CHAPTER IV

ARMS PRODUCTION IN SOUTH ASIA

4.1 Introduction

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4.1 Introduction

Indigenous production of major weapon systems is a complicated task. To attain self-sufficiency and self-reliance in defence production any country should have under its possession adequate industrial infrastructure, skilled manpower, financial resources and also access to sophisticated defence technology. Arms production passes through three broad stages. The first stage is the repair and overhaul of imported weapons with financial and technological assistance from the original producer of such weapons. The second stage involves assembly of imported components which in turn gives a country capacity to locally produce these components and dependence on import is reduced drastically. In the final stage, it reaches the goal of indigenous design and manufacture of a complete weapon system. Hardly any country in the Third World country ever became self-sufficient in arms production. Countries which have reached an advanced stage of industrialisation are also depending upon others for some defence related items and their raw materials.

Domestic arms production in Third World countries is a function of the multiple interaction between political motivation and national capacity. This motivation may stem from strong political will to indigenously produce military equipment, particularly in cases where countries perceive high degree of external threat to their sovereignty and existence as independent nation-states. The importance of arms industries lies where a country is dependent on external supplies but it

2. SIPRI Year Book 1981, p.76.
is suspended at critical junctures when they are needed most. Since most of the weapon producing countries of the West use arms transfer as an instrument to gain influence over their Third World clients, the latter by having indigenous arms production capacity aim at self-reliance and erosion of traditional suppliers' influence to the extent that they can formulate truly independent foreign and defence policies.

Indigenous defence production is an expression of self-reliance, and thus it is a means of reducing a state's vulnerability to military and political pressures during times of crisis.(7)

Economic motivation may, at times, induce a country to go for domestic arms production because it is expected to help in conserving foreign exchange and stimulating industrial development. But economic motive seems to carry less weight at the initial stage of building up a production capacity. Third World countries confront some inherent difficulties while setting up their defence production base, firstly


because their industrial growth is still at an infant stage. Since arms are produced with the help of various types of metals and other processed inputs, arms industries require support from several industries. Therefore, development of manufacturing capabilities in newly industrialised countries has contributed to expansion of armament industries. But unlike in the West, the growth of military-industrial complex is not in evidence in much of the Third World. Secondly, the non-availability of general financial resources and poor allocations of capital affects the meaningful growth of such industries. Thirdly, in most of the Third World countries there is lack of sophisticated Research and Development (R&D) programmes mainly due to their backward scientific capabilities. Because of this they lack the ability to absorb advance technologies imported from the West. Finally, many of these new arms producers lack any access to the export market (dominated by the industrialised countries) to overcome slack in domestic demand during peace time, and thereby they are not in a position to by-pass the bottleneck created by high cost of production. So only strong political and security considerations could motivate such countries to go for indigenous production. For an effective growth in the sphere of 'defence industrialisation' both motivation and capacity must move side by side. There should be a perfect harmony between the desire to produce indigenously and the possession of relevant ingredients to make indigenisation successful.

In the South Asian region, two countries - India and Pakistan - were listed among the thirty-odd Third World producers of major weapons like military aircraft, guided missiles, armoured fighting vehicles and


11. Peleg, "Military Production in Third World Countries", n.3.
warships. Bangladesh produced riverine patrol crafts. Besides that, small arms and ammunition were manufactured at the Jayadevpur ordnance factory, set up in 1968 with technical assistance from China. Sri Lanka has the potential and technological capacity to initiate its own domestic armament industry for the manufacture of basic weapon systems. The strongest impetus for arms production is the current civil war. Sri Lanka's military asset is the ship-building industry. The large patrol craft and the coastal patrol craft were built at the Colombo Dockyard. Sri Lankan air force possess the technical skill for repair and maintenance of its fleet of Jet Ranger helicopters.

Defence production programmes in Sri Lanka and Bangladesh being limited and there is no production in Nepal, Bhutan and Maldives we shall concentrate only on India and Pakistan.

4.2 India: Arms Production:

The first defence production facility in India was set up in 1801 by the East India Company in the form of a Gun Carriage Agency near Calcutta. But little was done by the colonial powers to encourage the growth of such industries for almost 150 years. During World War II arms production facilities in India were expanded by the addition of eleven (previously there were only four such factories) new establishments. After independence this became the base of national programme for arms production.

13. SIPRI Year Book 1977, see Appendix 1D, p.288.
16. Ibid.
In the initial years, defence sector was accorded lowest priority in India. Its policy of nonalignment and peaceful coexistence in the international front, and in the domestic sphere emphasis on economic development and social welfare measures cast their shadow over any meaningful expansion of an unproductive sector like defence. The defence production policy in the early 1950s aimed at expanding the civil production base in direction which would also help to meet the defence requirements of the country in an emergency. During those initial years India confronted a number of problems in the development of defence industry. First, there was shortage of general financial resources and the expenditure on defence necessitated substantial increase. Secondly, weapon production required special types of raw materials - steel and rarer metals - which were in short supply. Finally, the manufacture of armaments looked to be a difficult proposition because of the shortage of skilled manpower. Therefore, the emphasis in India in those days was only on the production of small arms and ammunition in ordnance factories.

The signing of a bilateral defence agreement between Pakistan and the United States in 1954 compelled India to initiate a few critical weapons projects. To counter the immediate danger of sophisticated weapons in the hands of Pakistan, Jawaharlal Nehru decided for the indigenous production of tanks and aircraft. Defence production


efforts during that period was in the nature of a "learning experience". India put emphasis on import of technological know-how as a condition for the purchase of defence equipment. Defence Minister V.K. Krishna Menon, after taking charge in 1958, became instrumental in acquiring license for the production of Gnat fighters (Britain), Alouette III helicopter (France), Vijayanta tanks (Britain), L-70 anti-aircraft guns (Sweden), Shaktiman trucks (Germany), and 106 mm recoil less rifles (United States).

Protection of the country's security and territorial integrity was considered as paramount in the event of real threat from China in 1962 and Pakistan in 1965. Added to that sudden deterioration in the security environment, India's vulnerability due to its exclusive dependence on external sources for the supply of arms and ammunition was exposed during the course of the 1965 war as western powers (particularly India's traditional arms suppliers - Britain and the United States) imposed ban on the supply of equipments and spare parts to both warring nations. Thus with the twin objectives of modernisation of Indian armed forces and reducing its dependence on external arms suppliers during periods of crises, domestic production of arms and ammunition was accelerated. During April - November 1962 at least eight agreements were concluded with foreign governments and firms for the manufacture of defence items under licence in India.

The arms industries were required to feed the domestic demand. In 1990, the 36 Ordnance Factories and 8 Defence Public Sector Undertakings


22. Ibid.

(DPSUs) working under the Department of Defence Production within the
Ministry of Defence with a work force of about 3 lakhs were to meet the
requirements of the 1.26 million strong Indian armed forces. Ordnance
factories exclusively meet the needs of the three services, but
particularly that of the army. Supplies to the air force and navy were
small and only about 3 per cent of the products were utilised by the
civilian undertakings (explosives). DPSUs adopt a comparatively flexible production strategy
as their products include a mixture of defence and civilian items. Up to
50 per cent of DPSU sales were destined for civilian market. In
limited areas private sector was allowed to manufacture spare parts and
non-lethal equipments. Because of the vast internal requirement the
country had not given serious thought to export of military hardware to
outside markets. Till recently, India's export of defence items was
limited to supply of small arms to friendly neighbours mostly on non-


25. See Marwah, "India's Military Power and Policy" n.21, p.117; Chris
Smith and Bruce George, "The Defence of India". Jane's Defence Weekly
(London), March 2, 1985, p. 366; Akhtar Majeed, "Indian Security
Perspectives in the 1990s", Asian Survey, vol. xxx. no.11, November
1990, p. 1087; Nicholas Nugent, "The Defence Preparedness of India:
Arming for Tomorrow" Military Technology, (Bonn), March 1991, p. 32.

26. H. Wulf, "India: The Unfulfilled Quest for Self-Sufficiency" in M.
Brzoska and T. Ohlson ed., Arms Production in the Third World

27. B.R. Nayar, India's Quest for Technological Independence: The Result

28. A military-industrial complex does not exist in India. The civilian
industrial output to defence manufacture is of limited significance.
It was apprehended that any involvement of private sector in this
field would lead to the emergence of a military-industrial sector
with vested interest in an aggressive foreign policy and further
expansion of defence. Therefore, defence industries are entirely
run and controlled by the state. See Matthews, "The Development of
India's Defence Industrial Base", n.18, pp.416-17, and Raju G.C.
commercial basis. Hence, in the absence of any spin off from the civilian sector and a policy ban on export of arms, defence industries in India were bound to face difficulties in earning foreign exchange vital for launching modernisation programmes.

Indian Defence Industrial Policy has the twin objectives of achieving self-reliance and self-sufficiency in armament production. For a country like India which had to face external aggression on four different occasions during the past four decades and is surrounded by unfriendly neighbours, self-reliance in defence should be viewed not simply as an ideal policy but as a political as well as strategic necessity. Also the objective is to pursue an independent defence policy-free from external manipulation and pressure. In the words of Indira Gandhi, the former Prime Minister of the country:

Technological know-how for the latest weapon systems was never available from abroad unless the nation was prepared to compromise its interests when obtaining such technologies.(29)

The Annual Report of the Ministry of Defence in India had stated that:

Past conflicts highlighted the need for defence preparedness and, therefore, of self-sufficiency and increasing self-reliance in the field of defence equipment and weapon systems.(30)

The programme for indigenisation of defence production covered the entire range of equipments for the three services including combat aircraft, warships, tanks, sophisticated radars, communication and gun control equipment, guided missiles, rockets, field, medium, anti-tank and anti-aircraft guns, small arms and a whole range of ammunition for almost every gun used by the three services. India's arms procurement policy


31. India, Lok Sabha Debates (Sixth Series) vol. X, no. 8, March 1, 1978, cols.95-96.
was redefined and made explicit in the late 1970s by the Janata Government to include transfer of technology for licence production of high-tech defence equipment a necessary precondition for any defence agreement. Though the percentage of indigenous content in defence projects gradually increased, it continued to be impossible for India to produce major modern weapon systems like fighters, sophisticated fighting ships and tanks entirely without foreign assistance. The indigenous Integrated Guided Missile Programme is an exception. Even though India has a sound technological base and there is abundance of scientific manpower it lacks financial resources and there is dearth of sophisticated defence technology to carry indigenous military projects towards a successful end.

Ordnance Factories:

In 1947 India inherited 15 Ordnance Factories and one clothing factory. By 1963 the number of these factories had gone up to 22 and six new factories were sanctioned in the wake of Chinese aggression which

32. Matthews, "The Development of India's Military Industrial Base", n.18, p.410; also see Marwah, "India's Military Power and Policy", n.21, p.126.


34. In 1977 it was reported that Defence Research and Development Organisation in India and its related military research projects employed more scientists and engineers than private industries employed as a whole for R&D. See Peter Lock and Herbert Wulf, "Consequences of the transfer of military oriented technology on the development process", Bulletin of Peace Proposal, vol.8, no.2, 1977, p.134.

necessitated a reappraisal of the country's defence policy. This number has now gone up to 36 excluding five new factories sanctioned in 1987 for the manufacture of T-72M Soviet MBT under licence, BMP-2 infantry combat vehicle, night version equipment, propellants and the fifth factory was sanctioned to manufacture ammunition for high calibre weapons.

The ordnance factories are broadly divided into ammunition group, weapons group, explosives and propellant group, clothing group and vehicle group. Their range of production include tanks, ICVs, anti-tank and anti-aircraft guns, field and self-propelled guns, mortars, rockets and other small arms. Unlike the DPSUs, ordnance factories have limited research and development facilities and for new design and development, they exclusively rely on Defence Research and Development Organisation.

Since their sole customer is the Indian army, Ordnance Factories have to face problem when demand slackens due to budgetary constraints or when such goods are imported from abroad. The absence of any opening to the civilian market and ban on export of defence items, not only affects the full utilisation of manpower and capacity in such factories but also raises the unit cost of production. The ordnance factories Board has to evolve a realistic market strategy to overcome such slack in demand in the future.


38. Wulf, "India: The Unfulfilled Quest for Self-Sufficiency", n.26, pp.130-1.


In 1955 a committee headed by Baldev Singh recommended production for the civilian market. Its implementation resulted in an increase of civilian production to about 20 per cent, but again dropped to 3 per cent in 1965 because of the two wars with China and Pakistan. However, in recent years there is greater drive for privatisation of defence production in India. The tone was set by the former Prime Minister, Rajiv Gandhi when he said: "We must get a spin off in the civilian sector from the production in ordnance factories". In 1988 government identified 700 low technology defence items for production in the civilian sector with a view to optimise the utilisation of the existing capacity of the ordnance factories towards production of sophisticated defence items. The gross value of production had increased from Rs.130 crores in 1971-72 to Rs.1842 crores in 1987-88, representing a 15-fold increase in as many years.

Tanks and ICVs:

In 1961 a team of Indian experts visited Britain and West Germany to make an evaluation of their tank designs for licence production in India of a Main Battle Tank (MBT). The team preferred the modified British Chieftain tank and consequently an agreement was signed with the Vickers Armstrong Ltd. of Britain for production of around 1,000 medium tanks at the Heavy Vehicle Factory at Avadi near Madras. The first tank, built mainly from components supplied by the British firm, came out in 1965.

41. Kavic, India's Quest for Security, n.36, p.128.
43. Economic Times (Bombay), January 17, 1986.
44. Indian Express (New Delhi), May 13, 1986.
1982 about 1,100 Vijayanta tanks joined the armoured regiments in the Indian army. When its production was discontinued imported components constituted only 3 per cent. Its locally designed 105 mm gun, Indian made ammunition, its Leyland L-60 engine along with its transmission and suspension units gave it a distinct Indian colour.

In 1974 a project was sanctioned for the indigenous design and development of a next generation MBT. The task was undertaken by the Combat Vehicle Research and Development Establishment (CVRDE) at Avadi under the overall supervision of DRDO. Initial cost of the project was Rs.15.50 crores, that increased to Rs.180.8 crores by 1989. Though the first prototype of the tank, called Arjun, was tested in 1983 no subsequent trials have taken place. The former Defence Advisor to the Government, V.S. Arunachalam, admitted that the project was delayed because "the aspiration is to produce totally indigenous MBT". But the Controller and Auditor General of India in his report on the Project commented, "it is an overestimation of the competence of DRDO to develop a tank on totally indigenous design". The report claimed that by August 1988 the share of imported components in Arjun was 45 per cent. Even after production, dependence on imported components and sub-systems would be significant. Arjun would be powered by an indigenous gas cooled 1,500 hp diesel engine developed by the Gas Turbine Research Establishment (GTRE). Its armament will be a 120 mm rifled gun designed

47. The Telegraph (Calcutta), August 21, 1983.
48. The Times of India (New Delhi), July 20, 1989.
by the Armament Research and Development Establishment (ARDE). The
Explosive Research and Development Establishment (ERDE) at Pune has
developed a new high energy propellant which would give the tank's
ammunition higher muzzle velocity and greater penetration. The Indian
Defence Metallurgical Research Laboratory (DMRL) has developed a low-
weight armour plating called Kanchan armour for this MBT. But, the
main problem is with its engine. In May 1987 it was admitted in the
Parliament that "indigenous diesel engine development has not been
successful". To avoid delay in prototype trial it was decided to import
40 German (previously West Germany) 800 hp Motor and Turbine Union (MTU)
engines that powers its Leopard-1 tanks. Government had instructed
CVRDE to scale down the specification of the indigenous Kirloskar engine
from 1,500 hp to 1,000 hp. Once production starts, around 150 such tanks
would be manufactured per year.

Because of the inordinate delay in the production of Indian designed
MBT it was decided to manufacture T-72 tanks under Soviet licence. It was
estimated that the initial batch would have 10 per cent indigenous
components which would subsequently increase to 95 per cent.

Production of an advanced version of T-72 M-1 tanks, from major
components supplied by the former Soviet Union, commenced in 1987. As

52. Ibid. Also see The Hindu (Madras), January 13, 1984; and Jane's
Defence Weekly, June 1, 1985.


55. India was interested in importing 1,500 hp engines from the same
source. But due to the ban imposed by NATO on export of such
engines, Germans refused to provide the engine that powers their
Leopard-II tanks. See Brig, Gurbux Singh (Retd.), "The Main Battle
Tank Mess" Indian Express, October 21, 1991; Also see Ibid, May 15,
1984.


Arjun is still clouded in ambiguity, it was decided to continue the T-72 production line till the mid-1990s. But the developments in Soviet Union is bound to affect the future supply of components of this tank for production in India. This may also affect the licence manufacture of Soviet designed BMP-2 Infantry Combat Vehicle (ICV) which is also being produced since 1987.

Small Arms and Artillery:

By 1972 ordnance factories were placed in a position to meet the entire requirement of the army in respect of infantry weapons like the 7.62 mm light machine guns and self-loading Ishapur rifles, 9 mm sub-machine guns, 81 mm mortars and 106 mm recoilless anti-tank guns. The former Defence Minister, Jagjivan Ram, attributed India's spectacular victory in the 1971 war to indigenously produced arms.

The Armament Research and Development Establishment (ARDE) at Pune has designed and developed a whole family of 5.56 mm calibre infantry weapons to replace the older guns. It has also developed an external power gun for the ICVs and helicopter gunships which could fire 500-600 rounds a minute automatically at a target without deviation.

Just before 1962 war India acquired the Swedish licence to manufacture 40 mm L-70 air defence guns. Flycatcher fire control radar for the gun were produced by the Bharat Electronics Limited. In 1975 another agreement was signed with that country for licence production of

58. International Defence Review, Ibid.


60. The Times of India, February 21, 1974. However, such claims are politically motivated. Victory in a war depends on superior strategy and tactics.


the 84 mm Carl Gustav shoulder-fired anti-tank guns. Production started five years after the contract was signed.

The ARDE has also to its credit the indigenous design and development of 105 mm Indian Field Gun (IFG) and a Light Field Gun (LFG) of the same calibre and range but about 650 kg lighter than the IFG for its easier transportation in mountain terrains. These guns have replaced the 25-pdr guns used by the artillery regiments since the early 1950s. To overcome the deficiency of self-propelled guns some M-46 130mm Soviet designed medium guns are mounted on the Vijayanta tank chassis.

India is virtually self-sufficient in the production of ammunition for small, medium and heavy calibre arms. In the 1960s two factories were set up at Varangaon (Maharashtra) and Tiruchirapalli (Tamil Nadu) for the manufacture of ammunition for small arms. Ammunition for the 9 mm, 7.62 mm and 12.7 mm calibre guns are produced at Kirkee and Khamaria and high energy propellants are manufactured at Jabalpore and Varangaon ordnance factories. New units have now come up for the production of 105 mm fin stabilised armour piercing discarding Sabot (FSAPDS) for the tanks, ammunition for the 130 mm medium artillery guns and high-calibre advanced ammunition required for the T-72M tanks and BMP-II ICVs.

Aerospace Industry:

Hindustan Aeronautics Ltd. (HAL) is India's only aerospace industry

63. The Hindustan Times, July 12, 1980.


67. Wulf, n.38, p.140.


engaged in the production of aircraft and helicopters for its principal customer, the Indian air force. It had produced 22 different types of aircraft of which 13 were built under foreign licence and the rest were based on indigenous design. While the former includes Vampire, Gnat, MiG-21, MiG-27, HS-748 aircraft and Cheetah and Chetek helicopters, aircraft based on indigenous designs include Pushpak, Krishak, Basant for civilian usages, HP-2 and Kiran MK I trainers and Marut and Ajeet combat aircraft. In 1988 HAL, with a work force of 48,800, was selling its products worth US $494 million (73 per cent of which was military sale) in the civilian and military markets. It has drawn up a perspective plan to cover design and development of a Light Combat Aircraft (LCA), Advanced Light Helicopter (ALH) and Advanced Jet Trainer (AJT) to meet the future requirements of IAF. Besides this, HAL produces avionics, aircraft radars, accessories and inertial navigation system for all locally designed aircraft. However, HAL faces the major problems in indigenous design and development of aircraft engines. Its initial attempt in the 1960s to develop Marut fighters could not succeed mainly due to that problem.

Indigenous Design:

To meet the air force requirements for a tactical air superiority and secondary ground support mission aircraft HAL has taken up an ambitious programme for local design, development and production of a

70. The Economic Times, March 22, 1982; and Interavia (Geneva), February 1984. By August 1992 HAL had produced 3000 aircraft, and one-third of them were indigenous. See The Hindustan Times, August 31, 1992.


74. Graham, "India", n.42. p.170.
Light Combat Aircraft (LCA). The programme was launched to "reinvigorate the aeronautical industry to a higher technological level". It is intended to develop a single-seat, single-engine, delta-wing aircraft with a fly-by-wire flight control system. While over fifty agencies are involved in the LCA project the premier institutions include HAL, BEL, DRDO, Aeronautical Development Agency (ADE) and the National Aeronautical Laboratory (NAL).

The major problem facing the Indian scientists is the development of a suitable engine for the LCA. In 1982 government sanctioned a project worth Rs.80 crores for the development of the GTX aero-gas turbine engine for Combat aircraft by the Gas Turbine Research Establishment (GTRE) at Bangalore which would eventually power the production version of the LCA. Meanwhile, an agreement was signed with the United States for 11 General Electric F-404 aero-engines for an initial batch of six prototypes at a cost of US $2 million each. The offer of transfer of technology for this US engine was turned down by India because of its possible adverse impact on the indigenous designed GTX-35 aero-engine. The Parliament was informed that consultancy service will be utilised for specific aspects of the project and no overall consultancy agreement was being sought with any country.

LCA has posed a real challenge to the aerospace industry of a Third World country like India because none of these countries have ever succeeded in carrying out a totally indigenous combat aircraft project. Even a country like Israel after investing billions of dollars on its

75. Annual Report, 1980-81, Ministry of Defence, p. 34.
76. The Tribune, September 27, 1982.
prestigious Lavi Project had to cancel it. Not only that the financial
cost of such project is enormous but also due to any delay in production,
any combat aircraft, which has a life span of ten to fifteen years, would
become obsolete. India has experienced this with its first locally
designed combat aircraft, HT-24 Marut. In 1964 when it joined squadron
service it was already outdated. Subsequently the production of this
fighter-bomber was stopped. India has already invested Rs.450 crores in
the LCA project. The first prototype is expected to come out in 1996
and it would be inducted into the striking units of the air force by the
next century.

A high-level committee headed by C. Subramaniam recommended for the
indigenous manufacture of an Advanced Light Helicopter (ALH) at HAL. In
1971 an agreement was signed with the Aerospatiale of France for
designing a single-engine ALH which was subsequently canceled because IAF
changed its specifications for a twin-engined chopper. In 1984 a fresh
 collaboration agreement was signed with WBB of West Germany (renamed as
Eurocopter), and the project started all over again.

The first prototype of this multi-purpose ALH was test flown in
August 1992. It has a cruise speed of 245 Kmph, a flying range of 800

80. Development and production of Israeli Lavi fighter was funded
substantially by the United States through Foreign Military Sales
Credit worth US $500 million. This was the only instance where the
US invested in a Third World defence project. See Carol Evans, n.9,
p.112.

81. Raju G.C. Thomas, "Defence Planning in India" in Stephanie G. Neuman
ed., Defence Planning in Less-Industrial States: The Middle-East and

82. The Times of India, June 30, 1992.

83. See "Development of a Light Helicopter" Public Accounts Committee,
1982-83, 130th Report (7th Lok Sabha).

84. The Economic Times, July 24, 1984; India Today (New Delhi),
September 15, 1986, p. 78.

km and has an endurance up to four hours. Apart from serving the air force it would perform an anti-submarine warfare role in the Indian navy and for the army it would be deployed in a anti-armour role. HAL has been asked to keep the commercial angle in mind because this would be the cheapest available in the world market. With its existing capacity HAL could produce 36 such aircraft every year.

In response to Pakistan's prospects for acquiring Boeing airborne warning and control system from the United States, India launched a project for indigenous development of a similar system. Defence Ministry sanctioned about Rs.1.5 billion (US $101 million) for initial research to be conducted by the National Aeronautical Laboratory in collaboration with HAL and DRDL. The flight characteristic of HS-748 AVRO was tested and was found suitable for such a spy plane. Air Force specifications required it to have look-up, look-down and electronic jamming capability and a surveillance range of 300-400 kilometers from a height of 30,000 ft.

As Pakistan's prospects for acquiring an AWACS diminished, after the Soviet troop withdrawal from Afghanistan, work on the Indian project slowed down and it was assumed that the project was scrapped, though no official pronouncement was made to that effect. There are two major obstacles in successful launching of such high-tech projects. First, the financial burden and second, the sophistication of the project in which the United States has exercised virtual monopoly. Even Britain had to cancel its Nimrod project due to the same reasons.

88. The Muslim (Islamabad), June 17, 1986.
Licence Manufacture:

India's initial desire to procure and licence manufacture Lockheed F-104 starfighter was turned down by the United States. Britain was also persuaded to allow licence production of their Lightening fighter aircraft. There also the response was negative. When it became clear that transfer of weapon technology from the West was conditioned upon mutuality of security interest, the Soviet Union expressed its willingness to transfer weapons as well as technology to India. This resulted in the first agreement signed between the two countries in August 1962 for licence production of MiG-21 supersonic air superiority fighters in India in spite of the fact that air force was initially not very enthusiastic about the project.

The production programme was undertaken in four stages. In the first stage complete weapon system was imported from Soviet Union. The second stage involved assembling of MiGs from imported components. During the third stage it was planned to manufacture such components for the aircraft from imported materials, and the fourth stage aimed at producing the parts using locally manufactured materials that would lead to progressive indigenisation of MiG-21 production in India.

Full-scale production got underway in 1969 and within the next four years HAL produced about 150 MiG-21 FL before it switched over to

90. Subrahmanyam, n. 19, p. 368.
94. Dennis Childs and Michael Kidron, "India, the USSR and the MiG Project", Economic and Political Weekly, (Bombay), September 22, 1973, p.1724.
MiG-21M aircraft. But total indigenisation could not become possible since HAL had to import 30 to 55 per cent of the parts for each MiG. Government's decision to continue with the production of MiG series was in conformity with the aeronautical committee's recommendations in 1969 to continue production of MiGs throughout the 1970s instead of undertaking licence production of any new type of fighter aircraft. In 1978 yet another agreement was signed with the Soviet Union for the production of improved version of interceptor called MiG-21 bis. But simultaneously, the first non-Congress government at the centre took decision to purchase Anglo-French Jaguars. The Janata Government's policy was to diversify the procurement of weapon system for the air force and not to rely exclusively on MiG family strategic aircraft. A five-year programme for indigenisation of MiG aircraft was sanctioned in 1978, signifying the fact that HAL could not indigenise MiG-21 during the last 15 years.

In July 1983, the then Indian Defence Minister informed the Lok Sabha that an agreement was signed with the Soviet Union for the production of MiG-27 ground attack aircraft. After manufacturing about 200 MiG-21 bis, the Nasik Division of HAL switched over to the new Soviet plane. It was planned to manufacture 200 such aircraft in four


96. Graham, "India", n.42, p.172.

97. Childs and Kidron, n.94.


stages starting with assembly of Soviet-built major subsystems to manufacture of the aircraft in India from local raw materials in the final stage.

In the field of licence production of aircraft in India, Indira Gandhi's Congress Government took two other vital decisions. In 1982 India, by exercising its option, scrapped the production part of the Jaguar deal with Britain. In 1984 New Delhi declined the offer to produce under licence up to 110 additional Mirage 2000 (excluding the direct purchase of 40 such aircraft) at HAL. Commenting on Government's arms production policy G.K. Reddy wrote in Hindu:

After a careful reappraisal of the country's defence strategy in the changing security environment of the subcontinent, India has decided to concentrate on the development of the MiG production line to meet the basic requirements of the Air Force without going in for too much diversification...The Government is obliged to go in for more and more Soviet equipment because of financial constraints besides less exacting maintenance requirements.(105)

Keeping this broad production policy in mind, in 1986 a Memorandum of Understanding was signed with the Soviet Union. The latter expressed its willingness to transfer technology for licence production of 110 MiG-29 air superiority fighters besides outright supply of 40 such aircraft. However, it is doubtful whether the Russian Republic,


which has inherited the mantle of old Soviet Union, would honour the commitment in the changed atmosphere. In that case India has either to go in search of western technology or to expedite its indigenous LCA project. But, both options require enormous financial burden on India's already dwindling economy.

Radars:

In India ground based radars are manufactured by BEL while the Hyderabad division of HAL produces airborne radars. The entire radar system for the licence-built Leander class and indigenously designed Godavari class frigates were produced by BEL. In 1974 a new factory at Gaziabad, near Delhi, was set up for the manufacture of highly sophisticated air defence ground environmental system comprising static and mobile three-dimensional radars. An agreement was signed with the French Company Thomson -CSF for joint collaboration in this field.

Besides that, the Electronic and Radar Development Establishment (ERDE) at Bangalore has successfully designed and developed a low-level surveillance radar, called Indra which will come in two versions for use by the air force and army. ERDE is also presently developing a surface-to-air missile (SAM) guidance radar and new radars for use by the navy for detecting and tracking sea-skimming missile. In the field of secondary surveillance radars it has designed and engineered a family of identification friend and foe (IFF) to suit its own primary radars.

In January 1987 the Electronic division of HAL announced the development of a high-power air route surveillance radar with a range of


108. The Times of India, January 8, 1974.


200 kilometers, thus making India the sixth country in the world to have
designed and produced this radar.

Missiles:

India's most successful indigenously designed and developed defence
project was its Integrated Guided Missile Development Programme (IGMDP)
which was launched in 1983 for achieving self-reliance in the field of a
new generation of surface-to-surface, surface-to-air, air-to-air missiles
along with their propellants (both solid and liquid) and their guidance
systems.

The Defence Research and Development Laboratory (DRDL) has designed
and successfully tested a short-range SAM, Trishul in 1987 and the
next year test fired Prithivi SSM. The second missile is faster and
more accurate than its contemporaries—the Russian Scud-B, the US build
Lance, Israel's Jerich and China's Tong Feng missiles.

But, the most prestigious project which has drawn the world's
attention is the successful testing of India's indigenous intermediate
range ballistic missile Agni. It has put India in an exclusive club of
countries—United States, Russia, Britain, France, China and Israel—


112. For details on India's missile programme see Hormuz p. Mama,
"Progress on India's New Tactical Missiles", International Defence
Review, July 1989, pp.963-64; and Anand Parthasarathy, "A Firm
Purpose", Frontline (Madras), June 10-23, 1989, pp. 9-14; K.
Subrahmanyam, "India Enters Missile Age", The Times of India, June
13, 1990.


114. International Herald Tribune, February 26, 1988; The Hindu, February
26, 1988; also see "Shooting Ahead", India Today, March 31, 1988,
p.170.

380.

116. Manoj Joshi, "Agni: Importance, Implications", Frontline, June 10-
with their indigenous ballistic missile technology. Even if the defence scientists claimed Agni to be a "technological demonstration", rather than the introduction of any new weapon system, its deterrent capability was revealed by the former Prime Minister, Rajiv Gandhi. He said:

Agni would give New Delhi an effective non-nuclear deterrent with its capability to deliver non-nuclear warheads, with high precision at long ranges. (117)

Even the former Defence Minister, K.C. Pant said, "India may likely to opt soon for a missile based defence system". Defence experts in India argue for integrating the deep strike aircraft with a possible ballistic missile force to "constitute a strategic deterrent capability for national defence".

Proliferation of ballistic missiles in the Third World has virtually shattered the western monopoly over such high-tech weapon systems. The Missile Technology Control Regime (MTCR) was conceived in 1987 to check such proliferation. Export restrictions have been imposed on complete weapon systems covering ballistic missiles, space launch vehicles,


118. Ibid.


unmanned aircraft and sounding rockets. Restrictions on sub-systems cover re-entry vehicles, solid and liquid fuel engine, guidance system and warhead technology. However, scientists in India claim that MRTP restrictions could have no impact on the missile programme as DRDL has mastered all such critical areas of missile technology.

Ship Building:

Indian armed forces were neglected during the initial years after independence, but the worst affected was the navy. Not only that navy did not receive any new ships but there was not a single ship repairing yard under the Ministry of Defence. In the year 1960 Mazagon Dock Limited (MDL), previously a private limited company, was purchased by the government and was brought under the control of the Department of Defence. In subsequent years MDL turned out to be India's premier ship building industry involved in the construction of warships like frigates, submarines, destroyers, corvettes for the navy and off-shore patrol vessels for the coast guard.

In 1966 India entered into the field of ship building. A licence agreement was signed with Vickers Armstrong and Yallow of Britain for the construction of 2500-ton Leander class frigates. Percentage of indigenous content in these ships steadily increased from a mere 18 per


123. Lok Sabha Debates (Seventh Series), vol.36, no.26, April 5, 1983, col.366.

cent in the first frigate to about 60 per cent in the sixth. Just after the termination of the Leander project MDL started construction of three indigenously designed and developed 3600-ton Godavari class multipurpose frigates. Western sources claimed that even for these indigenous frigates 50 per cent of the components were imported. Towards the end of 1987 the former Chief of Naval Staff, Admiral R.H. Tahiliani announced the construction of a new frigate which would be larger than the Godavari class, and some 85 per cent of its components would be produced locally.

As early as in 1972 government started giving thought to build submarines. But due to lack of R & D activities and technological know-how the ambitious project could not go beyond the feasibility studies. In 1981 a decision was taken to purchase two German HDW Type 1500 submarines and a further two to be built in India under licence. This will be followed by a class of larger ocean going submarines designed in India for patrolling the Indian Ocean. India has also launched a project definition study for the construction of two 30,000-ton aircraft carriers. In 1988 government announced that the level of indigenisation in major warships has reached 60 per cent. and the

The Defence Research and Development Organisation (DRDO) in India has under its control 42 research laboratories scattered all over the country with a work force of 25,000 that includes 6,000 scientists. DRDO activities are concentrated on two broad areas: first, projects based on specific requirement of the services regarding weapons, equipment, materials, indigenisation, import substitution and design of...
new equipment, and second, to acquire expertise in the design and development of futuristic weapons and equipment in the field of aeronautics, missiles, rockets, naval technology, electronics, armaments and vehicles.

The one area in which indigenous R&D has achieved complete success was in the field of designing missiles like Agni (IRBM), Prithivi (SSM), Trishul and Akash (SAM), Astra (AAM) and Nag anti-tank missile. In all other fields the quest for self-sufficiency has given mixed results. The relative failure of the arms industry in India to indigenise some of the advanced weapon systems in the past was mainly due to the fact that unlike the major arms producers India failed to adopt an intermediate strategy for armament research, development and production. To overcome this loophole R&D allocations has to be increased and proper coordination between various research laboratories and industrial establishments has to be established.

Arms Export:

Unlike many other leading Third World arms producers, India has so far adopted a restrictive arms export policy. It could be argued that the policy of exporting arms clashed with Indian foreign policy. Non-alignment being the central pillar of the country's external policy no government in New Delhi advocated arms export. Another plausible

136. Lok Sabha Debates (Fifth Series), vol.LI, no.36, April 18, 1975, Cols. 110-1.


139. International Herald Tribune, December 24, 1979; also see the two part article by Indian defence analyst G. Katoch an arms export in The Statesman (New Delhi), October 18 & 19, 1988.
reason that dissuaded India to enter into the lucrative arms bazar was the ready availability of a huge domestic market. All previous supplies found their way either to the friendly neighbouring countries like Nepal, Bhutan or Bangladesh (before 1975) on a non-commercial basis in the form of grants, and where commercial transaction took place with Malaysia, Ethiopia, Oman and Ghana the average value of such export never exceeded $100 million.

As a matter of policy India has decided to sell its spare defence products on a government-to-government basis with appropriate end-user restrictions as a safeguard against possible diversion of sophisticated defence items to third countries. Secondly, it is argued that Indian arms should be used by the recipients for self-defence against potential threat and not to be used in any offensive military action. Thirdly, there is a ban on supply of arms to areas of conflict and the policy is not to fuel arms race in any part of the Third World.

While arms production in the Third World is primarily justified on politico-strategic considerations, arms export eventually becomes an economic necessity. The purposes for which these countries entered into the international arms market were for generating valuable foreign exchange, for importing defence technology from the west, sustaining the domestic arms industry, for expanding the R&D capabilities, and for

140. See Far Eastern Economic Review April 18, 1975, p.5; also see SIPRI Year Book 1984, p.201; for arms transfer to friendly countries. See Wolf, "India: The Unfulfilled Quest for Self-Sufficiency", n.38, p.141.

141. This policy decision was reiterated first by former Minister of State for Defence, Sukh Ram, see The Times of India, August 10, 1986 and then by former Minister of Defence, K.C. Pant, see The Times of India, July 17, 1989.

reducing the production cost of indigenous weapons. Brazil and Israel together account for over 75 per cent of all Third World arms exports.

During 1985-89 Chinese export to the developing countries, in the form of tanks, missiles and aircraft, was nearly US $7 billion. Modernisation of Chinese arms industry is financed by such export earning. In case of India, though most of the time, the capacity of defence public sector undertakings and that of the ordnance factories remained underutilised due to sluggish demand from the Indian armed forces, there was sheer lack of political will to take note of this Chinese strategy.

During the previous years India had confronted two major problems in exporting arms to other countries. Since most of the defence items are manufactured under licence in India, it is handicapped by their restrictions on the export of such items. Soviet Union, for instance, had turned down India's request to sell spare parts of MiG-21 to Egypt.


144. During 1985-89 Brazil turned out to be the largest exporter of arms in the Third World (US $1.3 billion) followed by Israel (US $1 billion). See SIPRI Year Book, p.220.

145. China, along with Brazil and Israel, exported arms to warring nations in the first part of 1980s. In 1989 Pakistan and North Korea emerged as the leading importer of Chinese arms. Ibid., p.221.


147. See "HAL Capacity Underutilised", Indian Express (Bombay), May 31, 1982. Defence Minister Sharad Pawar has said that Ordnance Factories run at 40 per cent of their capacity, The Times of India, August 12, 1991. To overcome such crisis the Ordnance Factories Board took a major policy decision to produce items for the civilian market, see The Statesman (Calcutta), July 15, 1989.

148. In 1985 it was reported that India had asked permission from the former Soviet Union to export MiG-21 aircraft and parts which were built under licence in India, see Aviation Week and Space Technology, June 10, 1985. For Indian decision to sell MiG spares to Egypt and Soviet reaction, see International Herald Tribune, January 31, 1989 and K.R. Singh, "India and the Arms Bazar", The Hindustan Times, March 22, 1989.
Secondly, the it was apprehend that Indian exported arms might get into wrong hands. Around 100 exported Centurian tanks had landed up in South Africa via third countries. Another similar instance was reported by American Columnist Jack Anderson. In September 1983 CIA purchased through U.S. companies 60,000 rifles from India which were delivered to the Afghan Mujahideen fighting the Soviet troops in Afghanistan.

A new arms export policy was adopted by the Indian Cabinet in 1983. It decided that India would export small arms, mortars, light artillery, military vehicles, defence electronics and helicopters. It was also decided not to export indigenously manufactured heavy equipments like tanks and fighter aircraft. However, in 1991 ordnance factories in India for the first time made breakthrough with export of 105 mm and 130 mm field artillery guns to Yugoslavia, Vietnam and some other countries.

For 1992, India has set a target of Rs.1000 crores (compared to last years figures of only Rs.72 crores) in the field of arms export. It is offering a variety of weapons ranging from medium mountain guns and field guns, tanks and spare parts of Soviet-made equipment. There are around 45 countries which use Soviet made armaments but are facing spare parts

149. Wulf, "India: Unfulfilled Quest for Self-Sufficiency" n.38, p. 141.
150. See The Sunday Observer (New Delhi), October 19, 1986
153. Ibid. Also see The Times of India, August 12, 1991.
crisis due to the recent changes in Soviet Union, and that the Russians are insisting on hard currency. But before achieving this ambitious target India has to get over its inhibitions concerning defence exports. Further, India is entering the arms market as a seller at a time when there is a slump in arms sale due to the recent global changes. The problem also stems from the fact that India's main target for export are the poor Third World countries. In the buyers market India may be forced to enter into barter arrangements, or it may have to advance soft loans to encourage potential buyers of Indian weapons. Even Pakistan has provided a loan worth US $ 50 million to Iran to sale its defence products. In that case, the primary aim of arms export i.e. earning foreign exchange, would be relegated to the second place.

4.3 Pakistan: Arms Production:

The growth of arms industries in Pakistan is a recent phenomenon. From zero industry base at the time of partition of the subcontinent, today Pakistan has acquired the status of an "intermediate" arms producer, and has enlisted itself among the elite group of Third World countries exporting weapons. The country is self-reliant in the production of all varieties of small arms and ammunition, for both small and heavy calibre weapons. Islamabad has acquired the capability to repair, overhaul and rebuild its fleet of tanks, combat aircraft and warships. Having set up the necessary infrastructure Pakistan is now all


set to launch indigenous military projects for the manufacture of missiles, tanks, fighter planes, armoured personnel carriers and small naval ships. The defence policy aims at attaining self-sufficiency in the production of weapons required by the armed forces of the country.

Motivation to produce:

Indigenous production of defence items is viewed in Pakistan as a strategic necessity. This motivation grew out of its perception of actual and potential threat to national security. Its strong sense of insecurity vis-a-vis India moulded the strategic thinking towards defence buildup from an early date. Added to this crucial factor are two other corollary factors: firstly, the unreliability of external arms suppliers and the fear that the supply of arms, ancillaries and spare parts might be cut off during times of conflict. The reference point here is the decision of the United States' to impose an arms embargo on the subcontinent during the India-Pakistan wars in 1965 and 1971. Secondly, the Indian plan to expand and modernise the domestic arms industry after the military debacle in 1962 motivated security decision-makers in Islamabad to move in that direction. The political motive was to reduce external dependence and to act independent of great power influence. The strategic planning was also remodelled so as to ensure uninterrupted supply of weapons to its armed forces during war, even if there was any dislocation in external supplies.

Islamabad's motivation for expanding its domestic arms industries were closely intertwined with the love-hate relationship with the United States. In 1954 the foundation was laid for the US arms transfer to

Pakistan that helped the latter to redress the perceived military imbalance with India. Because of the continuous flow of arms during 1954 to 1965 there was no need for building the local defence industrial base. The US would not have liked that. The American decision to stop supply of arms to both India and Pakistan during the 1965 war was viewed in Islamabad as directed more against them because that country was receiving military equipment solely from the United States.

Pakistan's defence policy in the post-1965 period was readjusted to the changing situation. The source for military procurement was diversified and greater attention was laid on rapid expansion of defence production infrastructure. It established arms transfer relationship with China, France and former Soviet Union. Simultaneously production of small arms and ammunition was increased four-fold in few ordnance factories located at the Wah cantonment.

The third Indo-Pak war that led to the truncation of Pakistan further renewed its commitment to indigenise defence production. The half in the flow of U.S. arms helped strengthen the conviction that the country had to rely on its own resources in future conflict situations. The primacy of defence over development was in Bhutto's mind even much before he became Prime Minister of Pakistan in 1972. He wrote:

Pakistan's security and territorial integrity are more important than economic development. Although such development and self-reliance contribute to the strengthening of the nations defence capability, the defence requirement of her sovereignty have to be


met first. Pakistan will have to pay equal attention to the attainment of self-reliance through economic development and to her defence requirements. (161)

After becoming Prime Minister Bhutto announced that both defence and development being correlated must go hand in hand and a balance could be struck between them with a common approach. For him:

Both eyes must be open, the eye of peace and the eye of defence. Both hands must be active, the hand of peace and the hand of conflict. (162)

during his tenure in office (December 1971 to July 1977) Bhutto not only made his country self-sufficient in the production of wide range of small arms and ammunition but also laid the infrastructure for immediate and future production of sophisticated defence items like aircraft, warships, battle tanks and electronic equipment. The broad framework of the defence policy formulated by him was wholeheartedly accepted by the new military regime headed by General Zia-ul Haq. In the field of defence production General Zia started from where his predecessor had left off. Major defence projects were all commissioned in the early eighties.

The economic benefits of indigenous production are now projected as no less important than their strategic necessity. Firstly, it is argued that through both production and sale of military equipment Pakistan would be able to redress balance of payment situation. Secondly, defence industrialisation would have a spin-off effect on the civilian sector of the economy, leading to overall economic development. Thirdly, indigenous production is projected as more cost-effective as compared to procurement from abroad.


Production Capacity:

Pakistan is a typical case. There was strong politico-strategic motivation for arms production but it lacked adequate capacity to pursue advanced defence projects. Four decades after independence the country had just managed to have one steel plant and a heavy engineering project with assistance from Soviet Union and China respectively. On the other hand, the fourteen ordnance factories at Wah together constituted the single largest industrial enterprise in Pakistan. Not only that the defence sector had absorbed the largest contingent of scientific manpower, but also the ordnance factories were Pakistan's largest employer with a work force of some 40,000. This vividly explains the primacy accorded to defence over economic development.

To overcome problems of establishing factories for the production of sophisticated armament Pakistan has, since the days of Bhutto, taken recourse to strategic and diplomatic moves to attract external financial and technological assistance. The Sino-Pak strategic convergence on vital issues affecting both countries' national interest helped consolidate mutual cooperation in the field of defence. China's willingness to provide scientific and technological assistance helped Pakistan to overcome its major obstacle to defence industrialisation. The most


significant aspect of Sino-Pak collaboration was the secret agreement in 1976 between Bhutto and the then Chinese Premier Hua Guo-feng to include some of Pakistan's defence requirement in China's long-term defence production plan. All Chinese supplies to Islamabad, like Beijing's assistance to local defence production industries, were included in that plan. Bhutto's call to fellow Muslim countries in the Persian Gulf region to invest in defence projects in Pakistan had received favourable response. In 1974 Bhutto announced that four heavy ordnance factories were to be set up in Pakistan with cooperation of Gulf States for their "mutual benefit". "Such cooperation" he said, "will help meet the defence needs of not only Pakistan but also of its friendly countries" An agreement was also signed among Pakistan, Iran and Turkey for setting up joint defence industry. Besides inviting their capital for defence projects, Pakistan viewed the highly volatile Gulf region as an ideal market for export of defence goods manufactured in Pakistan.


170. The Times of India, March 9, 1975. Bhutto has in death-cell testimony had revealed that he established close military and economic cooperation with Iran. Besides providing project assistance, Iran also provided US $1 billion aid for investment in military and civilian industries in Pakistan. See Z. A. Bhutto, If I am Assassinated (New Delhi, Vikas Publishers, 1972), p. 72. Recent report shows that Pakistan is exporting arms to Iran. See Cheung and Ali, "China Bolsters Links with Iran and Pakistan", n.156, p.11.

171. The annual export turn out of Pakistan Ordnance Factories was $ 150 million in 1989 and bulk of these reached the GCC states. See Bokhari, "Defence Production in Pakistan" n. 166, pp. 12-14. Pakistani military products also find way to friendly countries in West Asia, Malaysia, Singapore, Sri Lanka, Bangladesh and even to European countries like Greece, Turkey, Germany and the United States. See Roger Frost, "Pakistan Ordnance Factories: A Rising Crescent in Defence Production", International Defence Review, May 1989, p.631.
Though Chinese were most generous in providing assistance, Pakistan looked towards the West. To gain access to such advanced technology which went beyond the Chinese capacity, Islamabad had in the past successfully absorbed defence technology from France, Britain and (West) Germany. United States was all through reluctant to pass sensitive technology to Pakistan despite the close security relationship between the two. However, in 1984, both countries signed an agreement that provided for the U.S. help to industries in Pakistan engaged in the manufacture of defence equipment. The latest report on a trilateral agreement for upgradation of Chinese supplied F-7 fighters and T-59 battle tanks in Pakistan with American technology is an indication of Pakistan's desire for joint ventures in defence production, and the US willingness to share its advanced technology with Islamabad.

But, it would be naive to argue that Pakistan relied only on external help to enhance its defence production capability. No opportunity was spared to invest scarce domestic resources on defence. Throughout the sixties average share of the defence budget from G.N.P. was 3.4 per cent that increased to nearly 7 per cent since the early seventies. In the words of Bhutto, no country in the world spent more on defence than Pakistan, in terms of percentage share of resources.

Though Pakistan, in its one-line defence budget did not provide break-ups


for military industries and investment in defence R&D, it could be argued that a large share of the defence budget all through these years was utilised for the rapid expansion and modernisation of the local arms industries. This is so because most of the armed forces' modernisation programmes were carried out throughout the seventies with both grants from China and financial help from the Arab countries, and with aid from the United States for the whole of the eighties. In June 1983, Finance Minister (now President) Ghulam Ishaq Khan revealed that "much of the allocations on defence was going to the defence industries which had come a long way in achieving self-sufficiency." According to SIPRI estimates, Pakistan's spending on military R&D was significant.

Further, to enhance the capacity for self-production, both heavy and medium-scale industries in the civilian sector were given defence orientation and emphasis was put on private sector involvement in the defence programme. Around 250 factories in the private sector were engaged in the production of spare items for armament. Though presently their share in defence production is a meager 6 to 7 per cent, the emphasis on commercialisation and joint ventures in the defence sector would lead to equal participation of both private and state-owned industries in the coming years.


### Table 4.1 CIVIL INDUSTRIES PARTICIPATING IN DEFENCE PRODUCTION

<table>
<thead>
<tr>
<th>Industries</th>
<th>Licencer</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pakistan Machine Toos Factory</td>
<td>Switzerland/France</td>
<td>60 mm, 81 mm, 120 mm mortars, 106 mm anti-tank rifles, RPG-7 rocket launchers.</td>
</tr>
<tr>
<td>2. Heavy Mechanical Complex</td>
<td>China</td>
<td>Spare parts</td>
</tr>
<tr>
<td>3. Heavy Forge Foundry</td>
<td>China</td>
<td>Spare parts</td>
</tr>
<tr>
<td>4. Pakistan Automobiles Corporation</td>
<td>Japan (Suzuki Company)</td>
<td>Military Vehicles</td>
</tr>
<tr>
<td>5. National Radio Telecommunication Corporation</td>
<td>Japan (Nippon Electronics)</td>
<td>High and very high frequency radio sets</td>
</tr>
<tr>
<td>6. Pakistan Railways</td>
<td>Not Known</td>
<td>Tank transporters</td>
</tr>
<tr>
<td>7. Pakistan International Airlines Precision Engineering</td>
<td>Not Known</td>
<td>Surface-to-air and Surface-to-surface missiles</td>
</tr>
</tbody>
</table>

Prior to the 1971 Indo-Pak war, a small cell within the Ministry of Defence was dealing with both arms production and procurement. Major institutional and structural changes in defence were carried out during the civilian regime of Bhutto. In December 1975 a new Production Division was created within the Defence Ministry headed by a Federal Secretary to deal with indigenous manufacture of armaments. A Defence Production Board within the Production Division is dealing with the Ordnance Factories, Pakistan Aeronautical Complex, Tank Rebuild Factory and the military R&D programme. The board coordinates and controls all programmes.

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for repair, rebuild, overhaul and manufacture of defence equipment in order to reach the ultimate goal of self-reliance and self-sufficiency in defence production. However, unlike India domestic military production is completely controlled and influenced by the Pakistani armed forces.

Ordinance Factories:

In 1951 the first ordnance factory in Pakistan was set up to manufacture small arms and ammunition. Because of the close military proximity with Britain, during the initial years, the Royal Ordnance Company of Britain was given the task to design the Wah Complex at a capital cost of Pakistan rupees 55 crores. The small arms & ammunition factory began with the production of World War II vintage .303 Lee Enfield rifles and 9 mm ammunition for pistols and sub-machine guns. From this humble beginning Pakistan has crossed a long distance and today the country is self-sufficient in the production of small arms, and ammunition for small, medium and heavy calibre weapons - from 9 mm to 155 mm howitzers. Ordnance factories were not only feeding the domestic market but were exporting small arms to more than thirty countries. 15 per cent of the products were earmarked for export, and it had fixed a target to earn US $ 150 million every year.

Its major products include the famous G-3 automatic rifle, the machine-gun MG 1A3 P and the sub-machine-gun MP5 A2; all produced under licence from (west) Germany. The gun manufacturing factory, inaugurated in 1985 with financial and technical assistance from China, produces 12.7 mm Type 54 machine-gun. The Machine Tools Factory manufactures, with


183. The Pakistan Times (Islamabad), November 6, 1985.
US licence, 106mm anti-tank recoilless rifles.

According to Major General Talat Masood, the former chairman of Pakistan Ordnance Factories, its products are a mixture of Western and Chinese origin. Rifles, machine guns and sub-machine guns are of German origin, the anti-tank guns are American while the anti-aircraft guns are Chinese. The mortar bombs are French and the rockets are Chinese. Other medium and heavy calibre ammunition are a combination of eastern and western origin. Because of the diverse source of arms procurement, standardisation of weapons and ammunition has become a major problem for the Pakistan Army. The current plan is to switch over from 7.62mm standard calibre to 5.56mm adopted by the advanced countries. Pakistan would procure about one million rifles, and would secure full right to manufacture a whole family of weapons and ammunition to meet the requirement of its armed forces and for their export to friendly countries. The high degree of commonality in design between the 7.62mm G3A3 automatic rifle produced in Pakistan with licence from Heckler and Koch of Germany, and the latter's own 5.56mm HK33 assault rifle make it an attractive proposition for manufacture.

Missiles:

In early 1989 Pakistan successfully test fired indigenously manufactured surface-to-surface missiles called Hatf-I, with a range of 80 kilometers, and Hatf-II with 300 kilometer range. Both missiles

186. See Howarth, "Defence Production in Pakistan" n. 182, p.941; and, Frost, "Update on POF Activities" n.166, p. 638.
were designed to carry a payload of 500 kilograms. Disclosing this, the former Chief of Army Staff, General Mirza Aslam Baig said, "these missiles along with their guidance system were built indigenously".

But, Pakistan so far has not disclosed any details of the missile configuration, warheads and guidance system. Commenting upon Pakistan's guided missile programme a western defence expert wrote:

Contrary to Pakistani announcement that Hatf missiles were domestically developed, they are identical to French sounding rockets manufactured by Aerospatiale, previously transferred to Pakistan for use in atmospheric research. The Hatf project simply mounted these on military gun carriages and fired them in a surface-to-surface trajectory.(189)

Pakistan is developing yet another ballistic missile, Hatf-III with a range of 600 kilometers with active support from China. Beijing has also confirmed the sell of M-11 Surface-to-Surface missiles to Pakistan has manufactured a shoulder-fired Surface-to-air missile (SAM) called Anza, which bears a close resemblance to the Chinese HN-5 (Russian version of SA-7 Grail) missile. About 70 per cent of this

188. Defence Journal, Ibid.


191. Cheung and Ali, "China bolsters link with Iran, Pakistan" n.156, p.11.
Table 4.2  MISSILE RACE - INDIA & PAKISTAN

<table>
<thead>
<tr>
<th>System</th>
<th>Range</th>
<th>Payload</th>
<th>Type</th>
<th>Source</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prithivi</td>
<td>250km</td>
<td>500Kg</td>
<td>BM</td>
<td>India</td>
<td>T/D</td>
</tr>
<tr>
<td>Agni</td>
<td>2,500km</td>
<td>900Kg</td>
<td>BM</td>
<td>India</td>
<td>T/D</td>
</tr>
<tr>
<td>Akash</td>
<td>27km</td>
<td>-</td>
<td>SAM</td>
<td>India</td>
<td>T/D</td>
</tr>
<tr>
<td>Trishul</td>
<td>9km</td>
<td>-</td>
<td>SAM</td>
<td>India</td>
<td>T/D</td>
</tr>
<tr>
<td>Astra</td>
<td>100km</td>
<td>-</td>
<td>AAM</td>
<td>India</td>
<td>Dn</td>
</tr>
<tr>
<td>Nag</td>
<td>4km</td>
<td>-</td>
<td>ATM</td>
<td>India</td>
<td>T/D</td>
</tr>
<tr>
<td>Pakistan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hatf-I</td>
<td>80km</td>
<td>500Kg</td>
<td>BM</td>
<td>Pak/France/China</td>
<td>T/D</td>
</tr>
<tr>
<td>Hatf-II</td>
<td>300km</td>
<td>500Kg</td>
<td>BM</td>
<td>Pak/France/China</td>
<td>T/D</td>
</tr>
<tr>
<td>M-11</td>
<td>290km</td>
<td>800Kg</td>
<td>BM</td>
<td>China</td>
<td>O</td>
</tr>
<tr>
<td>Hatf-III</td>
<td>600km</td>
<td>NA</td>
<td>BM</td>
<td>Pak/China</td>
<td>T/D</td>
</tr>
<tr>
<td>Anza</td>
<td>5km</td>
<td>-</td>
<td>SAM</td>
<td>Pak/China</td>
<td>T/D</td>
</tr>
<tr>
<td>TOW</td>
<td>NA</td>
<td>-</td>
<td>ATM</td>
<td>Pak/USA</td>
<td>T/D</td>
</tr>
</tbody>
</table>

BM - Ballistic Missile; SAM - Surface-to-air missile; AAM - Air-to-air missile; ATM - Antitank missile.
T - tested; D - in development; Dn - Design stage; O - operational


missile development was indigenous and 30 per cent was achieved with Chinese assistance. Though in recent years India has achieved tremendous success in mastering guided missile technology, the missile gap between India and Pakistan is narrowing and a missile race in the subcontinent is on.
Tank Rebuild and Upgradation:

The Heavy Rebuild Factory (HRF) at Taxila repairs and overhauls the 1,000 Chinese supplied T-59 tanks that forms the backbone of the Pakistan Army. Constructed with assistance from China, HRF is equipped to undertake complete rebuild of the tank and major overhaul of its engine. Majority of its plants and 2000 work force are engaged in production of spare parts. Currently 70 per cent of the spares are manufactured locally and a target is set to increase it to 90 per cent in the next few years. HRF has also developed capacity to rebuild M-47 and M-48 tanks supplied by the United States.

In recent years HRF has undergone extensive expansion to accommodate major projects. The first in the line is a project for upgradation and modernisation of T-59 tanks in some key areas like power plants, new ammunition and fire control system to enhance its battlefield effectiveness. China is providing assistance for the project. Pakistan is currently producing under licence T-69 Chinese tanks. But, the country is looking forward to manufacture MBT-2000 which would be, in the words of General Beg, "capable of defeating any known armour in the world today". There is yet another project for the manufacture of armoured personnel carriers. It has got licence from FMC corporation of the United States to manufacture M-113A2 APCs which would lead to the manufacture of infantry fighting vehicles.


196. The Muslim, February 6, 1989.

Aerospace Industry:

Pakistan's indigenous aerospace programme started in the early seventies with the assembly of imported components of Cessna light liaison aircraft and Alouette III helicopters. In 1974 assembly production of Saab Scania MFI-17 basic trainer and support aircraft commenced. The Pakistan Aeronautical Complex (PAC) at Kamra was constructed in the late seventies with technical assistance from China. Over the years it has developed into a complex of modern facilities for repair, general overhaul and manufacture of a variety of aircraft and aeronautical equipment used by the Pakistan Air Force and also for export. Both Pakistan and China have launched joint ventures for manufacture of a basic jet trainer called Karakoram-8, and for upgradation of F-7 Chinese fighter with American technology. At present PAC comprises of three main factories:

1. The F-6 Rebuild Factory,
2. The Mirage Rebuild Factory; and
3. The Aircraft Manufacturing Factory.

The F-6 Rebuild Factory:

The largest establishment within the aerospace complex designed, with Chinese help, to undertake major overhaul and spare part manufacture for the Shenyang F-6 combat aircraft. The nine squadron of F-6 constitute more than 40 per cent of PAF's total fleet of jet fighters.


The rebuilding facility fulfils the requirement of 24 rebuilt aircraft annually. Since 1988 it is assembling and overhauling Marchang Q5 Chinese supplied fighters and can even undertake rebuilding of 201 Chinese F-7 aircraft currently operated by PAF.

The Mirage Rebuild Factory:

In July 1973, Prime Minister Bhutto started negotiations with France to build facilities in Pakistan to overhaul and rebuild Marcel Dassault Mirage III fighters. The factory constructed with technical assistance from France and financial support from Saudi Arabia was commissioned at the aeronautical complex in May 1978. The first overhauled Mirage was handed over to the air force in February 1980. This factory now handles about six aircraft per year and its engine rebuild facility overhauls 36 Snecma ATAR engines of this fighter. Since 1983 Mirage V planes are also overhauled at the same complex. The engine rebuild facility has been expanded to overhaul F-100 power plant of F-16 fighters supplied by the United States. As many of the countries in the Gulf region possess Mirage fighters, Pakistan looks forward to extend this facility to friendly countries to earn foreign exchange.

The Aircraft Manufacturing Factory:

This factory was commissioned in November 1981 to manufacture MF1-17


204. Abu Dhabi's entire fleet of 32 Mirages are operated by Pakistani pilots and it has agreed to place all its aircraft at Islamabad's disposal in case of an emergency. See Asian Recorder, February 5-11, 1974, p.11840. In Gulf region Pakistani pilots either handle these aircraft or impart training to their own pilots.
trainers called Mushshaq in Pakistan. Now around 20 aircraft are produced annually and 70 per cent of its components are manufactured in Pakistan. Besides supplying 100 aircraft to the Pakistan army and 60 to the air force, it has exported about 80 Mushshaq to Syria, Turkey, Iraq and United Arab Emirates at a price of $200,000 each. The aircraft manufacturing factory is currently engaged in producing a new Pakistani variant of Mushshaq and K-8 Karakoram advanced trainer are being developed jointly with China. Both these aircraft are being aimed at the export market.

Ship Building:

Prior to 1971 naval modernisation in Pakistan was completely neglected. The crucial role of the Indian navy during the 1971 war forced security decision-makers to change their outlook towards naval requirements. A modest beginning was made by Bhutto to expand and modernise the country's only shipyard at Karachi which has now become self-sufficient in overhauling Pakistan navy's entire fleet of destroyers, frigates and submarines. Plans for the construction of frigates are underway for the last few years. Karachi shipyard has built a number of harbour launchers, cutters, motor boats and big ferry crafts and had made commercial sale of such ships to Abu Dhabi and Saudi Arabia.

4.4 Conclusion:

In both India and Pakistan the motivation to build up indigenous arms production capacity came because of their perception of insecurity in the event of external threat. In case of India it gathered momentum after the 1962 military debacle and Pakistan was motivated after their defeat in 1971 war. There was an attempt in both countries to implement

205. The Pakistan Times, December 20, 1983.
the defence production plan within the broad framework of their defence policies which envisaged minimum dependence on external support and ensuring uninterrupted supply of weapons to their armed forces during crisis situation. Their experience of western arms embargos during previous wars compelled them to take such policy decisions.

India is a leading arms producer in the Third World and its defence industries have now reached the "take off stage". There is strong desire to completely indigenise production of all major weapon systems but the result, so far, is a mixed one because the main problem is lack of defence technology and non-availability of valuable hard currency to acquire such technology from abroad. It's poor indigenous R&D programme affects sophisticated defence projects. Though India has a sound technological base in the civilian sector no attention has been paid to reap benefits in the field of defence. Even industries in the private sector are completely left out of this field. What is required is proper coordination and planning to get spin off from these sectors to make the desire for self-help a successful one. In order to overcome the foreign exchange crisis India has to first get rid of its rigid and orthodox arms export policy and must evolve a flexible and dynamic marketing strategy to sale Indian defence goods abroad. Before venturing into external arms market quality content and efficiency in production are to be properly taken care of. Countries like China, Brazil, Israel and even Pakistan are now relying on arms export to sustain their arms industries.

Though Pakistan is a late starter, few countries could afford to make such faster stride as Pakistan did in modernising and expanding its defence production base. In 1972 the only sophisticated weapon manufactured in that country was the Cobra anti-tank missiles. Now Pakistan is producing ballistic missiles, light aircraft, tanks and APCs and plans to co-produce more advanced fighters and armoured vehicles. For
Pakistan, "indigenisation is part of the process to build up a strong deterrent capability so that the country wouldn't be made victim of aggression in future". The strong motivation of the civilian as well as military leadership to lead the country towards the goal of self-reliance and self-sufficiency, even at the face of acute shortage of technology and capital is, by any standard, not a mean achievement.

But so long as countries like India and Pakistan depend on military technology designed and produced in developed countries it would become difficult for these countries to achieve self-reliance in the field of defence.