>2</sup> It means that given the raw material the country develops the requisite industrial capacity and technological knowledge to manufacture most of its warlike requirements.<sup>3</sup> This suggests that there should be sufficient linkages between civil and defence industries.<sup>4</sup> Developments in the ordnance factories and defence public sector undertakings are intimately connected with developments in civilian sector-industries and communication network, etc. This is so because the development of equipment and weapons required by our armed forces involves various sophisticated technologies such as aeronautics, electronics, ship-building and metallurgy.<sup>5</sup>

#### Ordnance Factories

In an effort to meet the growing needs of defence forces and to achieve a greater measure of self-reliance, a large number of ordnance factories have been established all over India. At the end of World War I, there were eight such factories which increased to sixteen by the end of World War II. But those factories were established by the

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2 B.D. Nagchaudhuri, Science and Society (New Delhi: Ankur, 1977), p. 226.

3 S.T. Das, Indian Military : Its History and Development (New Delhi: Sagar Publications, 1969).

4 Nagchaudhuri, n. 2, p. 231.

5 Ibid., p. 229.

British to supplement their own requirements during the war, their production being confined to small arms, clothing and general stores.<sup>6</sup> The deteriorating border situation with China prompted the government, in late 1959, to undertake an ambitious modernization and expansion programme in its ordnance establishment.<sup>7</sup> Nehru said, in the Congress Parliamentary Party's meeting of 8 February 1960, that top priority was to be given to defence and defence industries in the 1960--61 budget and in the Third Plan.<sup>8</sup> About Rs.20 crores were sanctioned in the fiscal year 1961-62 to produce new items, renovate old plant and equipment, establish a new explosive factory at Bhandara and develop a plant for steel and special alloys.<sup>9</sup> Thereafter the number of ordnance factories increased rapidly and now there are 31 ordnance factories under the control of the Department of Defence Production.<sup>10</sup> These units produce a wide variety of stores and equipment for the three services ranging from sophisticated defence equipments to certain specialized items of food and clothing, parachutes, leather items, cables, general stores and other defence

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6 Agarwal, n. 1, p. 42.

7 Lorne J. Kavic, India's Quest for Security (Berkeley and Los Angeles: University of California Press, 1967), p. 130.

8 Times of India, 9 February 1960.

9 Ibid., 19 January 1960.

10 India, A Reference Annual, 1977 and 1978 (New Delhi: Ministry of Information and Broadcasting, 1978), p. 45.

equipment. There is self-sufficiency in the field of small arms, artillery and mountain regiments. These factories also meet the requirements of the three services for various fire control instruments - binoculars for the Navy and the Air Force and airfield lighting equipment for the Air Force.<sup>11</sup>

The value of production in these factories has risen from Rs. 15 crores in 1947 to about Rs. 375 crores in 1976-77 along with improvement in quality, reliability, precision and sophistication.<sup>12</sup> During 1976, the industrial establishments of the ordnance factories employed about 118,000 skilled, semi-skilled and unskilled workers. The value of total production during 1975-76 reached a figure of Rs. 249 crores as against Rs. 205 crores fixed as a target for that year.<sup>13</sup> The indigenous content of vehicles was 94 per cent for Shaktiman, 80 per cent for Nissan one-ton truck, and 82 per cent for Nissan petrol vehicle. In the new areas of production are the heavy gun for the army, creation of production facilities for the propellants of heavy guns, modernization of facilities at the Kirkee High Explosive Factory, the Aruvankadu Kordite Factory and the Bhandara Ordnance Factory.

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11 India, Annual Report, 1976-77 (New Delhi: Ministry of Defence, 1977), pp. 29-30.

12 India, n. 10.

13 India, n. 11, p. 30.

Defence orders cannot be steady and continuous and the rate of consumption in peacetime is much less than that in wartime.<sup>14</sup> Moreover, increase in work shifts in wartime is not possible, nor is it possible to produce the skill in a short time to run three shifts. So, the spare peacetime capacity of the ordnance factories was to be used for the manufacture of civilian items and it was intended to maintain close contact with the civilian industry to permit future planning of defence production to proceed on a realistic basis.<sup>15</sup> This decision was provoked partially by delays in civilian production in providing sufficiently advanced basic materials, components and semi-manufactured parts.<sup>16</sup> The production mix of ordnance factories now covers several items processed through diverse technologies in the field of metallurgy, electrical and mechanical engineering, chemical engineering, ballistics, aero-dynamics, under-water systems, optical systems, etc.<sup>17</sup> The Coal India Limited has engaged the ordnance factories to set up a facility at Bhandara for

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14 Press Inst. of India, Defence of India (New Delhi: Vikas, 1969), pp. 45-53.

15 H.M. Patel, The Defence of India (Bombay: Asia, 1963), pp. 15-16.

16 India, Lok Sabha Debates "Statement by Mahavir Tyagi, Minister of Defence Organisation", pt. 2, vol. 2, 25 March 1953, col. 2822.

17 India, Ministry of Defence, Story of Defence (New Delhi: Directorate of Public Relations, 1972), p. 61.

the manufacture of 5,000 tonnes of commercial explosives a year for use in gassy coal mines.<sup>18</sup> Development work is in progress in respect of production of various types of propellants for the navy, plastic explosives-based RDX for oil-well shooting required for ONGC, and RDX/TNT of different composition for warhead ammunition. The indigenous development and substitution activities resulted in a saving of Rs.17.40 crores in foreign exchange during 1975-76.<sup>19</sup>

#### Defence Public Sector Undertakings

In addition to the thirty-one ordnance factories, there are nine giant public sector undertakings employing about 93,000 people. Their production has been increasing in value at the rate of Rs.50 to 60 lakhs per year. It was Rs.346 crores in 1975-76 and Rs.405 crores in 1976-77.<sup>20</sup> Of the nine such undertakings, seven companies are wholly owned by the Government of India. The Government of India, the Government of Andhra Pradesh and the general public hold shares in the Praga Tools Ltd. The Goa Shipyard Ltd. contains the shares of the Government of India, the Mazagaon Docks Ltd., the general public and private institutions.<sup>21</sup>

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18 India, n. 10, p. 45.

19 India, n. 11, p. 40.

20 India, n. 10.

21 India, n. 11, p. 45.

Hindustan Aeronautics Limited

The growth of aeronautics industry in India is synonymous with that of HAL. It was established in 1940 as a private limited company, but was acquired by the Government of India in 1942, and was utilized mainly for the overhaul and repair of aircrafts. By 1946, it diversified its activities and established a rail coach division; and <sup>also</sup> began undertaking the assembly of small trainer aircrafts. In the fifties, it entered into license agreements with the British, French and Soviet Governments to manufacture jet fighter aircrafts, helicopters and aero-engines for the air force.<sup>22</sup> In 1964, it emerged as a large industrial complex when it took under its fold the Aeronautics India Limited.<sup>23</sup> At present, there are eleven factories located in six states which produce, apart from defence equipment and aircrafts, the HS-748 transport planes which are used by civil airlines, and agricultural aircraft Basant for aerial application of pesticides and fertilisers.<sup>24</sup> HAL's aero-engine division had achieved the distinction of being the first organization in non-Communist Asia to manufacture a gas turbine aero-engine; and the HJT-16 was the first jet aircraft designed by an

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22 India, Annual Report, 1971-72 (New Delhi: Ministry of Defence, 1972), pp. 88-89.

23 India, n. 11, p. 49.

24 India, n. 10, p. 46.

Afro-Asian country without help from either of the super-power blocs.<sup>25</sup>

The Hindustan Aeronautics Limited is now the largest public sector undertaking. It functions under the Ministry of Defence and its total value of production in 1975-76 was Rs. 113.69 crores. The export earnings in that year for repair and overhaul services of foreign customers amounted to Rs. 43.34 lakhs and the foreign exchange savings were estimated at Rs. 60 lakhs. The indigenous material content was increased from 24.3 per cent in 1974-75 to 32 per cent in 1975-76.<sup>26</sup>

#### Bharat Electronics Limited

This company grew out of the Industrial Policy Resolution of 1948 which declared that the responsibility for the wireless apparatus industry (excluding radio receiving sets) should be assigned to the public sector.<sup>27</sup> In 1948, an exploratory committee under the Ministry of Industry and Supply recommended collaboration with the French firm the Compagnie generale De Telegraphic Sans File (C.S.F.). This resulted in an agreement for a period of ten years beginning in January 1953. The list of collaborators was later extended

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25 Kavic, n. 7, p. 136.

26 India, n. 11, p. 50.

27 India, Committee on Public Undertakings, 1971-72 Report 3, 5th Lok Sabha, "Bharat Electronics Limited", Ministry of Defence, pp. 1-2.

to some twenty companies of Western Europe, the United States and Japan, including Pye Telecommunication and Marconi of England, Siemens of West Germany, Nippon of Japan, Bendix and RCA of the United States and Contraves of Switzerland.<sup>28</sup> In 1954, BEL was reconstituted as a corporation under the Ministry of Defence to design, develop and progressively manufacture electronic equipment such as transmitters, trans-receivers, oscillators, amplifiers, radar equipment, X-ray tubes, surgical and medical appliances, germanium and silicon transistors and diodes, TV picture-tube etc.<sup>29</sup> The manufacture of these communication equipments met the needs of not only the defence services but also served the requirements of broadcasting, meteorology, posts and telegraphs and civil aviation, etc.<sup>30</sup> A second unit at Ghaziabad was set up in 1973-74 which, apart from an air defence ground environment system, has undertaken manufacture and supply of microwave communication links for the Indian Oil Corporation and for the Tamil Nadu police as a turn-key project.<sup>31</sup> The government has approved a diversification plan for this unit involving an additional investment of Rs. one crore for the maximum utilization of its facilities. It was decided that the third

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28 Raju G.C. Thomas, The Defence of India (Delhi: Macmillan, 1978), p. 160.

29 Ibid., p. 161; see also India, n. 10.

30 India, n. 11, p. 51.

31 Ibid.



unit at Pune should manufacture a special type of electronic tubes based on technical know-how developed at the Bhabha Atomic Research Centre. After the commencement of its production in 1979, India will enter into the sophisticated field of electro-optics.

The production of the Bangalore and the Ghaziabad units in 1975-76 was valued at Rs.55 crores and Rs.7.52 crores respectively. The sales in that year were Rs.55.45 crores showing an increase of 28 per cent over the previous year. The company's exports amounted to Rs.7.87 crores during 1976-77.<sup>32</sup> Due to indigenisation efforts, the foreign exchange content in the equipment and components produced in the Bangalore unit came down from 26 per cent in 1971-72 to 22 per cent in 1975-76.<sup>33</sup>

#### Bharat Earth Movers Limited

This company arose out of certain activities of the rail coach division of HAL which were being conducted in collaboration with the West German firm, Maschinen fabrik Augsburg-Nurenburg (M.A.N.).<sup>34</sup> The Ministry of Defence entered into a collaboration agreement with Le Tourneau

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<sup>32</sup> India, n. 10.

<sup>33</sup> India, n. 11, pp. 52-53.

<sup>34</sup> India, Committee on Public Undertakings, 1971-72, Report 2, 5th Lok Sabha, "Bharat Earth Movers Limited", Ministry of Defence, pp. 1-4.

Westinghouse Company (now WABCO) of the United States, in 1962, for the manufacture of earthmoving equipment. The project was initially assigned to HAL but, after the Sino-Indian war, HAL submitted a project report and an ad hoc technical committee was then instituted to examine its proposal. After the advice of the committee a BEML Division was incorporated under HAL in 1964,<sup>35</sup> and it commenced operation from January 1965 with the transfer of the rail coach factory from HAL. This undertaking now has two main units - the Rail Coach Factory at Bangalore which has its own marketing division, and the Earthmoving Company at the Kolar Gold Fields.

The Rail Coach Factory meets about 25 per cent of the requirements of the railways. It is producing broad-gauge II class sleeper passenger coaches, postal and parcel vans, baggage and brake vans for the Indian Railways, and it supplements the supply from the Indian Coach Factory, Perambur. It has taken up various diversification plans, such as production of Heavy Duty Transportation Trailers, of which 40 were produced and delivered in 1975-76 and 100 were on plan for 1976-77.<sup>36</sup> The Earth Moving Company produces heavy earthmoving equipment such as scrapers, dumpers, motor-graders, wheeled-tractors and crawler-tractors. Initially it was

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35 Thomas, n. 28, p. 161.

36 India, n. 11, p. 54.

scheduled to produce 'C' scrapers and Articulated and Haulpack Rear dumps. After the Sino-Indian war, an American consultancy firm, A.T. Kearney, suggested the additional manufacture of crawler tractors and, accordingly, an earlier collaboration struck with Kamatsu Manufacturing of Japan in 1958 was transferred to the BEML Division under the Ministry of Defence.<sup>37</sup> Apart from Komatsu, the know-how for these equipments was received from WABCO of the United States and Radoja Davik of Yugoslavia; and some new items are being developed by BEML's own R & D cells. The products of BEML are used in projects like irrigation and power, cement and steel plants, mines, etc.<sup>38</sup>

The number of employees in BEML in March 1976 was 11,120; production increased from Rs.5.23 crores in 1965-66 to Rs.70.61 crores in 1975-76. Total sales in 1975-76 were worth Rs.64.98 crores and the total surplus accumulated by the company that year was Rs.20.40 crores. Earth-moving equipments and spares worth Rs.43 lakhs were exported in 1974-75 and worth Rs.159.21 lakhs in 1975-76.<sup>39</sup> The Rail Coach Factory has attained an indigenous content exceeding 95 per cent.<sup>40</sup>

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37 Thomas, n. 28.

38 Saral Patra, "Rapid Indigenisation and Self-Reliance", Mainstream, vol. 16, no. 51, 19 August 1978, p. 109.

39 India, n. 11, p. 55.

40 Ibid., p. 56.

Mazagaon Docks Limited

It was established as a Private Limited Company in 1934 and was taken over by the Government of India in 1960 for the construction of warships.<sup>41</sup> Its main business, at the time of takeover, was ship repairs but since then modern facilities like ship building berths and machine shops have been added to make the shipyard capable of building various types of vessels for the navy, passenger-cum-cargo and cargo-ships, dredgers, tankers and other small crafts like trawlers, barges, etc. The new ship-way has the capacity to build ships up to 27,000 dead weight tonnage (DWT).<sup>42</sup> This shipyard can carry out deck and engine repairs to ships of any size including under water repairs. It has already completed the fifth 'Leander' class frigate - INS Vindhyagiri - on 12 November 1977 which is a landmark in the annals of our progress towards self-reliance.<sup>43</sup> It has added two ship-building berths, an impounded wet dock capable of taking four medium-sized ships at a time, besides new production and assembly shops with modern machinery.<sup>44</sup>

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41 Agarwal, n. 1, p. 44.

42 India, n. 11, p. 58.

43 Inder Malhotra, "Producing for Defence", Times of India, 16 November 1977.

44 India, n. 10, p. 46.

The production of this company has increased from Rs.2.66 crores in 1961-62 to Rs.49.23 crores in 1975-76, which includes Rs.3,533.41 lakhs from ship construction, Rs.1,323.38 lakhs from ship-repairs and Rs.66.05 lakhs from general engineering. The company became an eligible export house in June 1975 and agreements have been reached with manufacturers of engineering goods, connected with ship building ancillaries, to export their goods through the company. The total export business in respect to construction, during 1975-76, was Rs.466.83 lakhs, and foreign exchange earnings from ship repairs amounted to Rs.468.31 lakhs.<sup>45</sup>

Garden Reach Shipbuilders and Engineers Limited (GRSEL)

This company has been in existence since the nineteenth century. Since the government of India took over in 1960, it has grown from a ship repairs workshop into a multi-unit industrial undertaking engaged in ship-building and manufacturing a wide variety of engineering products including high powered diesel engines, technological equipment for steel plants, road rollers, turbines, submergible pumps, cranes, bailey bridges, conveyor equipments, pressure vessels and heat exchangers.<sup>46</sup> Three projects have been undertaken

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<sup>45</sup> India, n. 11, pp. 59-60.

<sup>46</sup> Ibid., p. 60.

for capital expansion - the marine diesel engine project at Ranchi which enables the yard to build ocean-going cargo ships up to 26,000 DWT;<sup>47</sup> the Building Dock Project at Calcutta; and the grey iron foundry project at Belur (Howrah).

The value of production in this yard was Rs.39.22 crores in 1975-76. After incurring losses in the last few years there was a profit of Rs.30.68 lakhs. The export earnings from fabricated steel equipment were worth Rs.158 lakhs. The company achieved export orders for the supply of pumps and road rollers to the United Arab Emirates, Bangladesh, Ceylon and Libya. It has also been recognized as an export house.<sup>48</sup>

#### Goa Shipyard Limited

This company was established in November 1957 under the name of Estaleiros Navais de Goa for facilities of repairing barges which used to carry iron ore. After the liberation of Goa in 1961, the yard was given on lease to the Mazagaon Docks from April 1962 to September 1967, and a separate company was set up in October 1967 as a subsidiary of the Mazagaon Docks Ltd. It functions as separate company with its own board of management.<sup>49</sup> Now it is capable of building barges up to 10,000 DWT.<sup>50</sup> Apart from ship construction and

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47 India, n. 10, p. 46.

48 India, n. 11, p. 61.

49 Agarwal, n. 1, p. 44.

50 India, n. 10, p. 46.

ship repairs, there is an expansion plan including the construction of a fitting-out jetty, extension of existing production bays, a dry dock, capital dredging in the yard's waterfront, facilities of GRP vessels etc. The production increased to Rs.270.09 lakhs in 1975-76, registering a growth of 22 per cent over the previous year. The foreign exchange earnings from repairs were in the order of Rs.1.86 lakhs in that year as against Rs.0.85 lakhs in 1974-75.<sup>51</sup>

### Praga Tools Limited

It was registered as a public limited joint stock company in May 1943 in Secunderabad for the manufacture of high speed cutting tools and measuring instruments.<sup>52</sup> It was taken over by the Ministry of Commerce in 1959 and in December 1963 its administration was transferred to the Ministry of Defence. It has collaboration agreements with three British companies: Jones and Shipman, Kearney and Trecker, and F. Pratt and Co.<sup>53</sup> The company has two divisions - the Machine Tool Division at Kavadiguda (Secunderabad) and Forge and Foundry Division at Hyderabad. The Machine Tool Division produces cutters and tool grinders, surface grinders,

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51 India, n. 11, p. 66.

52 India, Committee on Public Undertakings, Report 25, 4th Lok Sabha, "Praga Tools Limited" (Paras in Section IV of Audit Report, 1968). Ministry of Defence, Government of India, p. 1.

53 India, Annual Report, 1963-64 (New Delhi: Ministry of Defence, 1964), p. 69.

universal milling machines, box column drilling machines, thread rolling machines and GF copying lathes, besides accessories of machine tools like lathe chucks, drill chucks machine vices etc. The Forge Foundry Division manufactures railway screw couplings, auto and diesel forgings, tractor components, industrial forgings and grey iron castings. The total value of production in 1975-76 was Rs.553.78 lakhs through which the company earned a profit of Rs.11.92 lakhs. In the last two years the company has increased its production by 68 per cent. The company has also started the production of defence items from 1977-78 and has expanded the Tool Room to meet the tooling requirements of sister defence undertakings.<sup>54</sup>

#### Bharat Dynamics Limited

This company was established at Hyderabad in the late 1968 under the Ministry of Defence, and was to manufacture ground-to-air, air-to-air and anti-tank missiles.<sup>55</sup> By 1971, the company began to deliver its products to the air-force and the army which included anti-tank missiles. The government announced that the company was manufacturing

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54 India, n. 11, pp. 64-65; see also India, n. 10.

55 G.K. Reddy, "French Aided Missiles Unit at Hyderabad", The Hindu, 23 April 1969.



battlefield surveillance radar equipment for the infantry as well as high frequency monocone antennas and intruder alarm systems.<sup>56</sup> This company achieved the production of ₹.3.20 crores in 1975-76, and sales were of the order of ₹.4.05 crores. It has its own R & D organization and so it has achieved 72 per cent indigenisation with an attempt to diversify its activities into the field of electronics.<sup>57</sup>

### Mishra Dhatu Nigam

This company was incorporated in Hyderabad in 1973 to set up indigenous capabilities for the production of a wide range of sophisticated and strategic special metals and super alloys required by some vital industrial sectors such as nuclear energy, power generation, aeronautics, space, electronics, <sup>and</sup> chemical engineering. The unit will go into production by 1980 with a cost of ₹.90 crores. The capacity of the plant is envisaged to be about 3,000 tonnes of special metals and super alloys in various sizes and shapes. The power metallurgy facility is being commissioned in March 1979 much ahead of schedule; and Melt shops and the forge shop will follow by September 1979.<sup>58</sup> These items

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56 Times of India, 21 August 1971.

57 India, n. 11, pp. 66-68.

58 The Hindustan Times, 4 March 1979.

will facilitate the indigenisation of high technology industries.

These public sector undertakings provide impetus to generation of sophisticated industrial activities in the small-scale sector also because they purchase about twenty per cent of their requirements from small-scale and ancillary units.<sup>59</sup> HAL has added twelve ancillary units to the already existing eleven, and BEL has 14 such units. All the defence public sector undertakings earned profit in 1975-76 including the PTL and GRSEL which had been incurring losses for the last few years. The major contribution to defence potential is from HAL, MDL and BEL, and the percentage of production for defence to the total production was 51 per cent. During 1976-77, these companies earned the foreign exchange of Rs.29.47 crores.<sup>60</sup> Most of the defence public sector undertakings are engaged in the production of machinery, equipment and components which are also used in the civilian sector.

Indigenous production of defence apparatus is, of course, related to the general scientific technological and industrial base of the country and so progress in all these fields is intimately related. Apart from political stability economic growth and military strength, another pillar on which

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59 Patra, n. 38, p. 109.

60 India, n. 10, p. 46.

the security of a nation rests in its scientific and technological resources and the ability to deploy these resources to augment military strength.<sup>61</sup> Moreover, defence requirements contribute to the general industrial development of a country; because of the growing technological complexity of modern warfare the production of specialised defence equipment cannot any more be centralized in factories specially designed for that purpose.<sup>62</sup> The amount of resources devoted to the R & D of a particular industry depends on how closely that industry is related to defence, medical or other social needs for which the government assumes major responsibility.<sup>63</sup> Moreover, it would be very expensive to have specialized defence factories large enough to meet a country's entire requirements during war. It thus becomes necessary in a war to mobilize the entire industrial capacity of a nation for defence production.<sup>64</sup> The development of defence production, following the conflicts with Pakistan and China, also demanded priority growth rates in heavy industries.<sup>65</sup>

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61 Nagchaudhuri, n. 2, p. 33.

62 Das, n. 3.

63 Edwin Mansfield, Industrial Research and Technological Innovation (New York: W. W. Norton, 1968), p. 196.

64 Das, n. 3, p. 262.

65 V. Pavlov, et al., India : Social and Economic Development (Moscow: Progress Publishers, 1975), p. 215.

The main question is to gear the economy of the country and its industrial and technological capacities to the needs of national defence. The process of industrialization of a country plays a crucial role in defence, and this very process is defined as filling up the empty cell of an input-output table.<sup>66</sup> At the time of our independence there were many empty cells; there were hardly any machine-building or steel industries to push the country towards sustained economic growth. Foreign assistance was, therefore, considered necessary in India to enable it to set up few basic industries and to train an army of technical, engineering and scientific personnel. The First Five-Year Plan laid stress on agriculture but it was soon realized that agricultural progress itself was dependent on heavy industries which could provide steel, tractors, harvesters, and other equipment as well as power generating units for the supply of electricity and water.<sup>67</sup> The Industrial Policy Resolution of 1956 defined the empty cells of the input-output table. The growth and diversification of industries were remarkable in the Second Five-Year Plan during which three new steel plants, each of 10 lakhs ingot tonnes capacity, were set up in the public sector. Heavy electricals, heavy machine tools and other branches of heavy industries were established along with

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66 Branco Horvat, "The Gap between Rich and Poor from Socialist Viewpoint", in Gustav Ranis, ed., The Gap Between Rich and Poor Nations (London: Macmillan, 1972), p. 98.

67 Vinod Mehta, Soviet Union and India's Industrial Development (New Delhi: Manas, 1975), p. 3.

paper and cement industries. Despite uneven performance during the Third Five-Year Plan (1961-66) and subsequent annual plans (1966-69), a diversified industrial structure was established during this period. Largely through indigenous efforts it was made possible to expand capacity in vital sector like iron and steel, mining, power generation, rail and road transport and communications. In the Fourth Five-Year Plan there was substantial production increase in alloys and special steels, aluminium, automobile tyres, petroleum, refinery products, electronics, machine tools, tractors and heavy electrical equipments.

### Iron and Steel

Along with fuel, power and machine-building industries, steel industry forms the core of basic industries without which we would always have to depend on foreign assistance. Top priority has, therefore, to be given to such industries.<sup>68</sup> Moreover, defence today is mainly the question of defence science and defence industries. This brings us back to heavy industries, which do not yield quick dividends, but take a long time and absorb money.<sup>69</sup> Among them, steel is important because "the test of a country lies in making steel plant; when it can do that, it can make

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68 India, Problems of the Third Plan : A Critical Miscellany, New Delhi, pp. 33-35.

69 Ibid., pp. 50-51.

every thing else".<sup>70</sup> India possesses one-fourth of the world's iron ore reserves in Singhbhum district of Bihar and other adjacent areas of Orissa, Madhya Pradesh, Madras, Mysore and Hyderabad.<sup>71</sup> In 1960, India's share was only one per cent of the world's production of iron ore (metal content) as compared with 26.1 per cent of the United States, 20 per cent of the USSR, 9.9 per cent of West Germany and 7.2 per cent of Britain.<sup>72</sup> The earliest attempt to produce steel by modern methods was made in 1874, but the first effort in large-scale production got under way when TISCO was set up in Jamshedpur in 1907 and IISCO at Burnpur in 1919. The first public sector industry, the Visvesvaya Iron and Steel Works Limited, was set up at Bhadravati in 1923. Since steel is essential in machinery, construction of houses, railway wagon and coaches, ships, aircrafts and agricultural implements, TISCO and IISCO could not meet all the requirements.

After independence, the development of steel industry was considered in the First Plan, but work started only in the Second Plan. Since massive investment was involved in such ventures, it was decided that all the steel mills would be set up in the public sector. But at the

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70 Ibid., p. 51.

71 According to a United Nation's survey in 1965, iron ore reserves in India amounted to 21,600 million tonnes.

72 Mehta, n. 67, p. 43.

same time the USA provided substantial credit through the IBRD to TISCO and IISCO for their expansion scheme,<sup>73</sup> and a West German firm, Krupp-Demag Combine, agreed to assist India to build a steel plant of 1.2 million tonnes capacity at Rourkela. In February 1955, India signed an agreement with the Soviet Union to set up a steel plant at Bhilai; the Soviet Union took the responsibility to deliver the plant in working order and granted India a 12-year credit of Rs. 101.96 crores for the basic plant at the nominal interest rate of 2.5 per cent.<sup>74</sup> With the help of the design institute, Giprorez, the plant was set up and it was an integrated development programme for the whole steel industry from iron ore to finished steel. Bhilai gets supply of ore from Rajhara pahar and Dalli iron ore mines, limestone from Mandini quarry and power from Korba power station. Bhilai specializes in the production of rails, heavy structurals, railway sleeper bars etc. The expansion programme of four million tonnes, signed in 1972, includes the construction of converter shops, continuous steel casting machines and plate mill '3600' which will give a boost to ship-building, machine building, defence etc.

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73 P.J. Eldridge, The Politics of Foreign Aid in India (Delhi: Vikas, 1979), p. 139.

74 Basant Chatterji, Indo-Soviet Friendship (New Delhi: S. Chand, 1974).

The proposal to set up a second steel plant with American assistance was rejected by the Clay Committee because of India's domestic and foreign policies and the American insistence that the project should be in the private sector. An agreement was eventually signed with the Soviet Union in January 1965 providing for Soviet assistance in the construction of a steel plant at Bokaro. A credit of Rs. 166.66 crores was given on 2.5 per cent interest per annum. This plant was to have an annual capacity of 4 million tonnes of ingot steel to be rolled into 3.22 million tonnes of hot and cold sheets and coils in addition to 835,000 tonnes of salable foundry iron.<sup>75</sup> Iron ore for the Bokaro plant comes from Kiriburu and Meghahaturu mines while limestone is provided by Bhawanpur and Kutneswar, and Birri provides dolomites. The installation of the plant is phased for convenience into 1.7, 2.5 and 4 million tonnes stages, on completion of which Bokaro will account for nearly 25 per cent of ingot steel capacity in the country.

Under the Fourth Plan, the steel programme was based on maximum utilization of existing steel capacity, and plans to set up three new steel plants at Salem (Tamil Nadu), Vijayanagar (Karnataka) and Vishakhapatnam (Andhra Pradesh) were made to create additional steel capacity to meet the requirements in the Fifth Plan. The management of IISCO was

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<sup>75</sup> Mehra, n. 67, p. 49; see also Chatterji, n. 74.



taken over by the central government in 1972. The Steel Authority of India Limited (SAIL) co-ordinates these industries; it owns all the shares in the public sector as well as shares in the private sector. The management of the Bhilai, Durgapur and Bokaro plants is vested in the state-owned Hindustan Steel Limited (HSL) which is a subsidiary of the SAIL. The Metallurgical and Engineering Consultants (MECON) provides consultancy and engineering services in the field of iron and steel; it is the central engineering and design bureau of the HSL, and was incorporated in 1973 as an independent company. For a high degree of technical self-reliance, an R & D unit has been set up under SAIL. An R & D plan for the steel industry has been drawn up in consultation with the Planning Commission and the Department of Science and Technology.<sup>76</sup>

Bhilai produces one third of India's total steel output - it was 4.9 million tonnes in 1973-74 which was 35 per cent of the total output. In the same year, the HSL made an overall profit of Rs.47.1 million in which Bhilai contributed Rs.177.8 millions, Rourkela Rs.17.4 millions and Durgapur incurred a loss of Rs.184.4 millions which dragged the profit of HSL down to a low level.<sup>77</sup> In 1974, Bhilai contributed

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76 India, n. 10, pp. 301-2.

77 Press Institute of India, Data India (Delhi, 1974), p. 404.

Rs.360 million to the overall profit of Rs.400 million of the HSL.<sup>78</sup> On reaching 90 per cent of the rated capacity Bokaro will also be in a position to pay the dividends of Rs.20 crores per annum and it also expects to generate over Rs.100 crores, from internal sources, for investments. Apart from this contribution to the economy, steel plants promote import substitution and reduction of the foreign exchange component in indigenous production. India exports steel to Latin America, West Asia, South East Asia, Africa and even the USA and the USSR.<sup>79</sup> Bokaro is the largest supplier of pig iron to foundries all over India constituting about 50 per cent of total despatches. In 1974, it earned Rs.110 million from its exports to the Soviet Union and Japan. It also produces grass coke, ammonium sulphate, crude tar, sinter and hot metal.

### Engineering Industry

After independence, the Heavy Machine and Building Plant (HMBP) was set up with Soviet co-operation to manufacture machinery to equip a plant with one million tonne capacity. After diversifying its products, this plant now produces blast furnace and coke-even equipment, all types of rolling stocks, electrical overhead travelling cranes of

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78 The Patriot, 26 May 1975.

79 Mehta, n. 67, p. 47.

different capacities, washing and grinding machinery and elevators etc. Since 1966, this company has been supplying machinery to Bhilai and Bokaro; electrolyzers and other equipments for the Aluminium Plant at Korba; it is already supplying equipment to the Durgapur Mining and Allied Machinery Corporation, the Heavy Electrical Limited, TISCO etc., as also drilling rigs to the ONGC; and it will provide equipment for underground railway projects in India.<sup>80</sup> The major units of engineering industry are: (i) The Heavy Engineering Corporation, set up in 1958 which has three units of heavy machines, foundry and forge, and heavy machine and tools plants; (ii) The Triveni Structural Limited, Naini (U.P.), set up in 1965 for the design and manufacture of sophisticated steel structures; (iii) The Tungabhadra Steel Products Limited (Karnataka); (iv) The Bharat Heavy Plates and Vessels Limited (Vishakhapatnam); (v) The Jessop and Company Limited; (vi) The Richardson and Cruddles Limited; and the (vii) Mining and Allied Machinery Limited, Durgapur. In a decade since its inception, the HFBP has manufactured about 24,000 tons<sup>n</sup> of machinery of different kinds as well as metal structures. India can change the design of equipments to suit the needs of importing countries.<sup>81</sup> The export of engineering goods touched the all-time high when they were

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80 Ibid., p. 53.

81 Ibid.

worth Rs.550 crores in 1976-77 as against only Rs.6 crores in 1950-51.<sup>82</sup>

### Machine Tools

The HMT Limited, Bangalore, has units at Bangalore, Pinjore (Haryana) and Kalamassary (Kerala), Hyderabad and Srinagar; there are watch factories at Bangalore and Srinagar. The Hyderabad unit has facilities to manufacture lamps and lamp components. Altogether 118 major units produce machine tools worth Rs.113.1 crores and products worth Rs.13.1 crores were exported in 1976-77. The growth rate achieved during 1976-77 was 113 per cent. The Central Machine Tools, Bangalore, is the primary Research Institute and its other functions are designing, standardization, training and documentation.<sup>83</sup>

### Power Generation

This is one of the most crucial areas of development because both agriculture and industry are dependent on power supply. Our power generation has increased from 2.3 million kilowatts at the time of independence to 17 million KWs in 1970-71.<sup>84</sup>

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82 India, n. 10.

83 Ibid.

84 Mehta, n. 67, p. 57.

The Bharat Heavy Electricals Ltd. (BHEL) was incorporated in 1964 and it consists of four units at Bhopal, Tiruchirapalli, Hyderabad and Hardwar; two more at Jhansi and Hardwar are under construction. The construction of another unit for the manufacture of seamless tubes at Tiruchirapalli has already started. India can now produce large turbo-generators and is planning to produce up to 550 MW sets. Efforts are being made to develop the Magneto-Hydrodynamic generators (MHDs) which can convert coal heat directly into electricity without using water or steam, and it will be highly economical as compared to the conventional methods.<sup>85</sup> BHEL is exporting power station equipment to Malaysia and to a number of countries of West Asia and Africa earning Rs.25 crores in 1976-77.<sup>86</sup>

Apart from thermal and hydro-electric sources, another source of power generation is that of nuclear energy. Nuclear-power generation was initiated in the country in 1969 with the commissioning of the Tarapur plant. It had installed capacity of 400 MW which has now been increased to 620 MW.<sup>87</sup> The Atomic Power Authority - an agency of the Department of Atomic Energy - is responsible for commercially operating all atomic power stations. Presently, it runs the

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85 Ibid.

86 India, n. 10.

87 Ibid., pp. 270-71.

Tarapur Station and looks after the commercial aspects of the Rajasthan Atomic Power Station Unit I. Other nuclear power plants are in different stages of development.<sup>88</sup>

### Aluminium and Copper Industry

Non-ferrous metals are required in many principal industries and so, they have important role in rapid industrial advance. India has 10 per cent of the world reserves of bauxite, which are found in Bombay, Bihar and Madhya Pradesh. The two aluminium plants at Kerala and Ratnagiri produce about 2.5 lakh tonnes while demand may go higher. With the steep rise of aluminium in the world market, India can become self-sufficient with its largest deposits of bauxite.

At present, India produces only 10,000 tonnes of copper annually, whereas annual consumption is 63,000 tonnes. With the development of one of the largest copper deposits at Malanj khand (M.P.), India will be able to meet half of its copper requirements; this will save up to Rs.35 crores in foreign exchange.<sup>89</sup>

### Instruments

The Instrumentation Ltd (Kota) manufactures various industrial process control instruments. It is also executing

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88. Ibid., pp. 79-80.

89. Mehta, n. 67, pp. 55-56.

the supply of instrumentation and control systems to certain power plants in Malaysia valued at Rs.3.60 crores. It achieved a record turnover of Rs.15.21 crores in 1976-77. Its automatic control instruments are required by industries like power, fertiliser, steel, chemicals and oil refineries. The National Instruments Ltd., Calcutta, manufactures various types of surveying, metereological, scientific and industrial instruments.<sup>90</sup>

Thus, we see that defence requirements contribute to the general industrial development of the country and, similarly, these allied industries cater to the needs of defence forces. The whole process of industrialization has a positive impact on employment, total output and value added to production. The nine states with large number of factories - Maharashtra, West Bengal, Gujarat, Tamil Nadu, Uttar Pradesh, Bihar, Andhra Pradesh, Madhya Pradesh and Karnataka - accounted for 83.1 per cent of total employment, 84.4 per cent of total output and 85.5 per cent of total value added. Moreover, 15 major industrial groups, taken together, accounted for 94.5 per cent of total employment and 96.1 per cent of value added by manufacture.<sup>91</sup>

Expenditure on industrialization plays an important role in the regional development of a country by narrowing

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90 Ibid., p. 55.

91 India, n. 10, pp. 281-7.

regional income differentials and balancing employment between regions. Exogenous income, which is generated from outside, raises the national income for the same aggregate defence budget and, thus, is a primary determinant of growth of a region.<sup>92</sup> The government policy has been the dispersal of industries by giving preference, in location of public sector, or licensing of private sector, to projects of relatively backward areas.

Along with the development of sophisticated industries and workshops, there has been a sharp increase and improvement of the communication network and the transportation system - railways, road transport, shipping and aviation. The defence needs of the country prompted the development of many remote areas along with the establishment of communication networks. This has facilitated the integration of remote regions into the mainstream of Indian society.

#### Telecommunication

A major expansion programme in this field was introduced after independence. The capital invested in this field was Rs. 18 crores in the decade 1940-41 to 1950-51, Rs. 119 crores in the decade 1950-51 to 1960-61, and Rs. 193 crores in 1959-60 to 1967-68. The telecommunication system expanded a hundred

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92 Roger E. Bolton, Defence Purchases and Regional Growth (Washington, The Brookings Institution, 1966).



fold as compared with the early forties, and the total capital outlay reached the figure of Rs.322.29 crores. Thus, the telecommunication system became a major vehicle for industrial development in India.<sup>93</sup>

### Railways

India inherited a sick railway system from the British. The railway assets, which were already depleted due to the economic depression of the thirties and intensive use in the world war II, were fragmented by partition. But indigenisation of this industry started after independence. We were largely dependent on imports in 1947 but in 1951-52, the foreign exchange needed for railway stores purchased was reduced to 30 per cent and it was further brought down to 13 per cent in 1967-68.<sup>94</sup>

There are three units of production. The Chittaranjan unit started production in 1950 and delivered 2,351 steam engines up to the end of 1972 after which the production of steam engines was terminated in favour of electric locomotives which was started in 1961. The Diesel

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93 S. Mohan Kumarmangalam, "Improvement in Telecommunication", in Vadilal Dagli, ed., Infrastructure for the Indian Economy (Bombay: Vora & Co., 1970), p. 84.

94 Ram Subhag Singh, "Railways in Post War Economy", in Vadilal Dagli, ed., *ibid.*, pp. 52-53.

Locomotive Works (Varanasi) started production in 1964 and assembled diesel locos from imported components. The indigenous content of the broad-gauge locos is now 90.5 per cent and that of meter-gauge locos 90.6 per cent. The Integral Coach Factory, Perambur, went into production in 1955; it was originally designed to produce broad-gauge coach shells, but now it has diversified and turns out furnished coaches, electric multiple units, diesel rail cars and airconditioned coaches. In addition, Bharat Earthmovers Ltd (Bangalore) and Jessop and Company (Calcutta) also produce coaches. All this shows a trend towards the modernization of railways. Steam locomotives, which were all time high of 10,613 in 1965-66 are being replaced by electric and diesel locomotives. In 1975-76, the total investment was Rs. 5,345 crores and a revenue of Rs. 1,727 crores. In 1975-76, the operational fleet consisted of 11,095 locomotives, 38,818 coaching vehicles, 395,250 wagons; and there were 14.5 lakh regular employees and about 3 lakh casual labourers. Our railway system is the largest in Asia and fourth largest in the world - it had a route length of 60,231 km; 11,000 trains run daily covering a distance of 13 lakh kilometres carrying over 80 lakh passengers and about 6.1 lakh tonnes of freight.<sup>95</sup>

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95 India, n. 10, pp. 336-40.

### Roads

We inherited 298,380 kilometres of roads from the British, 35 per cent of which were metalled. After India took to planning in 1950-51, road development became an integral part of development. In 1974-75, the total road length was 12.15 lakh kilometres as against 4 lakh kilometres in 1950-51. The proposed outlay for the Fifth Plan for central and state sectors is Rs.1,397.44 crores as against Rs.135 crores in the First Plan. The Border Road Development Board was set up in 1960 to accelerate the economic development of the north and north-eastern border areas; and the world's highest road has been constructed - average height 4,270 metres - from Manali to Leh.<sup>96</sup> The National Highway scheme was introduced in April 1947 and till March 1974 the increase was of 7,430 kilometres.<sup>97</sup>

### Shipping

Admiral S.M. Nanda, on appointment as Chief of Naval Staff, stated that a comprehensive shipping programme, both commercial and military, could produce economies of scale within the infant industries and spin-offs to ancillary

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96 Ibid., pp. 341-45; see also "Road Transport", in Daggi, ed., n. 93.

97 India, Annual Report (1974-75), Ministry of Shipping and Transport, pp. 68, 70.

industries making more economic/<sup>the</sup> heavy capital investment for the Navy.<sup>98</sup> The Ministry of Shipping and Transport declared in 1973 that, in view of India's share of world trade and world tonnage and the expansion plans of merchant marines of neighbouring countries, the rapid expansion of our merchant marine could not be over-emphasized.<sup>99</sup> The Shipyard at Cochin commenced production in 1976 in collaboration with the Mitsubishi Heavy Industries of Japan, and there are two additional shipyards to be built in collaboration with A & P Appledore of Britain. The Vishakhapatnam Yard builds cargo freights up to 12,300 deadweight tonnage (DWT), the Mazagaon Docks build up to 15,000 DWT, and the Cochin Shipyard is designed to build up to 85,000 DWT.<sup>100</sup> At present, India ranks sixteenth among the maritime countries of the world in terms of operative tonnage, and carries two per cent of international sea-borne trade.<sup>101</sup> Under the Fifth Plan, ending in 1979, the operative tonnage was fixed at 8.6 million gross registered tons (GRT) as against 3.72 lakhs GRT in 1951.<sup>102</sup>

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98 Thomas, n. 28, p. 208.

99 India, Annual Report : 1972-73, Ministry of Shipping and Transport, pp. 3-4.

100 Thomas, n. 28, p. 209.

101 India, n. 98, p. 34.

102 Times of India, 15 September 1974; see also India, n. 10, pp. 345-9.

### Aviation

There has been tremendous improvement in civil aviation since 1947, and especially after the introduction of the Indian Airlines in 1953. By the end of 1976, there were 661 aircrafts with current certificates of registration and 250 more with current certificate of air worthiness. There are four international airports, and 85 other aerodrom<sup>e</sup>s which connect the country with remote border areas in the north and the north-east. In 1976, Indian aircrafts flew 7.69 crores kilometres carried 45.35 lakh passengers and 81,805 tonnes of cargo.<sup>103</sup>

### Research and Development

Apart from the rate of production and profits earned by the industries, another major factor connected with the whole production system is the quality of the products. This quality control is much more rigorous in defence production than in civilian production because the soldier must have complete confidence in his weapons in varying climates. The rate of obsolescence is high due to accelerated speed in technical changes, and weapons should match those of the adversary to buttress the morale of

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<sup>103</sup> India, n. 10, pp. 350-1.

fighting men. In the present technological age, the rate of innovation becomes a crucial factor and this capacity is best approximated by measurement of investment in Research and Development.<sup>104</sup> This R & D capacity shows the military strength of a country in terms of its staying power as well as its immunity to pressure from foreign arms suppliers.<sup>105</sup> Apart from the above mentioned benefits, technological capacity plays the role of a regulatory agent in the production system by facilitating the realization of potential output as actual.<sup>106</sup>

The development of science for military purposes was considered to be an impolite thought during the British regime in India. But, during the Second World War, as a measure of survival, the British Government started to encourage a certain amount of developmental capability in ordnance factories, and some Technical Development Establishments (TDE) gave technical assistance and advice to these

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- 104 Ian Belly, "Military Aircraft Procurement and the Small State : The Australian Case", in Frank B. Horton, et al., ed., Comparative Defence Policy (John Hopkins, 1974), p. 414.
- 105 Frank Bray and Alvin Cottrel, "The Armed Forces of India, Iran and Pakistan", in Rusi and Brassey, Defence Year Book, 1977-78, p. 32.
- 106 Ajit K. Dasgupta, Economic Freedom, Technology and Planning for Growth (New Delhi: Associated Publishing House, 1975).

factories.<sup>107</sup> When Krishna Menon became Defence Minister, he showed keen interest in the scientific aspect of defence production. Nehru was also advised by Dr. P.M.S. Blackett that there should be linking of science with defence in the context of India's needs.<sup>108</sup> This led to the establishment of the Defence Research and Development Organisation (DRDO) in 1958 by amalgamating some of the TDEs.<sup>109</sup> By 1973, the DRDO had 34 laboratories all over the country manned by nearly 2,000 scientists and technologists and nearly 4,000 scientific-technical supporting staff. In view of the increasing importance of R & D in the field of defence, the office of the Scientific Advisor to the Ministry of Defence was established in 1948 with Dr. D.S. Kothari as the first advisor. This post has subsequently been held by Dr. S. Bhagwantam, Dr. B.D. Nagchaudhuri, Prof. K.G.K. Menon and Dr. R. Raman<sup>n</sup>.

The initial efforts of these laboratories were to indigenise certain items of ordnance and to improve them to meet varying environmental conditions. But, after the conflicts of the sixties and the seventies, many deficiencies

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107 Nagchaudhuri, n. 2, pp. 237-8.

108 S.S. Khera, India's Defence Problems (Bombay: Orient Longman ; 1968).

109 Nagchaudhuri, n. 2, p. 238.

became startlingly clear and, in 1973, it was stated that emphasis will be on indigenous design, development and production of weapons and development through licensing agreements would be avoided.<sup>110</sup> This required a solid R & D which were provided by the DRDO cells covering armaments, engineering, vehicles, propellants, electronics, aeronautics, rockets and missiles, metallic and non-metallic material, naval technology and food research. The defence R & D activities cover a wide span of items ranging from weapons, ammunition and explosives to fire control instruments, electro-optic instruments and ballistics. After the 1962 war, there was planned expansion of the army and the airforce, and then it became increasingly impractical and uneconomical to rely on off-the-shelf purchases. Moreover, the desire to avoid dependence on one or two arms suppliers and the need to have equipment suitable for high altitude operations in the Himalayas provided further incentive for the indigenous R & D.<sup>111</sup> Successful development relate to some mountainguns, howitzer, artillery shell fuzes and blank ammunition for the training of infantry; and the work on free swimmers distress signal for use in day and night has been completed.<sup>112</sup> Defence Minister Jagjivan Ram stated at

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110 Col. B.N. Kaul, "Gaps in Defence Research", The Times of India, 29 April 1978.

111 Rusi and Brassey, n. 105, p. 34.

112 India, n. 11, p. 69.



the Defence Industries Exhibition of 1978, that India had achieved 94-97 per cent indigenisation in respect of Vijayanta tanks and light vehicles.<sup>113</sup> India has achieved this production capability in a relatively short period and we have the third largest government-owned military manufacturing capability in the world; the emphasis, however, is on indigenous R & D.<sup>114</sup> Approximately 430 items have been developed in the DRDO resulting in a saving of about Rs. 145 crores in foreign exchange.<sup>115</sup>

### Electronics

The electronics industry plays an important role in achieving qualitative excellence in the field of defence and other areas of production. It has been recommended by various experts that electronics should be given priority in the field of defence for target acquisition. The Bhabha Committee Report on Electronics had emphasized that electronics was vital not only for defence but also for the entire spectrum of scientific and technological growth. The Report, which was completed just prior to Bhabha's death, noted that we have the expertise to design systems, develop

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113 Kaul, n. 110.

114 Janes All the World's Aircrafts : 1975-76  
(London: Sampson Low, Merston), pp. 113-14.

115 India, n. 10, p. 92.

equipments and undertake their manufacture. Among other things, the report said that the growth of a self-sustaining electronics industry was possible in a decade if developmental works and progressive switch-over to production and use of both indigenously designed and developed equipment was decided upon by the government.<sup>117</sup> The Electronics Commission was set up to take account of the needs of rapid development of electronics, to keep track of research done in design and development, and to promote building up of indigenous production in some sectors.<sup>118</sup> The Technological Development Council (TDC) and the National Radar Council (NRC), which were set up by the Electronics Commission, have approved 83 and 18 projects respectively for financial support from various sectors of electronics like materials, components, instruments, computers, radars etc. Most of the technology, in this case is related to import substitution activity. In order to encourage the electronics industry throughout the country, the Electronics Commission has assisted state governments in setting up functional electronics estates. The Santa Cruz Electronics Exports Processing Zone has started its operation with export on

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117 Kamala Chowdhry, ed., Science Policy and National Development (New Delhi: Macmillan, 1974), p. 100.

118 Ibid.

100 per cent basis. The Defence Electronics committee ensures that the defence requirements are properly co-ordinated with respect to overall plans. The National Information Centre, Delhi, has made considerable progress from the conceptual and planning angle for the building up of a computer network grid in connecting several important governments and autonomous organisations to form an integrated information system on an interactive basis. The Telecommunication Research Centre (TRC) of the Posts and Telegraph Department (New Delhi) is engaged in the design and development of all types of communication equipments and systems needed for the expansion and improvement of the telecommunication network in the country. The major breakthrough has been in the field of switches, both electronic and digital, and in transmission which includes satellite communication. During 1976, the total electronics production was worth Rs.410 crores and exports were worth Rs.27.10 crores. 119

From the foregoing discussion it can be concluded that there are critical choices to be made in the allocation

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of resources between civilian and military sectors. This necessitates the strategy of integrated development of the two sectors in the context of general socio-economic and political objectives.

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CHAPTER V

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### CONCLUSION

The dimensions of development relevant to our country were spelt out in the first chapter of this study. Now it remains to be analysed whether defence expenditure makes any positive contribution towards development. Many Western commentators have come to the conclusion that India should concentrate on internal problems of political stability, social change, regional integration and economic growth. Lawrence A. Veit has, for instance, maintained that even at low rates of return, India's growth would have been greater had defence funds been diverted to the civilian sector.<sup>1</sup> One can put forward a counter-argument that there is a positive correlation between defence and development and that there is, therefore, no need to make cuts in defence expenditure.

Before establishing any correlation between the two variables, defence and development, let us recollect some basic features of development. In the Indian situation, we just cannot accept the indices of mere increase in the output or per capita GDP as a true measure of economic development,

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<sup>1</sup> Lawrence A. Veit, India's Second Revolution : The Dimensions of Development (New York: McGraw Hill, 1976), pp. 110-15.

because these indices are too narrow in their perspective. Our development model will have to include changes from a traditional to a modern society. These changes include industrialization, self-reliance and gradual import substitution, and a broad general participation of the people in nation-building activities.<sup>2</sup> We have, therefore, tried to view development in three main dimensions: (i) Investment, which means the proper use of natural and capital resources for which we require heavy output, import substitution (saving foreign exchange), export activities (earning foreign exchange) and a habit of saving on the part of the people; (ii) Employment Generation, because our population growth rate is very high and the human resources should be properly used so as to attract maximum number of people in the economic activities; and (iii) Self-Reliance, for which a proper integration of science and technology in the production processes is required.

### Investment

An analysis of defence expenditure as percentage of GNP will reveal the actual burden on an average tax payer for the defence of his country.<sup>3</sup> The world military

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2 Bishwanath Ghosh, "R & D and India's Economic Growth", Commerce, vol. 137, no. 3526, Annual 1978, p. 45.

3 K. Subrahmanyam, "India's Defence Expenditure in Global Perspective", Economic and Political Weekly, vol. 8, no. 26, 30 June 1973, p. 1155.

expenditure as percentage of world GNP is well above the Indian defence burden. The countries around India - mainly Pakistan, Iran and China - spend far above the world percentage; thus posing a serious threat to the security of India.<sup>4</sup> Our defence expenditure is on the lower side of the bracket - out of the 64 countries whose defence expenditure was analysed for the year 1971, 24 countries spent more than 3.7 per cent of their GNP, which was equivalent to India's percentage; and yet none of them faced an environment as hostile as India had to face during the last 25 years.<sup>5</sup>

With such a comparatively low percentage of expenditure in the defence sector, is it correct to say that defence diverts resources from more important sectors of production? The assumption behind this line of reasoning is that savings on defence will be available for investment in civilian undertakings. Is this assumption correct? In 1971-72, personal consumption was 78 per cent and government consumption including defence was 10 per cent, which meant only 12 per cent was available for investment with 3.8 per cent of GNP on defence; but in 1965-66, 14 per cent of GNP was invested with a defence outlay of 4.1 per cent of GNP.<sup>6</sup> K. Subrahmanyam argues that more capital

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4 For comparison of military expenditures of China, Pakistan and India, see Appendix II.

5 Subrahmanyam, n. 3; see also Appendix I.

6 K. Subrahmanyam, Defence and Development (Calcutta: Minerva, 1973), p. 4.



for investment can be sought elsewhere by unearthing "black money" in the top 20 per cent of the population, and by a changed consumption pattern based on a sense of nationalism and reduction of demand for luxury goods.<sup>7</sup>

Emile Benoit has concluded after a detailed analysis that only a small part of income, not spent on defence, was put into highly productive investment in developing countries. He has shown a positive correlation between defence expenditure and growth rate - there was 150 per cent rise in real defence expenditure from 1961 to 1963 and the real GDP increased at an annual rate of about 6.3 per cent, as compared to just over 3.5 per cent increase in GDP in the period 1950-1961 which had much lower defence spending.<sup>8</sup> In the period of increased GDP agricultural output rose at 2.7 per cent per annum, eliminating the possibility that spurt in economic growth may have been due to especially favourable monsoon. Thus it can be argued that possible reduction in defence expenditure from the present level of over 3.5 per cent to the pre-1962 level of 1.8 per cent of GDP may mean less security with perhaps no appreciable rise in investment and growth rate.

Another argument against defence expenditure is based on its inflationary potential. It is pointed out

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7 Ibid., p. 5.

8 Emile Benoit, Defence and Economic Growth in Developing Countries (Lexington: Mass, D.C. Heath & Co., 1973), pp. 162-4.

that weapons and war materials are wasted through obsolescence or utilized in war, and there is no alternative use for them. Mitigation of such consequences is attempted by resorting to various types of tax structures and other fiscal measures that attempt to absorb any excess demands generated by defence-related incomes and purchases. In the period before the Sino-Indian war there was little or no inflation. The prices rose by more than 50 per cent in the six-year period 1963-68; there was one per cent decline in the mild depression year 1968-69; then there was increase of about 9 per cent till the end of 1971; and the period from 1973 to 1975 saw the price rise by about 50 per cent. It is true that post-war economies are inflation ridden and have adverse effects on saving, investment, economic planning and overall national economy. But while real defence expenditure rose by 150 per cent between 1961 and 1963, prices rose (between 1962 and 1964) at an annual rate of 7.5 per cent and the real GDP also grew by about 6.3 per cent per annum.<sup>9</sup> It proves that the growth rate in 1962-64 was accelerated by higher defence outlays, and the moderate price inflation aided the short period of economic prosperity. In 1972-73, the GNP grew by 4.5 per cent due to good agricultural production despite higher defence outlays of

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9 Ibid., p. 172.

3.8 per cent of GNP. In 1974-75, the GNP declined by 2.2 per cent, but inflation reached almost 30 per cent which was mainly due to steep rise in international oil prices and its adverse effect on the Indian economy. So, the adverse inflationary consequences of defence spending cannot be substantiated convincingly because there are other factors, such as agricultural failures, monetary expansion, deficit financing, short-fall in industrial production, distribution bottlenecks and population growth, which have to be taken into account.<sup>10</sup>

### Employment Generation

It is clear that defence requirements initiate a process of industrial growth in the country. Jawaharlal Nehru had advocated the industrial route to both national economic development and defence.<sup>11</sup> Since Nehru was aware of the requirements of modern warfare, he started the establishment of an autonomous defence superstructure upon an industrial base. Due to his philosophy for development, there was a tendency to misunderstand Nehru as favouring urban development and neglecting the agrarian sector, taking manpower and resources from the latter and developing

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10 Raju G.C. Thomas, The Defence of India (Delhi: Macmillan, 1978), p. 138.

11 Stephen P. Cohen and Richard Park, India : Emergent Power? (New York: Crane, Russak and Co. Inc., 1978), p. 18.

an industrial economy for the benefit of the upper strata of society. But in dual economies, the industrial system 'gains its existence in the new environment without being able to oust or to assimilate the divergent social system which has grown up there with the result that neither of them becomes general and characteristic for that society as a whole'.<sup>12</sup> It can be further stated that industrialization includes mechanization of agriculture and communication which are essential to the operation of a specialized and inter-dependent economy.<sup>13</sup> Improved agricultural productivity requires a greater use of industrial products, fertilisers, irrigation facilities and other modern implements. On the other hand, agricultural and rural development is essential for industrial growth because it allows the expansion of local industries through increased buying power of the bulk of the people, and it also generates domestic savings for further investment.<sup>14</sup> Thus development of industry and agriculture are interdependent and complementary.

Moreover, industrialization provides remedy for disguised unemployment or under-employment. The ratio of

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12 J.H. Boeke, Economics and Economic Policy of Dual Societies (Haarlem, 1953), pp. 3-5.

13 G.R. Madan, Social Change and Problem of Development in India (Bombay: Allied, 1971), p. 13.

14 Graham Jones, Role of Science and Technology in Developing Countries (London: Oxford, 1971), pp. 56, 97.

labour to land and other resources is so large that marginal productivity of labour is reduced to zero, although the average productivity remains positive. This average productivity determines the earnings and hence the consumption capacity of the labour force. So, a marginal body of labourers consume but they do not produce, they are employed physically but not economically. The 'working' persons save a part of output and hand it over to redundant partners for their consumption. This transfer is called 'saving potential' which is a concomitant of disguised unemployment.<sup>15</sup> The organisational set-up and family holdings make for this. Thus, planning must take account of this problem of the subsistence sector and must make full use of the saving potential associated with it.<sup>16</sup> This process can be initiated only if increase in the volume of employment in the planned sector is made to exceed the addition to the labour force consequent on the growth of population. In other words, if a number of working persons are withdrawn from the agrarian sector for work in other sectors of the economy, the total output of the former would not be diminished even though no significant reorganization or substitution of

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15 Ragnar Nurkse, Problems of Capital Formation in Underdeveloped Countries (Delhi: Oxford, 1953), pp. 36-38.

16 C.N. Vakil and P.R. Brahmananda, Planning for an Expanding Economy (Bombay: Vora & Co., 1956), pp. 376-7.

capital occurs in that sector.<sup>17</sup>

Thus we see that industrialization creates employment opportunities without affecting the agricultural sector. The ordnance factories of India employ about 150,000 workers comprising highly skilled, semi-skilled and unskilled labour; the total strength of employees in defence undertakings is about 95,000 with a larger volume of employment through ancillaries, contractors, support industries and in townships in underdeveloped areas.<sup>18</sup> The industrialization efforts are also directly related to the modernization of agriculture and infrastructure of modern economy such as electric power, railways and communications.<sup>19</sup>

### Self-Reliance

We have noticed that apart from sustained increase in the per capita income, economic growth includes industrialization, self-reliance, gradual import substitution and a broad general participation in the nation-building activities. We have already analysed the role of defence industries and the volume of employment generated by it.

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17 Madan, n. 13, p. 14.

18 India, Annual Report, 1978-79 (New Delhi: Ministry of Defence, 1979), pp. 25, 40.

19 Ashok Parthasarathi, "Self-Reliance, Science and Technology for Development : Some Aspects of the Indian Experience", in W.K. Chagula and others, eds., Pugwash on Self-Reliance (New Delhi: Ankur, 1977), p. 208.

Now, we come to self-reliance which implies 'mutual benefits from trade and co-operation and a fairer redistribution of resources...reliance primarily on one's own resources, human and natural, and capacity for autonomous goal-setting and decision making. It excludes dependence on outside influences and powers that can be converted into political pressure'.<sup>20</sup> It follows that self-reliance means capacity not to succumb to undue pressure of advanced countries which supply material gadgets and the technology to build them.

Whereas natural resources are given by nature's bounty and labour supply is determined by non-economic forces also, the stocks of real capital can be made available only in the form of outputs of the production flow itself. A temporary provision can be achieved by channeling all inputs into one productive sector yielding consumer goods; but continuous production requires a second sector producing equipment goods. It requires the existence of a group of industrial activities in the field of equipment goods capable of both producing other equipment goods and also of reproducing themselves.<sup>21</sup> We have shown in the fourth chapter that defence industries help build-up an infrastructure

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20 Ibid., p. 4. See Dr. W.K. Chagula's opening address.

21 J.F. Rweyemamu, "The Economic Interpretation of Self-Reliance" in Chagula and others, eds., n. 19, pp. 32-33.

of basic industries, including engineering industries producing equipment goods to be used in other sectors of production.

Apart from aiding other industrial and productive activities, defence industries help in the acquisition of sophisticated technology which plays an important role in development. We have seen in the third chapter that acquisition of armaments can be divided into three phases: direct purchase, buying the patents of a foreign company and producing under licence, and building an indigenous design, development and production base aided by indigenous R & D establishments. The choice between imports and indigenous manufacture is governed by the time perspective, the criticality of items under consideration and the methodology adopted to analyse the alternatives.<sup>22</sup> But we move towards self-reliance in stages - an imported technology is broken up and remodelled to suit our climate, needs and economic resources. And the next stage is to progressively indigenise the technology for the fuller exploitation of our material and human resources. This requires scientific research and development which is the prime mover of social and economic change. During the year 1977-78, 4,012 items of value of Rs.2,247.4 lakhs were

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22 Homi N. Sethna, "Science, Technology and Self-Reliance", Commerce, vol. 137, no. 3526, Annual 1978, p. 49.



indigenised in the ordnance factories, and the foreign exchange content in the defence undertakings was also reduced considerably.<sup>23</sup> This technological innovation stems from continuous demand pressure; and defence research, which has very low commercial market, also attempts to match recognised needs with technical capabilities relating specifications for future weapons, technical resources and financial considerations.<sup>24</sup>

Defence industries help throw up a group of managers and skilled manpower which facilitate the proper management and use of available resources and constitute a crucial element in the production process. But, defence production runs into problems through the limited size of the domestic market which can worsen the balance of payments also.<sup>25</sup> In such a case, a viable monetary system is required and those who produce for surplus should exchange for the consumption of others.<sup>26</sup> India is also on the verge of entering the arms export market in a substantial way which may, for a while, assist the defence sector in becoming

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23 India, n. 18, pp. 31, 40-47.

24 Jones, n. 14, p. 103.

25 Ibid., pp. 97-99.

26 J.F. Rweyemamu, "The Economic Interpretation of Self-Reliance", in Chagula and others, eds., n. 19, p. 35.

self-sustaining within the national economy.<sup>27</sup> We have exported small quantities of some conventional and less sophisticated weapons in the past on an irregular basis - sale of 50 tanks to Kuwait - and can meet some defence equipment demands from the Arab world. We could not export certain weapons, e.g. MiGs and its spares, because they were manufactured under heavily restricted Soviet licences. So, it may be useful to tie future military purchases to permission for exporting them also.<sup>28</sup> Apart from weapons export, the defence public sector undertakings exported items worth Rs.36.05 crores in 1977-78.<sup>29</sup> Mazagaon Docks and Bharat Electronics were major foreign exchange earners with Rs.18.92 crores and Rs.15.90 crores respectively; and Bharat Earthmovers Ltd. exported earthmoving equipment worth Rs.3.29 crores to Burma and received another order of Rs.77 lakhs from there.<sup>30</sup> Other markets are also being explored.

We have been able to build a defence production base with our own scientific and technological efforts and modernize it with a massive indigenisation programme.<sup>31</sup>

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27 Rajesh K. Agarwal, Defence Production and Development (New Delhi: Arnold-Heinemann, 1978), p. 54.

28 Ibid., p. 89.

29 See Appendix X.

30 India, n. 18, p. 47.

31 Lt. Gen. K.P. Cadeth, "Defence Requirements and Self-Reliance", The Indian Express, 24 May 1979.

We have noticed in earlier chapters that defence production promotes technological and industrial growth, and helps the process of national integration. It provides military support to the policy of non-alignment, and a leverage in international politics.<sup>32</sup> The adjustment of defence expenditure within the overall consumption pattern of a modern economy, without upsetting the rate of savings and investment, is a matter of sophisticated political and economic judgment.<sup>33</sup> Apart from government initiative, a wide-ranging public involvement and debate is required for the realization of development goals along with maintenance of well-equipped defence forces.

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32 Benoit, n. 8, pp. 17-18. See also Cohen and Park, n. 11, p. 17.

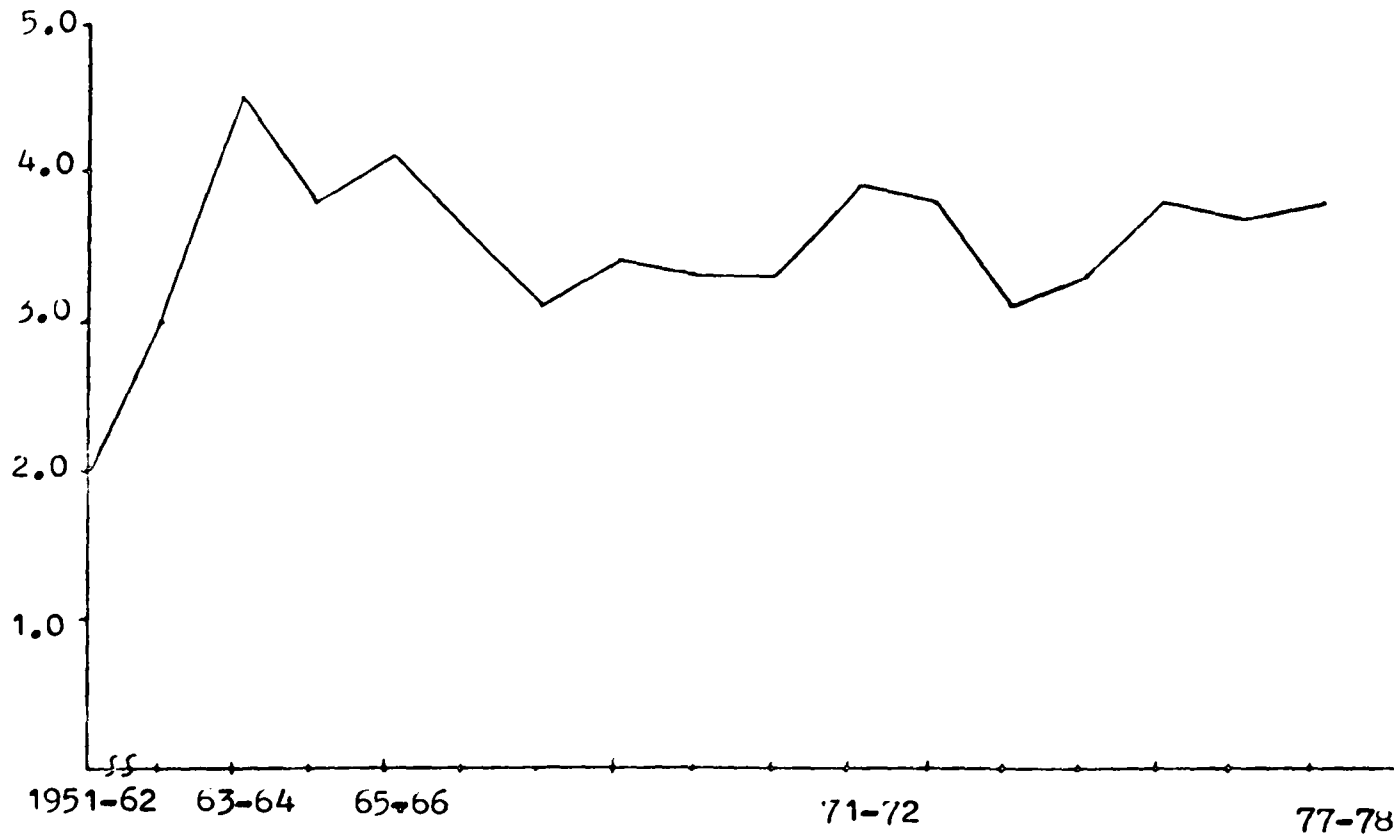
33 Subrahmanyam, n. 3, p. 1157.

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**APPENDICES**

APPENDIX I

DEFENCE EXPENDITURE AS PERCENTAGE OF G.N.P.

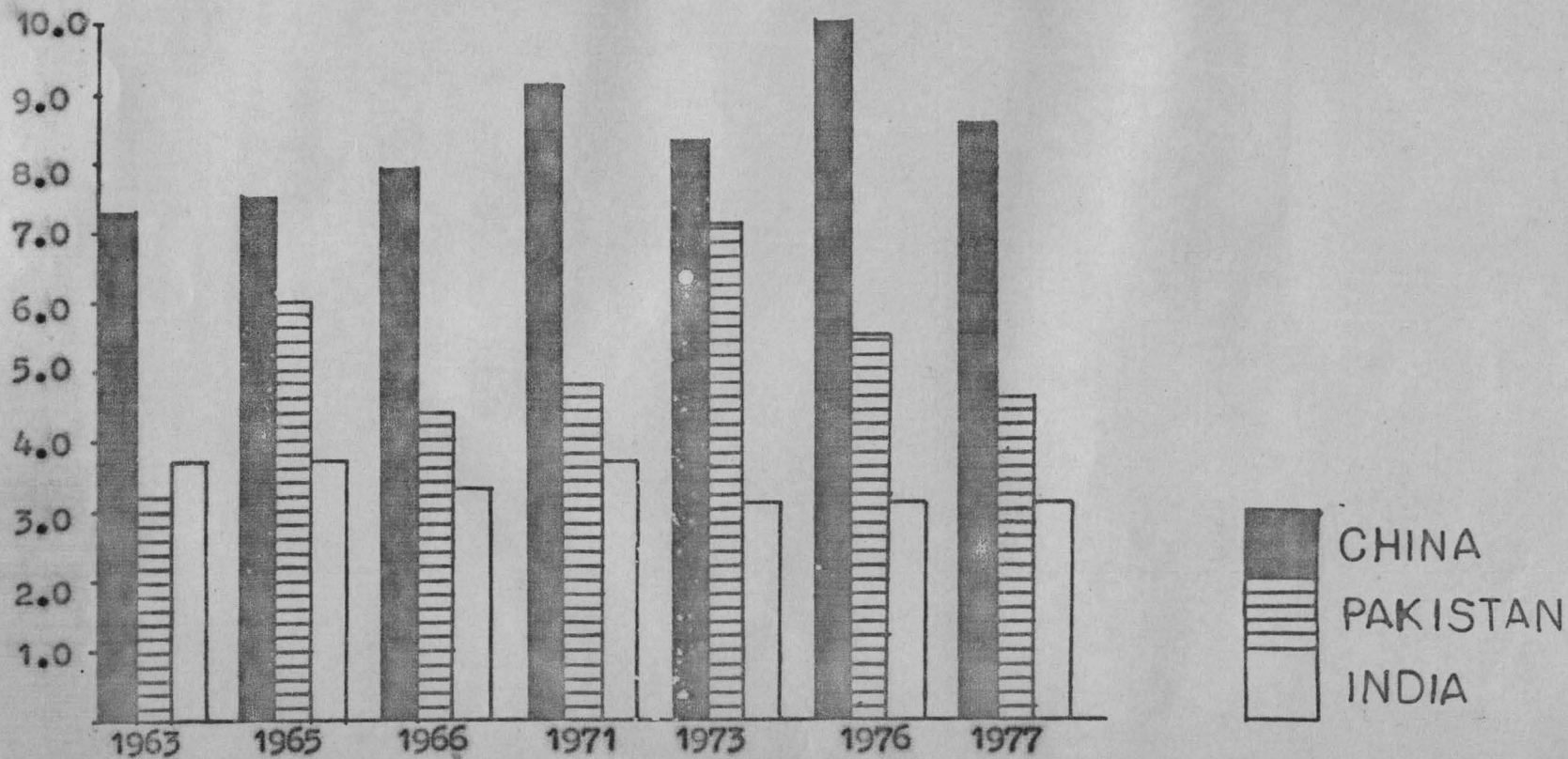


Source: India, Budget Estimates, 1978-79 (New Delhi: Ministry of Defence, 1978).

APPENDIX II

# COMPARISON OF DEFENCE EXPENDITURE:

## CHINA PAKISTAN AND INDIA



## APPENDIX III

COMPARISON OF MILITARY CAPABILITIES : CHINA,  
INDIA AND PAKISTANA. China

Population: 960-975,000,000.

Military service: Army 2-4 years, Air Force 4 years,  
Navy 5 years.

Total regular forces: 4,325,000.

GNP and defence expenditure - China has not made public  
any budget figures since 1960. Such estimates  
as there are have been speculative Western  
estimates.

Strategic Forces

IRBM: 30-40 CSS-2.

MRBM: 30-40 CSS-1.

Aircraft: about 80 Tu-16 med bbrs.

Army: 3,625,000.

## Main Forces:

11 armd divs.

121 inf divs.

3 AB divs.

40 arty divs (incl. AA divs).

15 railway and construction engr divs.

150 indep regts.

## Local Forces:

70 inf divs.

130 indep regts.

10,000 Soviet IS-2 hy, T-34 and Chinese-produced Type-59/-63 med, Type 60 (PT-76) amph and Type-62 lt tks; 3,500 M-1967, K-63 APC; 18,000 122 mm, 130 mm, 152 mm guns/how, incl. SU-76, SU-85, SU-100 and ISU-122 SP arty; 20,000 82 mm, 90 mm, 120 mm, 160 mm mor; 132 mm, 140 mm, RL; 57 mm, 75 mm, 82 mm RCL; 57 mm, 85 mm, 100 mm ATK guns; 37 mm, 57 mm, 85 mm, 100 mm AA guns.

usually two or three Districts to a Region. Divs are grouped into some 40 armies, generally of 3 inf divs, 3 arty regts and, in some cases, 3 armd regts. Main Force (MF) divs are administered by Regions but are under central cmd.

The distribution of divs, excluding arty and engrs, is believed to be:

North and North-East China (Shenyang and Peking MR\*):  
55 MF, 25 LF divs.

North and North-West China (Lanchow and Sinkiang MR):  
15 MF, 8 LF divs.

East and South-East China (Tsinan, Nanking, Foochow and Canton MR): 32 MF, 22 LF divs.

Central China (Wuhan MR): 15 MF (incl 3 AB), 7 LF divs.

West and South-West China (Chengtu and Kunming MR\*):  
18 MF, 8 LF divs.

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\* Figures include the equivalent of 2-3 divs of border



Navy: 300,000, incl 30,000 Naval Air Force and 38,000

Marines; 23 major surface combat ships.

1 Han-class nuclear-powered submarine.

1 G-class submarine (with SLBM tubes)

73 fleet submarines (incl 50 Soviet R-, 21 W-, 2 Ming-class)

7 Luta-class destroyers with Styx SSM (more building).

4 ex-Soviet Gordy-class destroyers with Styx SSM.

12 frigates (4 Riga-type with Styx SSM).

14 patrol escorts.

39 sub chasers (20 Kronstadt-, 19 Hainan-class).

70 Osa- and 70 Hoku/Komar-type FPBG with Styx SSM (more building).

140 P-4/6-class MTB (under 100 tons).

105 Hu Chwan hydrofoils (under 100 tons).

440 MCB (Shanghai-, Swatow-, Whampoa-classes).

30 minesweepers (18 Soviet T-43-type).

15 LST, 14 LSM, 15 inf landing ships, some 450 landing craft.

300 coast and river defence vessels (most under 100 tons).

#### DEPLOYMENT:

North Sea Fleet: about 300 vessels deployed from the mouth of the Yalu river to south of Lienyunkang; major bases at Tsingtao, Lushun, Luta.

East Sea Fleet: about 450 vessels: deployed from south of Lienyunkang to Tangshan; major bases at Shanghai, Chou Shan, Ta Hsiehtao.

South Sea Fleet: about 300 vessels; deployed from Tanshan to the Vietnamese frontier; major bases at Huangpu, Chanchiang, Yulin.

NAVAL AIR FORCE: 30,000; about 700 shore-based combat aircraft, organized into 4 bbr and 5 fighter divs. incl about 130 Il-28 torpedo-carrying, Tu-16 med and Tu-2 lt bbrs and some 500 fighters, incl MiG-17, MiG-19/F-6 and some F-9; a few Be-6 Madge MR ac; 50 Mi-4 Hound hel and some lt tpt ac. Naval fighters are integrated into the AD system.

Air Force: 400,000, incl strategic forces and 120,000 AD personnel; about 5,000 combat aircraft.

About 80 Tu-16 Badger and a few Tu-4 Bull med bbrs.

About 300 Il-28 Beagle and 100 Tu-2 Bat lt bbrs.

About 500 MiG-15 and F-9 Fantan FB.

About 4,000 MiG-17/-19, 80 MiG-21 and some F-9 fighters organized into air divs and regts.

About 450 fixed-wing tpt ac, incl some 300 An-2, about 100 Li-2, 50 Il-14 and Il-18, some An-12/-24/-26 and Trident. 350 hel, incl. Mi-4, Mi-8 and 16 Super Frelon.

These could be supplemented by about 500 ac from the Civil Aviation Administration, of which about 150 are major tpts.

There is an AD system, capable of providing a limited defence of key urban and industrial areas, military installations and weapon complexes. Up to 4,000 naval and air force

fighters are assigned to this role, also about 100 CSA-1 (SA-2) SAM and over 10,000 AA guns.

Para-Military Forces: Public security force and a civilian militia with various elements: the Armed Militia, up to 7 million, organized into about 75 divs and an unknown number of regts; the Urban Militia, of several million; the Civilian Production and Construction Corps, about 4 million; and the Ordinary and Basic Militia, 75-100 million, who receive some basic training but are generally unarmed.

#### B. INDIA

Population: 635,440,000.

Military service: voluntary.

Total armed forces: 1,096,000.

Estimated GNP 1977: \$101 bn.

Defence expenditure 1978♦ 29.45 bn rupees (\$3.57 bn).

\$1=8.25 rupees (1978), 8.83 rupees (1977).

Army: 950,000.

2 armed divs.

17 inf divs (1 more forming).

10 mountain divs.

5 indep armed bdes.

1 indep inf bde.

1 para bde.

14 indep arty bdes, incl about 20 AA arty regts, 4 arty observation sqns and indep flts.

100 Centurion Mk 5/7, 900 T-54/-55, some 700 Vijayanta med, 150 PT-76, AMX-13 lt tks; 700 BTR-50/-152, OT-62/-64 (2A) APC; about 2,000 75 mm, 25-pdr (mostly towed), about 300 100mm, 105 mm (incl pack how) and Abbot 105 mm SP, 550 130mm, 5.5-in, 155 mm, 203 mm guns/how; 500 120mm, 160 mm mor; 106 mm RCL; SS-11, ENTAC ATGW; 57mm, 100 mm ATK guns; ZSU-23-4 SP, 30mm, 40 mm AA guns; 40 Tigercat SAM; 40 Krishak, 20 Auster AOP9 lt ac; some Alouette III, 38 CHEETAH hel. (70 T-72 med tks, 75 Cheetah hel on order.)

RESERVES: 200,000, Territorial Army 40,000.

Navy: 46,000 incl Naval Air Force.

8 submarines (Soviet F-class).

1 aircraft carrier (capacity 25 ac, incl 12 Sea Hawk, 4 Alize, 2 Alouette III).

1 cruiser.

25 frigates (4 Leander-class with 2 Seacat SAM, 1 hel; 2 Whitby-class with Styx SSM, 12 Petya-II-class, 5 GP, 2 trg).

3 Nanuchka-class corvettes with SSM, SAM.

16 Osa-I/-II-class FPBG with Styx SSM.

4 large patrol craft.

7 coastal patrol craft (incl 5 Poluchat-class).

- 8 minesweepers (4 inshore).
- 1 LST, 6 LCT (Polnocny-class).
- (2 Kashin-class destroyers, 2 Leander-class frigates,  
5 Nanuchka-class corvettes, 3 landing craft on  
order.)

NAVAL AIR FORCE: 2,000.

- 1 attack sqn with 25 Sea Hawk (12 in carrier).
- 1 MR sqn with 12 Alize (4 in carrier).
- 3 MR sqns with 5 Super Constellation, 3 Il-38, 5  
Defender, 2 Devon.
- 1 hel sqn with 10 Alouette III.
- 3 ASW sqns with 12 Sea King, 8 Alouette III hel.
- 7 HJT-16 Kiran, 4 Vampire T55, 4 Sea Hawk ac, 4 Hughes  
300 hel.
- (8 Sea Harrier, 3 Il-38 MR ac, 3 Sea King ASW, 5 Ka-25  
hel on order.)

Air Force: 100,000; about 661 combat aircraft.

- 3 lt bbr sqns with 50 Canberra B(1)58, B(1)12.
- 13 FGA sqns: 5 with 100 Su-7B, 4 with 80 HF-24 Marut 1A,  
4 with 65 Hunter F56.
- 11 interceptor sqns with 200 Mig-21 F/PFMA/FL/MF/bis.
- 8 interceptor sqns with 160 Gnat F1.
- 1 recce sqn with 6 Canberra PR57.
- 10 tpt sqns: 1 with 16 HS-748, 2 with 32 C-119G;  
2 with 30 An-12; 1 with 29 DHC-3; 3 with 50  
C-47; 1 with 20 DHC-4.
- 12 hel sqns: 6 with 100 Mi-4; 3 with 35 Mi-8; 3 with  
120 Chetak (Alouette III); 12 AB-47, 2 S-62.

Comms flts with 1 TU-124, 6 HS-748, C-47, Devon.

OCU with MiG-21 U, 5 Su-7U, Hunter T66, Mystere IVA,  
Canberra T13.

Trainers incl 110 Kiran, 70 HT-2, 32 HS-748, C-47,  
45 Iskra, 15 Marut ac, Alouette III hel.

AA-2 Atoll AAM; AS.30 ASM.

20 SAM sites with 120 SA-2/-3.

(110 MiG-21 MF, 100 Ajeet (Gnat), 20 HS-748M, 45 Marut  
Mk 1F, 40 Iskra ac, 45 Chetak hel on order.)

Para-Military Forces: About 200,000 Border Security  
Force, 100,000 in other organizations.

### C. PAKISTAN

Population: 76,780,000.

Military service: voluntary.

Total armed forces: 429,000.

Estimated GNP 1977: \$17.6 bn.

Defence expenditure 1978-79: 9.15 bn rupees (\$938 m).

\$ 1 = 9.75 rupees (1978), 9.89 rupees (1977).

Army: 400,000 (incl 29,000 Azad Kashmir troops).

2 armed divs.

16 inf divs.

3 indep armd bdes.

3 indep inf bdes.

6 arty, 2 AD bdes.

5 army aviation sqns.

M-4, 250 M-47/-48, 50 T-54/-55, 700 T-59 med, 15 PT-76, T-60, 50 M-24 lt tks; 550 M-113 APC; about 1,000 75mm pack, 25-pdr, 100mm, 105mm, 130mm and 155 mm guns/how; M-7 105 mm SP guns; 270 107mm, 120mm mor; 57mm, M-36 90 mm SP ATK guns; 75mm, 106mm RCL; Cobra ATGW; ZU-23, 30mm, 37mm, 40mm, 57 mm, 90mm, 3.7-in AA guns; 9 Crotale SAM; 40 O-1E lt ac; 12 Mi-8, 6 Puma, 20 Alouette III, 12 UH-1, 15 Bell 47G hel. (TOW ATGW, 29 Puma hel on order.)

RESERVES: 500,000.

Navy: 11,000.

4 submarines (Daphne-class).

5 SX-404 midget submarines.

1 lt cruiser (trg ship).

6 destroyers (1 ex-British Battle-, 1 CH-, 2 CR-, 2 ex-US Gearing-class).

1 frigate (ex-British Type 16).

3 large patrol craft (2 ex-Chinese Hainan-class).

12 FPB (ex-Chinese Shanghai-class), 4 Hu Chwan hydrofoils.

7 coastal minesweepers.

4 Alouette III, 6 Sea King SAR hel.

(3 Hainan-class patrol craft on order.)

RESERVES: 5,000.

Air Force: 18,000; 257 combat aircraft.

1 lt bbr sqn with 11 B-57B (Canberra).

4 fighter sqns with 21 Mirage IIIEP/DP, 28 VPA.

9 FGA sqns; 7 with 135 MiG-19/F-6, 2 with 40 F-86.

1 recce sqn with 13 Mirage IIIRP, 4 RT-33A.

1 MR sqn with 3 Atlantic, 2 HU-16B.

Tpts incl 12 C-130B/E, 1 L-100, 1 Falcon 20, 1 F-27,

1 Super King Air, 1 Bonanza.

10 HH-43B, 4 Super Frelon. 12 Alouette III, 1 Puma,

12 Bell 47 hel.

Trainers incl MiG-15UTI, 45 Saab Supporter, 12 T-33A,

30 T-37, F-86.

Sidewinder, R.530, R.550 Magic AAM.

RESERVES: 8,000.

Para-Military Forces: 109,100. 22,000 National Guard,

65,000 Frontier Corps, 15,000 Pakistan Rangers,

2,000 Coastguard, 5,100 Frontier Constabulary.

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Source: IISS, The Military Balance 1978-79 (London, 1978).



APPENDIX IV

ARMS SUPPLIES TO INDIA

A. Aircrafts

Period	Number	Item	Type	Supplier	Comments
1	2	3	4	5	6
1949-53	62	HAL/Perceival Prentice	Trainer	UK/India	Under licence
1950	10	Short Sealand	Flying boat	UK	
(1950-51)	(20)	DHC-1 Chipmunk	Trainer	Canada	
1953	5	Fairey Firefly T.T.1.	Fighter	U.K.	
1953	(10)	D.H. Vampire N.F.54	Fighter	U.K.	Ex-RAF
1953-54	71	Dassault M.D. 450 Ouragon	Fighter interceptor	France	
1953-59	230	HAL/D.H. Vampire F.B.9	Fighter	U.K./India	Under licence
1954	6	Sikorsky S-55	Helicopter	USA	
1954	26	Fairchild C-119C Packet	Transport	USA	
1955	2	Il-14	Transport	USSR	Gift
1955	2	Vickers Viscount 730 and 723	Transport	UK	

contd.....

1	2	3	4	5	6
1955	10	Auster A.O.P. 9	Monoplane	UK	
1956	30	NA T-6G Texan (Harvard)	Trainer	USA	
1956	20	Auster A.O.P.9	Monoplane	UK	
1956-60	50	HAL/D.H.Vampire T.55	Fighter	U.K./India	Produced under licence
1957	6	DHC-3 Otter	STOL transport	Canada	
1957	(33)	Dassault M.D.450 Ouragon	Fighter-interceptor	France	
1957-58	6	Bell 47G-3B	Helicopter	U.S.A.	
1957-61	160	Hawker Hunter F.56	Fighter	U.K.	
1957-61	22	Hawker Hunter T.66	Fighter	U.K.	
1958	5	Fairey Firefly T.T.4	Fighter	U.K.	
1958	66	English Electric Canberra B(1)58	Bomber	U.K.	
1958	8	English Electric Canberra PR.57	Bomber	U.K.	
1958	6	English Electric Canberra T.4	Bomber	U.K.	
1958	25	Folland Gnat	Light-weight Fighter	U.K.	

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Contd.

1	2	3	4	5	6
1958	110	Dassault Mystere IV A	Interceptor Ground attack	France	
1958	20	DHC-3 Otter	STOL transport	Canada	
(1959)	15	Folland Gnat	Light-weight fighters	UK	In component form for local assembly
1960	2	Sikorsky S-62	Helicopter	USA	Supplied for evaluation
1960	24	Il-14	Transport	USSR	
1960-63	24	Armstrong Whitworth Seahawk	Naval fighter	U.K.	
1960-(65)	100	HAL/Folland Gnat	Light weight Fighter	U.K./India	Produced under licence
1961	29	Fairchild C-119G Packet	Transport	USA	
1961	6	Bell 47G-3B	Helicopter	USA	
1961	10	Mi-4	Helicopter	USSR	For cash
1961	8	An-12	Heavy Transport	USSR	
1961	15	Breguet 1015 Alize	ASW aircraft	France	

contd....

1	2	3	4	5	6
1961-65	12	Armstrong Whitworth Seahawk	Naval Fighter	U.K.	Refurbished
1962	2	DHC-4 Ceribou	STOL Transport	USA	MAP
1962	16	Mi-4	Heavy Transport	USSR	for cash
1962	8	An-12	Asw aircraft	USSR	
1962	8	DH-Vampire T.55	Fighter	Indonesia	
(1962)	(23)	Fairchild C-119 G Packet	Transport	USA	
1962-64	12	Lockheed C-130 Hercules	Transport	USA	Free loan basis with air and ground crew provided
1963	5	Auster A.O.P.9	Monoplane	UK	
1963	24	Fairchild C-119G Packet	Transport	USA	MAP
1963	6	MiG-21	Fighter	USSR	
1963	6	Mi-4	Heavy Transport	USSR	For cash
1963	8	An-12	ASW aircraft	USSR	
1963	20	Sud Alouette III	Helicopter	France	
1963	5	DHC-3 Otter	STOL Transport	Canada	Emergency aid
1963	8	Douglas C-47	Transport	Canada	Emergency aid

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Contd...

1	2	3	4	5	6
1963	36	CCF T-6 Harvard	Trainer	Canada	Emergency aid
1963-64	16	DHC-4 Caribou	STOL Transport	Canada	On loan
1965	36	Mi-4	Heavy Transport	USSR	Deferred payment
1965	6	BAC Canberra B(1)58	Long range bomber	UK	
1965-67 (90)		MiG-21	Fighter	USSR	Direct Purchase
1965-67	10	HAL/HS-748	Transport	UK/India	Produced under licence
1966	40	Mi-4	Heavy Transport	USSR	On deferred payment
1966	24	Armstrong Whitworth Seahawk	Naval fighter	FRG	
(1966)	14	MiG-21 UTI	Fighter	USSR	
(1966)	10	An-12	ASW aircraft	USSR	
1966-69	100	HAL/HS Gnat	Light-weight fighter	UK/India	Production expanded due to success in 1965
1966-73	120	HAL/Sud Alouette III	Helicopter	France/India	Indigenous content 96 per cent
1967	3	TU-124	Transport	USSR	
1967	36	HS Hunter F.56	Fighter	UK	Refurbished

1	2	3	4	5	6
1967	12	HS Hunter T.66 D	Fighter	UK	Refurbished
1967-74	196	HAL/MiG-21 FL	Fighter	USSR/India	Indigenous content 60 per cent in 1973
1968	3	Breguet 1050 Alize	ASW aircraft	France	
1968	4	DHC-4 Caribou	STOL transport	Canada	
1968-69	4	HAL/HS-748	Transport	UK/India	Continued licensed production
1968-70	100	SU-7B	Fighter/Ground- attack	USSR	Unit cost - \$1 million
1970-71	12	BAC Canberra B.15 and B.16	Bomber	UK	Ex-RAF; Refurbished
1970-71	5	HAL/HS-748	Transport	UK/India	Continued licensed production
1970-71	10	BAC Canberra B(1)12	Long-range bom- ber	New Zealand	
1971	50	SU-7B	Fighter/Ground attack	USSR	
1971	6	Westland Seaking	Helicopter	UK	For ASW
(1971)	10	Hughes 300	Helicopter	USA	For Navy
(1971)	20	Mi-8	Helicopter	USSR	
(1971)	140	SA-315 Cheetah	Helicopter	France/India	Produced at HAL

1	2	3	4	5	6
1972	7	MiG-21 M	Fighter	USSR	Delivered prior to licensed production
(1972)	5	HS Hunter	Fighter	UK	Refurbished
1972	150	HAL/MiG-21 MF	Fighter	USSR/India	Improved version of licensed production
1972	26	HAL/HS-748	Transport	UK/India	To meet IAF order of 45
1972	8	Aerospatiale Alouette III	Helicopter	France	To be used in 'Leander' class Frigate
1972	200	HAL/SA-315 Cheetah	Helicopter	France	Produced under licence
1973-74	6	Westland Seaking	Helicopter	UK	For ASW
...	...	HAL/HS Gnat MK. II	Fighter-bomber	UK/India	Production of improved version
...	20	HAL/HS-748	Transport	UK/India	Freighter version to be produced
1974	99	SA-316 B Alouette III	Helicopter	France/India	Produced at HAL

contd....

1	2	3	4	5	6
1975	50	TS-11 Iskra	2 seat jet-trainer	Poland	
1975	4	Il-38	ASW aircraft	USSR	
1976	5	Ka-25 Harmona	ASW helicopter	USSR	
1976	50	HAL/MiG-21 B.15	Fighter	USSR/India	Produced under licence
1977	12	Dassault Breguet Alize	ASW aircraft	France	

Source: SIPRI, Arms Trade Register (Cambridge, 1975).

SIPRI, World Armaments and Disarmament Yearbook (Stockholm, 1978).



B. NAVAL VESSELS

Period/ Date	Number	Item	Supplier	Comments
1	2	3	4	5
1950	3	Destroyer "R" class	UK	
1953	3	Destroyer Escort 'Hunt' class	UK	On loan
1953	1	Oiler	Italy	
1954-55	2	Inshore minesweeper 'Ham' class	UK	
1956	4	Coastal minesweeper 'Ton' class	UK	Completed in 1956
1957	1	Cruiser 'Colony' class	UK	
1957-58	4	Seaward defence Craft 'Savitri' class	Italy	3 delivered in 1958
1958	1	Anti-aircraft frigate 'Leopard' class	UK	Completed in 1958
1958	3	Anti-submarine frigate 'Backwood' class	UK	2 delivered in 1959
1959	2	Seaward defence craft 'Sharda' class	Yugoslavia	completed in 1959
1960	2	Anti-aircraft frigate 'Leopard' class	UK	Completed in 1960

contd....

1	2	3	4	5
1960	2	Anti-submarine frigate 'Whitby' class	UK	Completed in 1960
1961	1	Aircraft carrier 'Majestic' class	UK	
1966	2	Landing craft 'Polnocny' class	USSR	
1967	5	Fast patrol boat 'Poluchat' class	USSR	
1968	1	Submarine tender modified 'Ugra'	USSR	
1968	2	Landing craft 'Polnocny' class	USSR	
(1968)	1	Fast patrol boat 'Poluchat' class	USSR	
1968-69	2	Submarine 'F' class	USSR	2300 tons submerged
1969	5	Frigate 'Petya' class	USSR	
1970	2	Submarine 'F' class	USSR	
1971	1	Submarine tender	USSR	Ex-Soviet fleet mine-sweeper
(1971)	1	Frigate 'Petya' class	USSR	
1971-72	8	Motor torpedo boats	USSR	Armed with "Styx" SSMs

contd...

1	2	3	4	5
1972	2	Frigate 'Petya' class	USSR	
1972	6	Frigate 'Leander' class	UK/India	Armed with 'Seacat' SAMs
1975	8	Seaking ASW Helicopter	UK	
1975	8	'Nanuchka' missile patrol boat	USSR	
1976	2	'Osa 65' missile patrol boat	USSR	
1977	5	'Kashin' ASW destroyer	USSR	

Sources: SIPRI, Arms Trade Register (Cambridge, 1975).

SIPRI, World Armaments and Disarmament Yearbook (Stockholm, 1978).

C. ARMoured FIGHTING VEHICLES

Period/ Date	Number	Item	Type	Supplier	Comments
1	2	3	4	5	6
1950	(120)	Daimler and Humber	Armoured car	UK	
1953	180	M-4 Sherman	Main battle tank 34 tons (WWII version)	USA	Some supplied before 1950
1956-57	210	Centurian	Main battle tank 50-52 tons	UK	
(1956-57)	50	Ferret	Armoured car	UK	
1957-58	150	AMX-13	Light tank (15 tons)	France	
1964	70	PT-76	Light tank (16 tons)	USSR	
(1965)	80	PT-76	Light tank (16 tons)	USSR	
1967-73	500	Vijayanta	Medium battle tank (37 tons)	UK/India	Version of Vickers 37

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contd....

1	2	3	4	5	6
1968-71	225	T-54	Main battle tank	Czechoslovakia	
1968-71	225	T-55	36 tons each	USSR	
1969-72	(120)	OT-62A	APC (13 tons)	Czechoslovakia/ India	Under licence
1971	30	OT-64	APC(12.5 tons)	Czechoslovakia	

Sources: SIPRI, Arms Trade Register (Cambridge, 1975).

SIPRI, World Armaments and Disarmament Yearbook (Stockholm, 1978).

D. MISSILES

Year	Number	Item	Type	Supplier	Comments
1	2	3	4	5	6
1963	(36)	K-13 'Atoll'	AAM	USSR	To arm MiG-21
1965-66	102	SA-2	SAM, 40 Km.	USSR	17 sites; cost: \$112 million
1966-67	(540)	K-13 'Atoll'	AAM	USSR	To arm MiG-21
1967-73	(1120)	K-13 'Atoll' (Bharat)	AAM	USSR/India	Produced under licence
1968	(50)	Nord AS.30	ASM; 12 Km	France	
1968-72	(75)	SA-2	SAM	USSR	8 batteries; 50 sites
1969	(50)	Nord Entac.	ATM; 2 Km.	France	
1969	(50)	Nord SS.11	SSM; 3 Km.	France	
1971-72	(96)	SS-N.2-'Styx'	Sh.Sh.M.; 35 Km	USSR	4 missile launchers in 2 pairs
1971-73	(750)	Nord SS.11	ATM	France/ India	Licensed production
1972	(20)	Short Seacat	Sh.Sh.M; 4 Km	UK	On 'Leander' frigates

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contd....

1	2	3	4	5	6
1972-73	40	Short Tigercat	SAM	UK	Cost: \$ 10.4 million
...	(100)	Short Seacat	Sh.Sh.M.	UK	
1974	144	SSN-9	Sh.Sh.M.	USSR	
1976	84	SSN-2	Sh.Sh.M.	USSR	
1976	92	SSN-11	Sh.Sh.M.	USSR	
1977	--	R-550 Magic	AAM	France/India	Produced at HAL

Sources: SIPRI, Arms Trade Register (Cambridge, 1975).

SIPRI, World Armaments and Disarmament Yearbook (Stockholm, 1978).

APPENDIX V

LICENSED PRODUCTION OF MAJOR WEAPONS

Designation/Description	Licensor	Year	Comments
1	2	3	4
OT-62/64(2A) APC	Czechoslovakia	1970	Czech. version of BTR-50
Alouette III (Chetak) helicopter	France (Sud Aviation)	1962	-
Lama SA-315 Cheetah high altitude helicopter	France	1970	-
Artoueste III B 870 Shp Turbo-shaft engine	France (Turbo Mecca)	1962	
Bharat S.S-11 anti-tank missile (wire-guided)	France	1970	Complete production rights handed over in 1974. Produced in Bharat Dynamics Ltd.
R-550 Magic a-a-missile	France	-	-
Type A-69 Avisos frigate	France	1974	To be launched in 1978
Nissan Jeeps	Japan		Produced at Jabalpur. Indigenous content more than 75 per cent.
Shaktiman Trucks	West, Germany		
Perceival Prentice	U.K.	1947	50 aircrafts assembled

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contd....



1	2	3	4
DH-82 Tiger Moth (Primary Trainer)	U.K. (de Havilland)	1950	150 aircrafts produced
Vampire FB.9 (Jet fighter)	U.K. (de Havilland)	1952	230 produced/assembled by 1959
Vampire T.55 (Fighter)	U.K.	1955	50 produced by 1960
Ajit Light Weight Fighter	U.K. (Folland)		Production may end after completion of 69th plane in 1975
Orpheus-701 turbo-jet engine	U.K. (Bristol Siddeley)	1956, 1966	-
HS-748 twin-engined transport	U.K. (Hawker-Siddeley)		Ordered for both IAF and civil airlines
Dart RDA-7 turbo-prop engine MK.531	U.K. (Rolls Royce)	1959	-
HS-748 MF (Military freighter/paratroop version)	U.K. (Hawker Siddeley)	1971	Trials were done in 1972. Planned production of 200 plus.
Dart-532 turbo-prop engine	U.K. (Rolls Royce)	1971	--
Vijayanta medium battle tank	U.K. (Vickers Armstrong)	1965	Indian version of British Chieftains.
Leander class ASW frigates	U.K. (Vickers & Yarrow)	1965	--
Avionics and aircraft accessories	U.K. & France	1969/71	Production to begin in 1974

1	2	3	4
MIG-21 FL (Interceptor fighter bomber) Mach. 2.0	U.S.S.R.	1964	-
Electronic equipments	U.S.S.R.	1967	For MIG-21
MIG-21 M (fighter/ground attack) Mach. 2.0	U.S.S.R.	1972	Improved version of FL.
MIG-21 FMA (Multi-role version)	U.S.S.R.	1974	-
Bharat K-13 A (Atoll a-a missile)	U.S.S.R.	1964	To arm MIG-21 fighters
Electronics	Switzerland	1975	Contraves fire-control radar for L <sub>370</sub> anti aircraft guns.

SOURCES: SIPRI, Arms Trade with the Third World (Stockholm, 1971).

SIPRI, Arms Trade Register (Cambridge, 1975).

SIPRI, World Armaments and Disarmament Yearbook (Stockholm, 1973, 1975, 1978).

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Security (Berkeley and Los Angeles, 1967); and Raju G.C. Thomas, The Defence

of India (New Delhi, 1978).

APPENDIX VI

INDIGENOUSLY DESIGNED MAJOR WEAPONS IN DEVELOPMENT OR PRODUCTION

Design/Description	Design begun/ In production	Other Information
1	2	3
HAL/HJT-16 MKI Kiran jet trainer/ Ground attacker	1961/1968	180 required for IAF and Navy; production being phased out
HAL/HJT-16 Mk II Kiran fighter	1974	Prototype is in flight test. Production to start in 1978
HAL/HF-24 Marut Mk. I light fighter bomber	1956/1963	Further 45 aircrafts under production..
HAL/HF-24 Mk I T tandem trainer version	1967/1974	20 required, 10 being delivered.
HAL/HF.73 Marut Mk III strike/ fighter	1969	Proto-type flight expected in 1978
HAL/HAC-33 Light STOL transport	Design comple- ted in 1974	Large number of requirement for the IAF and Navy
HAL/HPT-32 Basic trainer	Design completed in 1974	Scheduled to replace AF HT-2 in the IAF from 1981-82.  Considered for aerial observa- tion, search & rescue, and weapon training.

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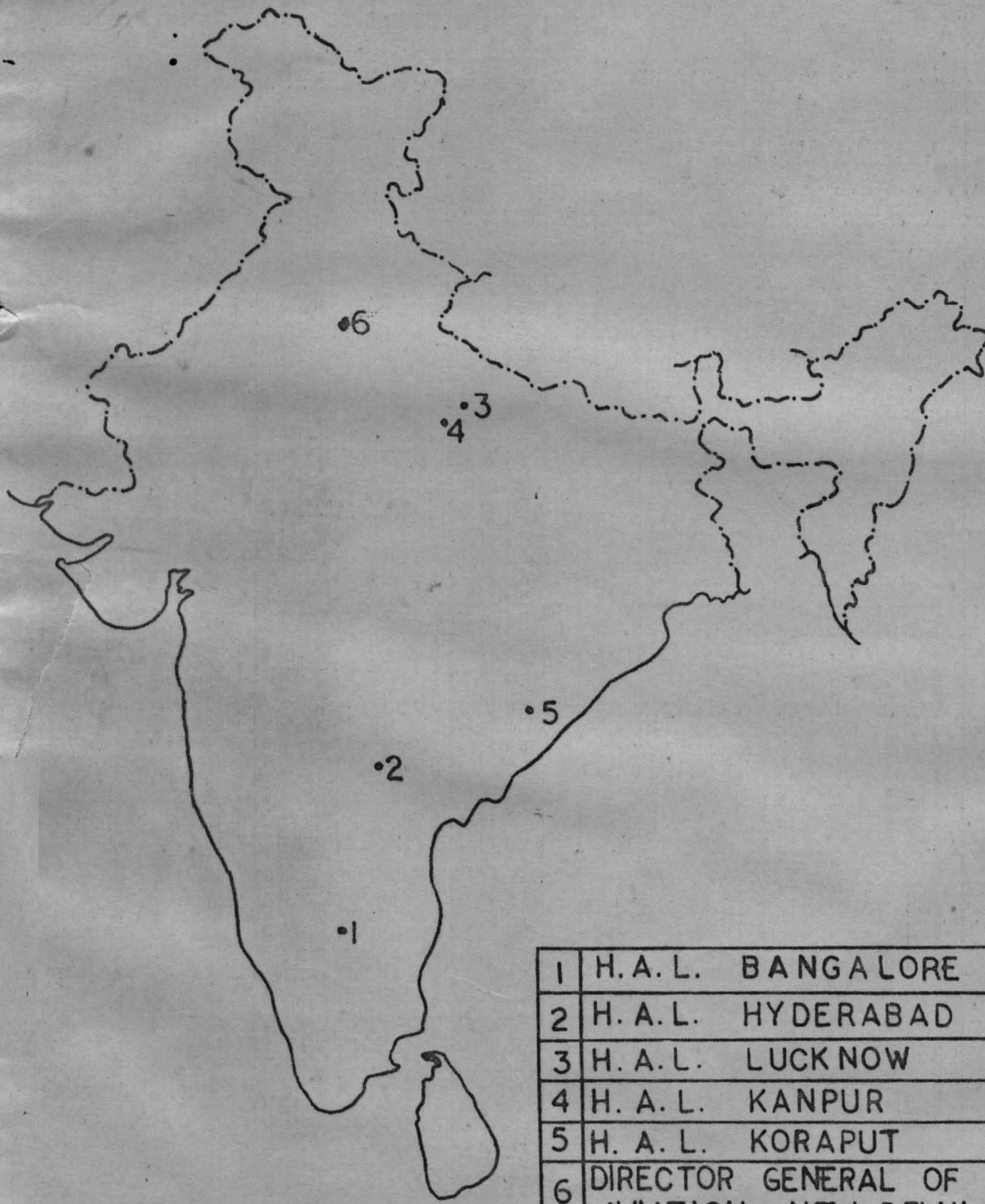
1	2	3
Armoured light helicopter	1973	Two versions under development for Army, IAF and Navy
Ship-to-ship missiles	-	Successfully tested in 1975
Main battle tank	1970	Designed at Avadi R & D Deptt.
Armoured personnel carrier	-	Prototype trials in 1973. Large scale production planned
Seaward defence boat Mk.II patrol boat	1974	First series of 8; SDB Mk II launched in 1977
Aeroengines	1965	In production for HJT-16 Kiran at HAL/Bangalore R & D

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Sources: SIPRI, World Armaments and Disarmament Yearbook (Stockholm, 1975, 1978).

A:

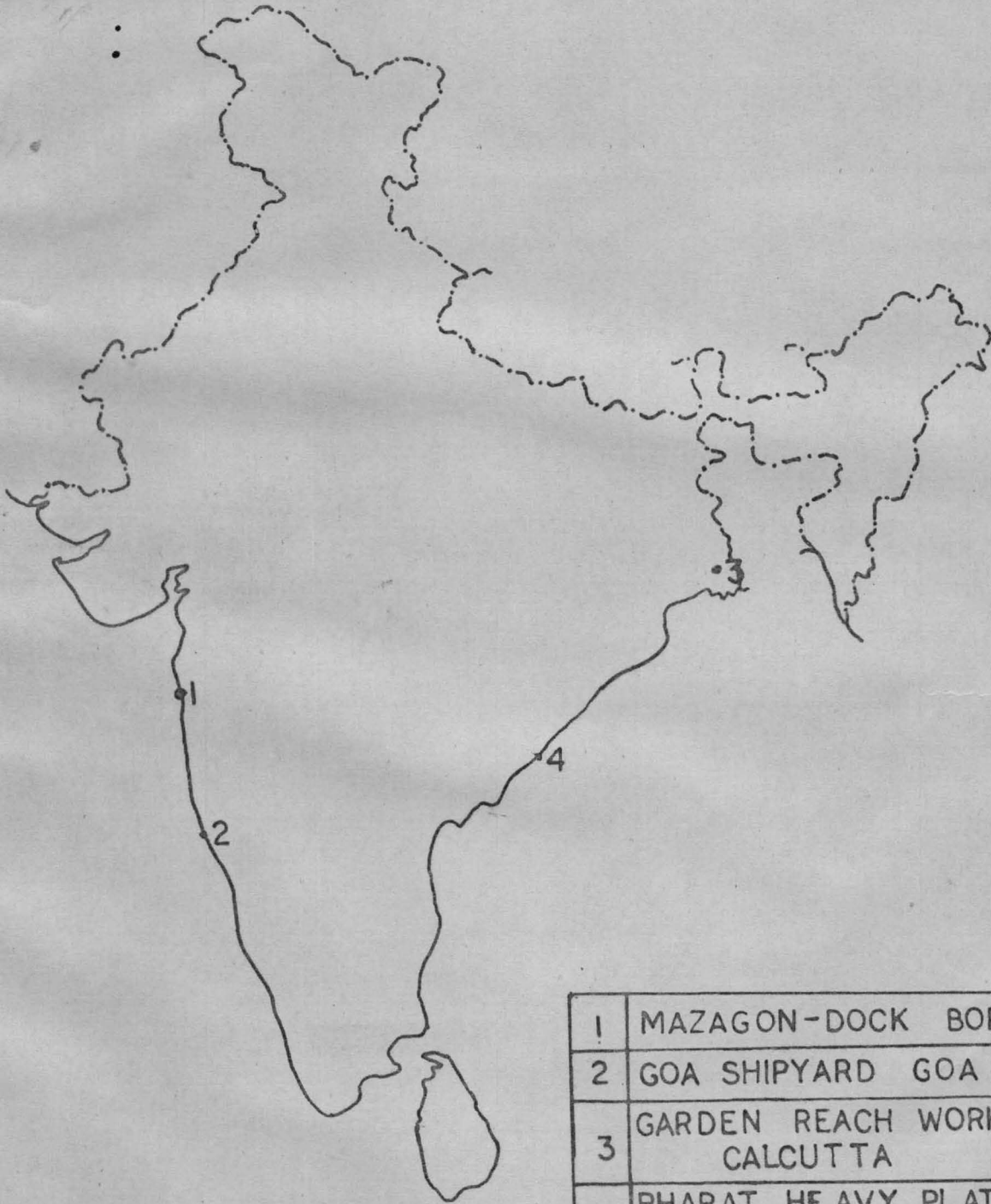
## AEROSPACE EQUIPMENTS (MAIN SYSTEMS)



1	H. A. L. BANGALORE
2	H. A. L. HYDERABAD
3	H. A. L. LUCKNOW
4	H. A. L. KANPUR
5	H. A. L. KORAPUT
6	DIRECTOR GENERAL OF CIVIL AVIATION NEW-DELHI

Source: Copley, G.R. and others, Defense and Foreign Affairs Handbook (Washington, D.C., 1978).

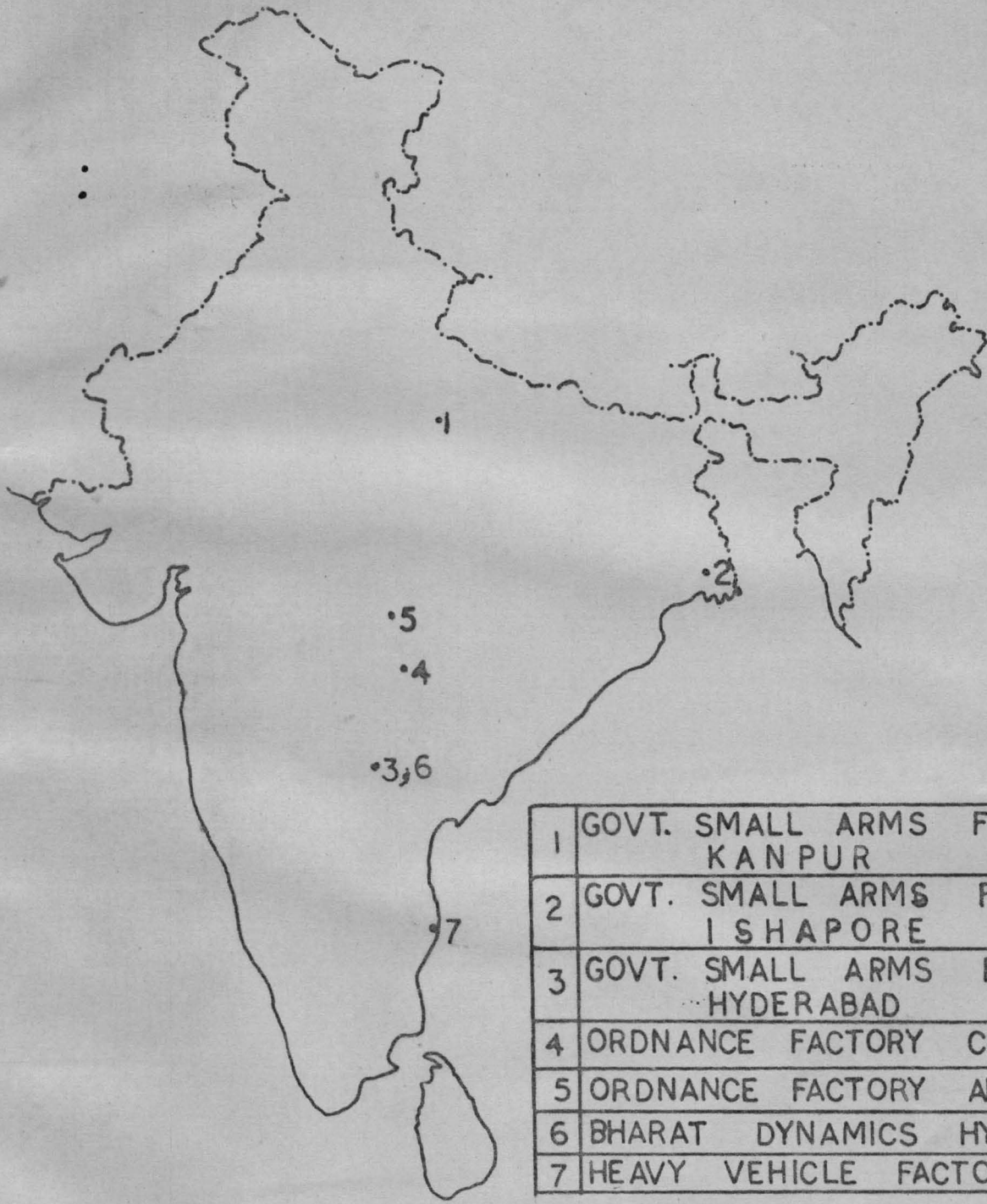
# NAVAL PRODUCTION & MAIN SHIP BUILDERS



1	MAZAGON-DOCK BOMBAY
2	GOA SHIPYARD GOA
3	GARDEN REACH WORKSHOP CALCUTTA
4	BHARAT HEAVY PLATES & METALS VISHAKHAPATNAM



c. SMALL ARMS & ARMAMENTS <sup>166</sup>

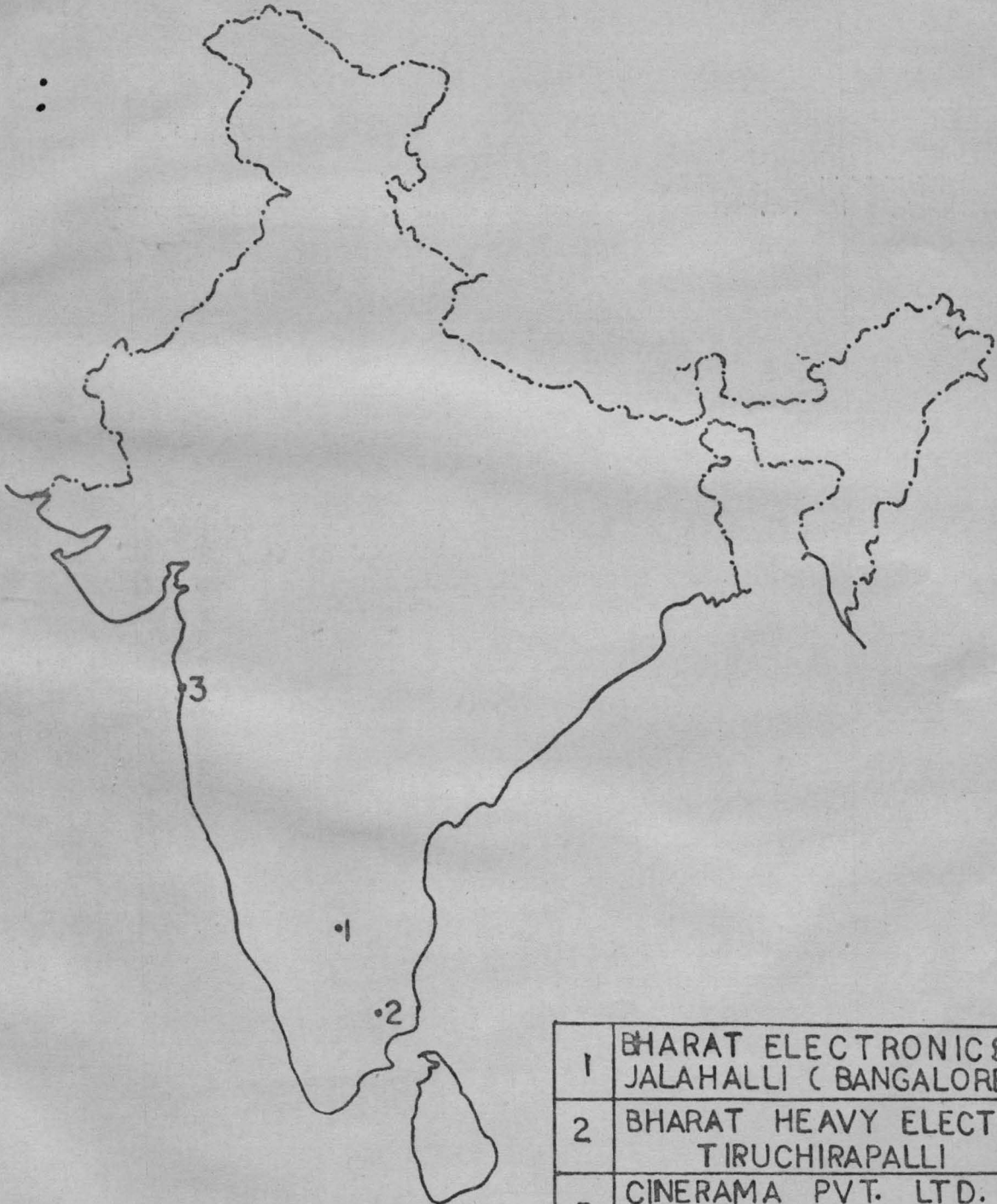


1	GOVT. SMALL ARMS FACTORY KANPUR
2	GOVT. SMALL ARMS FACTORY SHIMLA
3	GOVT. SMALL ARMS FACTORY HYDERABAD
4	ORDNANCE FACTORY CHANDA
5	ORDNANCE FACTORY AMBAJHARI
6	BHARAT DYNAMICS HYDERABAD
7	HEAVY VEHICLE FACTORY AVADI

NOTE:-31 GOVT. OWNED ORDNANCE FACTORIES FORM THE BASIS OF INDIAN EQUIPMENTS & MUNITIONS SUPPLY

Source: Copley, G.R. and others, Defense and Foreign Affairs Handbook (Washington, D.C., 1978).

D. ELECTRONIC <sup>167</sup> INDUSTRIES\*



1	BHARAT ELECTRONICS JALAHALLI ( BANGALORE )
2	BHARAT HEAVY ELECTRICALS TIRUCHIRAPALLI
3	CINERAMA PVT. LTD. BOMBAY

\* This includes main industries and R & D establishments related to defence.

Source: Copley, G.R. and others, Defense and Foreign Affairs Handbook (Washington, D.C., 1978).



APPENDIX VIII

VALUE OF STORES RELEASED BY THE DIRECTORATE GENERAL OF INSPECTION IN 1978-79

Category of Stores	Value (Rupees in lakhs)
(a) Armaments/Ammunition	31,699.8
(b) Vehicles and Miscellaneous motor transport spares	16,832.5
(c) General Stores and Clothing items	17,515.8
(d) Electrical and Electronic Stores	9,824.0
(e) Marine Stores	1,471.9
(f) Engineering equipment	1,753.0
<b>Total</b>	<b>79,097.0</b>

Source: Annual Report 1978-79 (New Delhi: Ministry of Defence, 1979)

APPENDIX IX

PRODUCTION/SALES OF DEFENCE PUBLIC SECTOR UNDERTAKINGS

S. No.	Name of the Undertaking	(Rupees in crores)							
		1971-72		1972-73		1973-74		1975-76	
		Production	Sales	Production	Sales	Production	Sales	Production	Sales
1.	Hindustan Aeronautics	69.59	70.25	79.09	73.79	98.14	85.02	113.69	114.98
2.	Bharat Electronics	32.82	33.63	39.11	39.72	42.92	48.68	62.18	55.45
3.	Mazagaon Docks	21.07	8.79	28.98	27.36	30.87	10.94	49.23	56.24
4.	Garden Reach Workshop	17.01	12.17	16.72	16.79	22.81	17.93	39.22	34.60
5.	Praga Tools	2.39	2.70	2.34	2.49	3.14	3.02	5.54	5.26
6.	Bharat Earth Movers	28.54	35.25	37.13	40.64	38.21	45.32	70.61	64.98
7.	Goa Shipyard	1.18	1.03	1.34	1.18	1.80	1.67	2.70	2.40
8.	Bharat Dynamics	1.08	0.40	2.16	3.40	2.51	3.91	3.20	4.05
9.	Mishra Dhatu Nigam	set up during 1973-74							
Total		173.68	164.22	206.87	205.37	240.48	216.49	346.37	337.96

Source: India, Annual Report 1974-75 (New Delhi: Ministry of Defence, 1975).

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## APPENDIX X

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FOREIGN EXCHANGE EARNINGS OF DEFENCE PUBLIC SECTOR UNDERTAKINGS  
(Rupees in lakhs)

Year	Total foreign exchange earnings
1971-72	227.00
1972-73	350.00
1973-74	540.00
1974-75	1,964.00
1975-76	1,465.00
1976-77	2,947.00
1977-78	3,605.00

Source: India, A Reference Annual (New Delhi, 1978).

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