CHAPTER IV

PAKISTAN'S MISSILE DEVELOPMENT PROGRAMME

The fourth chapter entitled **Pakistan's Missile Development Programme** examines the origin, growth, and development of different types of missiles at various stages, the motivations and the driving force behind building up of nuclear weapons, missiles, their relative advantages and disadvantages, role of outside powers in the process of acquiring nuclear technology, and nuclear policy.

Chapter IV

Pakistan's Missile Development Programme

Pakistan is an important example for understanding the emerging dynamics of nuclear politics in the Second Nuclear Age and the deterrence strategies of the new nuclear powers in the new nuclear era. The nuclear policies and strategies that Pakistan pursues will have significant bearing on emerging patterns of nuclear politics in the 21st century. The significance of Pakistan also lies in the fact that it is a country that provides proliferation lessons from the perspective of both recipient and supplier of nuclear technology in the proliferation process. As will be illuminated in this work, Pakistan built its nuclear weapons programme through clandestine procurement of nuclear technology and equipment from international sources. From the mid-1980s onward, Pakistani scientists, in particular A.Q. Khan began the secret transfer of nuclear technology and machinery to other countries.

Pakistan is one of the few defacto nuclear weapons states (Israel, India, Pakistan, and North Korea are other such states) that possess nuclear weapons today beyond the five 'legitimate' nuclear powers recognised by the NPT. It is one of the three states (the other two being India and North Korea) other than the traditional nuclear powers that have tested nuclear weapons since the conclusion of the NPT in 1968. And it is the only Muslim state that has built nuclear weapons. Against the backdrop of the paucity of empirical cases, Pakistan is a vital example for the understanding of deterrence strategies of small nuclear powers. Moreover, missile related developments in South Asia in recent months have been causing proliferation concerns in the region as well as among several world capitals, which many fear are already leading to an overt sub-continental missile race between India and Pakistan. While India remains perched close to deploying its indigenously developed missile systems, traditional rival, Pakistan, has been furtively trying to redress the balance by seeking to deploy Chinese supplied M-11 missiles in response. This action-reaction syndrome between the two South Asian countries has heightened suspicions about the other's intentions. A recent Congressional Research Service Report has noted that M-11 missiles imported from China in the early 1990s had now been deployed by the Pakistani Army.[1]

In the contemporary global geopolitical structure, Pakistan occupies a critical position, in particular in the context of global geopolitics of terrorism and the proliferation of nuclear weapons technology. Therefore, understanding nuclear-armed Pakistan is vital not only for understanding the dynamics of the Second Nuclear Age, but its practical implications for India's security, and contemporary regional and global security are also no less significant.

Pakistan's threat perception and defence posture are entirely Indo-centric. The country began its military nuclear program as a sequel to the defeat in the 1971 war with India. By 1979, Pakistan had already set up its facilities for producing weapons-grade uranium, when it incurred US punitive action. In the 1990s, plutonium production was operationalized with the commissioning of the Chinese-designed and supplied Khushab reactor,[2] and China continues to play a major role in Pakistan's nuclear program. China is viewed as a staunch and permanent ally, whose friendship with Pakistan is as high as the mountains and as deep as the ocean.

Pakistan began its nuclear program soon after the disastrous war of 1971, and it has created a missile force that will reach practically the whole of India when operationalized. In the early stages, American-supplied F-16s were the primary delivery vehicles. Later, Pakistan changed over to missiles as the main delivery system, when the United States applied sanctions under the Pressler Amendment. With Pakistan now an ally of the United States in the War against Terror, F-16s are again being supplied (16 aircrafts till 2008), and the older aircraft have been taken up for refurbishing in the United States. However, ballistic and cruise missiles remain the preferred choice as nuclear weapon delivery vehicles, since they have definite advantages, not the least of which is India's lack of an operational missile defence capability.

Pakistan's acquisition of missiles began in the mid-to-late 1980s. It has been supplied a range of solid-fuelled SRBMs by China. North Korea, too, has provided Pakistan with liquid-fuelled missiles, reportedly in exchange for uranium enrichment technology. During the mid-1990s, a complete missile manufacturing plant was transferred to Pakistan by China, with Chinese assistance most likely encompassing equipment and technology transfers in the areas of solid-fuel propellants, manufacture

of airframes, re-entry thermal protection materials, post-boost vehicles, guidance and control, missile computers, integration of warheads, and the manufacture of transporter-erector launchers (TELs) for the missiles.[3] China's assistance continued and even accelerated after the 1998 nuclear tests. It now nominally observes the Missile Technology Control Regime (MTCR) guidelines, but makes important exceptions, such as excluding cruise missiles and not counting the supply of weapons in a dismantled state that enable China to continue business as usual with Pakistan.

Pakistan is perceived to have acquired missile capability in the late 1980s. Initially, three major factors were attributed for Pakistan's missile acquisitions, namely:

- The easy availability of Chinese missiles and missile-related technologies;
- Pakistan's inability to obtain the delivery of all its F-16 fighters from the US;
- The success of India's missile development programme.

The Pakistani ballistic missile programme suddenly shot into the limelight on April 25, 1988, when it was announced that the country had tested two types of ballistic missiles named Hatf I and Hatf II.[4] Despite this claim by then Army Chief of Staff, General Mirza Aslam Beg, it was generally considered that Pakistan's missile capability was nascent. The Hatf I with a range of 80 km and a CEP of 200 metres and reportedly capable of carrying a 500-kg payload, and the Hatf II, an improved version having a longer range of 300 km, are generally thought to have been built with Chinese technology and in the presence of Chinese technicians. Although these missiles resemble the old US Army Honest John systems, Chinese assistance was crucial to make modifications which allowed them to carry high explosive warheads, which could also include chemical weapons. According to a Pakistani newsmagazine, the field trials of the Hatf ended in failure, with the missiles frequently blowing up in the air and failing to achieve the desired trajectory.[5] The Hatf I was reportedly very inaccurate and the Hatf II could not reach its target range of 300 km. After a few test flights from the Mekran Coast, the Hatf I and II appear to have been practically given up in favour of developing the Hatf III. According to experts, the missiles have been riddled with numerous problems ranging from lack of a reliable on-board guidance system to urgent improvement of rocket motors.

The third missile now under development, Hatf III, which at times has been confused with the M-11 supplied by China, is the result of more active cooperation with the Chinese. The M-11s supplied to Pakistan are perhaps meant to tide over difficult times, especially as Pakistan has started invoking a heightened threat perception from the development of the Prithvi missiles across the border. In the period 1989-93, it did not have any missile capable of challenging the Prithvi because the Hatf I and II programmes did not reach up to their expectations.

The Hatf III appears to have drawn the finest scientific talent from across Pakistan and has also received backing from the Chinese, who see the indigenous development of the Hatf III as a way out of their commitment on the MTCR given to the US whilst fulfilling their deals with Pakistan as part of their politico-strategic relationship which has evolved over four decades. Not only have the armed forces been actively involved in the project, but the civilian space research organisation too has been co-opted into the project. The Space and Upper Atmosphere Research Commission (SUPARCO) which was established in 1961, with US assistance, has gained some experience in launch technologies. While the sounding rockets that it has launched from its base at Sonmiani Beach, some 50 km north-west of Karachi have been rudimentary in comparison to the Indian Space Research Organisation (ISRO)'s rocket launching programme, SUPARCO has developed two rockets — the Shahpar, a 7 metre solid fuelled two-stage rocket that can carry 55 kg to an altitude of 450 km, and the Rakhnum which can lift 38 kg to a distance of 100 km. In addition, SUPARCO has tried to develop a small satellite launcher but the project has been stalled for want of technology. There have been other reports that SUPARCO has been seeking to buy sensitive equipment and materials for the ballistic missiles programme.

In 1995, SUPARCO approached several European firms for composites, specialist alloys and a range of production and testing equipment, which in turn prompted the US to write to other MTCR states about SUPARCO's plans.[6] Apart from the Ministry of Defence and the Space Research Council (SRC), other bodies like the Propellant Factory in Havelian, which has been producing rocket propellant since 1967, the Aerospace Institute located in Islamabad which conducts training in space sciences, the Computer Centre in Karachi that supports SUPARCO's technological and

scientific projects, the Control System Laboratories, Instrumentation Laboratories and the A.Q. Khan Research Laboratories, which initially were tasked with the production of missiles, are now involved in the production of the Hatf III. This would put into perspective as to why SUPARCO was openly involved with what the Pakistani Foreign Office spokesman called "a routine test without military purpose." The massive effort undertaken by Pakistan to bridge the gap appears to be the primary motivation for Islamabad to test launch the Hatf III missile.

Following the latest tests, Pakistan's missile arsenal now consists of the Hatf I, II, III, IV, V, VI and so on. The Hatf-I is a single-stage solid propellant missile with a range of 60 to 80 km and a payload capacity of 500 kg. It was first flight-tested in 1989, and a larger 100 km range variant was test-fired in early 2000. It is believed to be in service in limited numbers. The Haft-II, also known as Abdali, is a solid-propellant ballistic missile with a range of 180 km and a payload capacity of 500 kg. Abdali was first test-fired in February and later in May 1989. The Hatf-III, also known as the Ghaznavi, is a solid fuel short-range ballistic missile with a range of 290 km and a payload capacity of 500 kg closely resembles the Chinese M-11 missiles.

The Hatf-IV, also called Shaheen-I, has a range of 750 km and a payload capacity of 700 kg is a solid fuel missile, which is based on the Chinese M-9 missile design, was first flight-tested in April 1999. Shaheen-I entered serial production in mid 1998. Hatf-V, also named Ghauri, is a single-stage liquid fuel IRBM with a range of 1,500 km and a payload capacity of 700 kg. This missile was first test-fired in April 1998. There is another version, Ghauri-II, a liquid fuel, two- stage IRBM (intermediate range ballistic missile) with a claimed range of 2,300 km. It was first flight-tested in April 1999. The Ghauris' are believed to be derived from the North Korean Nodong missile. A longer range, two-stage solid fuel missile Hatf-VI, also called Shaheen-II, was unveiled during the Pakistan Day Parade on March 23, 2000 with a range of 2,500 km with a 1,000 kg payload. Beside the Hatf series, longer range missiles like Tipu and Haider have also been reported.[7]

Motivated by ongoing hostilities with India, Pakistan embarked upon an intense ballistic missile development program in the early 1980s. Overcoming lack of sophistication technical substantial disadvantages in infrastructure and human capital

relative to India, the imposition of US, and Missile Technology Control Regime (MTCR) sanctions, and the uncertainties of democratization, Pakistan gained a sophisticated missile arsenal in just 30 years.

The perceived strategic necessity of displaying the ability to execute a nuclear strike deep within India has sustained Pakistan's interest in medium- and long-range missiles. The Congressional Research Service and other assessments continue to report ongoing Pakistani missile collaborations with China and North Korea. Pakistan also remains a non-signatory to the MTCR, but the last US missile sanction laws against Pakistani entities were waived in 2003.

Missile developments, such as the April 2011 test-firing of the short-range nuclear capable Hatf-9/NASR missile, indicated potential Pakistani interest in building a tactical nuclear capability. Pakistan considers its nuclear weapons to be national "crown jewels" and likely also holds missile delivery systems in a similar regard. Barring substantial changes in South Asian geopolitics, a change in attitude seems unlikely.

Barring unprecedented industrial growth and a substantially enhanced defense-industrial base, Pakistan could continue its strategy of developing advanced missile systems with foreign assistance rather than pursuing the more expensive and less feasible option of pure indigenous development. Continued state patronage fuelled by competition with India, the high prestige accorded to Pakistan's nuclear arsenal, and the symbolic value of diversifying missile delivery systems will likely sustain the missile development in Pakistan.

Here are the missiles currently held by Pakistan:

Battlefield Range Ballistic Missiles (BRBM):

- Hatf-I/IA
- Abdali-I
- Nasr (Hatf-IX)

Short Range ballistic missiles (SRBM):

- Ghaznavi
- Abdali-II

Medium Range Ballistic Missiles (MRBM):

- Ghauri I
- Shaheen I
- Ghauri II
- Shaheen II

Intermediate Range Ballistic Missiles (IRBM):

- Ghauri-III
- Shaheen-III

Intercontinental Ballistic Missile (ICBM):

- Taimur 7,000 km, a proposed ICBM which is believed to be under development

Cruise Missiles:

- Babur (Hatf VII) - ground-launched cruise missile (submarine-launched version under development)
- Hatf-VIII (Ra'ad) - Air-launched Cruise Missile developed exclusively for launch from Aerial Platforms[8].

The following **Table 4.1**: **Ballistic Missiles,** throw light on Pakistan's missile force and its main features.

Type	Designation	Propulsion	Range in Km	Payload in Kg	Nos
SRBM	HATF 1/1A	Solid Fuel	60 – 80 / 100	500	NA
	HATF 2 / SHADOZ	Solid Fuel	300	500	NA
	HATF-3 / DF- 11 / M11 GHAZNAVI	Solid Fuel	280	800	35 - 85
	HATF-4 / DF – 15 / SHAHEEN /M9	Solid Fuel	600 - 800	500	40
MRBM	HATF – 6 / M 18 SHAHEEN - II	Solid Fuel	2,000	500	NA
	HATF V GHAURI NODONG	Liquid Fuel	1,200 – 1,300	1,000	12 - 15
	GHAURI II	Liquid Fuel	1,700		NA
IRBM	GHAURI III	Liquid Fuel	2,500 – 3,500		NA

Table 4.1: Ballistic Missiles [9]

Features of Pakistan's Missile Inventory:

The main features of Pakistan's missiles drawn from the above table include the following:

- The missile inventory is estimated to consist of around 85 Hatf 3 (Ghaznavi) SRBMs of 280-km range, around 40 Hatf 4 missiles of about 800-km range, and around 10 to 15 Hatf 5 (NODONG) MRBMs with a 1000-km range.
- The Babur is a ground-launched LACM, probably the Chinese DF 10, which itself is a derivative of the US Tomahawk
- An air-launched cruise missile, the Hatf 8, has been test-launched from a *Mirage* aircraft. The Hatf 8 ("Ra'ad") reportedly has a range of about 350 km. The air-launched version of the Babur is also under plans to be developed.
- While as far as is known Pakistan does not have plans for a sea-based ballistic missile deterrent, it plans to develop a submarine-launched version of the Babur missile subsequently, to give it a sea-based deterrent in the form of an SLCM.
- Pakistan's missiles are all of Chinese or Korean origin and design, and the country still depends heavily on China and the Democratic People's Republic of Korea (DPRK) for missile technology and hardware.
- The Ghaznavi (M11) and Shaheen (probably M9), both SRBMs, are believed to be operational.
- The Shaheen II (MRBM) development is complete, and inducted with service trials. The Ghauri II (MRBM) and Ghauri III (IRBM) development have been quite successful.

Thus the current Pakistan inventory, when becoming fully operational, will have ground, air and submarine launched components (the latter two being purely cruise missile equipped) with sufficient reach to strike any point in India[10].

Pakistan's Missile Development and Acquisition Philosophy

The decade of the 1990s witnessed the dramatic emergence of Pakistan's nuclear weaponization programme that had begun in the 1960s. It would have been logical to expect that a missile delivery programme for its nuclear weapons would be conducted concurrently. However, the outlines of an integrated Pakistani missile

development plan began to appear only in the 1980s though experimentation with sound ranging rockets had begun in the earlier decade. Pakistan's missile programme is termed as dramatic because in a short span commencing in 1991 this country has demonstrated the development of a long range potent missile arsenal with nuclear warhead capabilities. When measured against Pakistan's technological expertise, industrial infrastructure and hi-tech R&D capabilities, it becomes obvious that Pakistan's missile arsenal has come into being with total external assistance and aid.

Strategically, at the turn of the millennium, Pakistan could justifiably boast that not only had it offset India's overwhelming conventional superiority by its nuclear weaponization, but also had outstripped India's missile development programmes which had proceeded slowly due to both domestic and external restraints.

Pakistan Missile Development /Acquisition Programme - The Stimulus

Multiple stimuli existed for Pakistan to go into over-drive for an accelerated missile development and acquisition programme. The decade of the 1990s could better be termed as Pakistan's 'missile acquisition decade' rather than a development one. There were more acquisitions than development. Pakistan was impelled by the following stimuli, when contemporary developments are analysed:

- Pakistan had achieved nuclear weapons capability by 1987, but its only means of delivery were aircraft, basically the US-F16s.
- United States embargo on F-16 deliveries as a result of Pressler Amendment rendered Pakistan's nuclear weapons capability vulnerable.
- Ballistic missiles had emerged as more potently destructive weapons and cost-effective options by 1990-91. This was evident from the Iran-Iraq war of the 1980s, the war in Afghanistan and the Gulf War.
- China, by now had emerged as a source of ready supply of ballistic missiles for the Islamic world.
- Pakistan's strategic nexus with China enabled an easy and assured access for build-up of Pakistan's missile arsenal similar to its nuclear weaponization with Chinese help.
- The stage was thus propitiously set for build -up of Pakistan's missile arsenal. Unlike its struggle to acquire wherewithal for nuclear weapons production, Pakistan faced no problem in missile acquisition or production.

Strategically, Pakistan was aware that in terms of a missile build-up, it was running against time. Pakistan had nuclear weapons, but with aircraft delivery capability only. Aircraft had limitations both in terms of range of delivery of nuclear weapons and also penetration of India's air-defence systems. Pakistan was also sensitive to the indigenous development of India's integrated missile development programme. India's programme was slow but potent and threatening for Pakistan. Pakistan's missile build-up philosophy therefore, differed markedly from India's. Analysis of events indicates that Pakistan's missile build-up philosophy was grounded on the following guidelines:

- Speed was the uppermost imperative in terms of build-up of Pakistan's missile arsenal.
- Direct off-the-shelf acquisition of missiles for Pakistan's arsenal was based on priority requirement.
- Indigenous Pakistani missile development programme was Priority II, or at best, to proceed concurrently.
- The indigenous Pakistani missile development and production programme should not waste time on indigenous R&D. It should follow a dual-track path

Track I

Assembly of imported missiles in Pakistan from what at best could be termed as SKDs (semi knocked down) kits and CKDs (completely knocked down) kits.

Track II

Indigenous fabrication of above missiles, sub-systems and propellants were developed in a phased manner. Track I would enable a quantitative jump in Pakistan's indigenous missile production expertise. The above philosophy finds reflection in Pakistan's missile arsenal, both in terms of composition and capabilities.

Pakistan's Missile Arsenal: Composition and Capabilities

Pakistan's missile arsenal when discussed in the media or in academic publications tends to become one long list. Further, Pakistan's deception measures in relation to its missile arsenal tend to confuse analysts by giving HATF serial numbers to subsequent developments. This is aimed at both, for passing off latest acquisitions as indigenous, and also for confounding analysts. For a more orderly analysis of

Pakistan's missile arsenal and also in terms of range, propulsions systems and capabilities, the Pakistani arsenal needs to be viewed in the following groupings:

- HATF series
- GHAURI series
- SHAHEEN series
- M-11 (direct imports from China)

Missile[11]	**Year of Testing/ Acquisition**	**Range in km**	**Warhead Weight in Kg**	**Propulsion Stages Propellant**		**Origin**	**Deploy-ment Status**
HATF1	**1989**	80	500	Single	Solid	Indigenous	O[12]
HATF 1A	**1992**	100	500	Single	Solid	Indigenous	O
HATF II	**1989**	300	500	Two	Solid	PRC (M11)	D[13]
HATF III	**1997**	600-800	500	Two	Solid	PRC	D
GHAURI I	**1998**	1500	500-750	Single	Liquid	DPRK/PRC	T[14]
GHAURI II	**1999**	1500-2300	700	Two	Liquid	DPRK/PRC	T
SHAHEEN I	**1999**	750	1000	Two	Solid	PRC (M 9)	T
SHAHEEN II	**2000**	2500	1000	Two	Solid	PRC	T
M-11	**1991-1998**	300	500-800	Two	Solid	PRC	S[15]

Table 4.2: Pakistan's Missile Arsenal: Composition, Capabilities and Characteristics

Pakistan's missile arsenal is composed of varied types of short- and medium-range ballistic missile systems as well as two types of cruise missile systems. Ballistic

missiles are made of both solid and liquid propellant and can carry conventional as well as non-conventional ammunition. To be precise, Pakistan's ballistic missiles capabilities include the solid-fuelled **Hatf** battlefield missile series, the liquid-fuelled **Ghauri** intermediate-range ballistic missiles, and the solid-propellant **Shaheen** series. In addition to ballistic missiles, Pakistan has developed two types of cruise missile systems — the **Babar** and the **Raad**. Additionally, Pakistan possesses several dozen M-11 missiles, which Beijing supplied to Pakistan in the early 1990s. The **Table 4.2** indicate Pakistan's Missile Arsenal: Composition, capabilities and characteristics. The groupings of Pakistani missile arsenal analysed thus also finds reflection in terms of distribution of development and fabrication within Pakistan in the following **Table 4.3.**

Missile Series	**Propellant**	**Pakistan Development/Fabrication**	**Scientists**
HATF	Solid	SUPARCO (Initially)	Now likely NDC
GHAURI	Liquid	A Q Khan Research Lab Kahuta	Dr. A Q Khan
SHAHEEN	Solid	PAEC National Defence Complex (NDC) Fathehganj	Prof. Samar Mubarak Mund

Table 4.3: Pakistan's Missile Arsenal: Distribution of Development and Fabrication

In terms of analysis of missiles by ranges as per international classification standards, Pakistani missiles can be categorised as under:

- SRBM- HATF series, SHAHEEN 1 and M-11
- MRBM- GHAURI series
- IRBM - SHAHEEN II

However in terms of US classification system both GHAURI and SHAHEEN series are IRBMs. Thus Pakistan in a short span has been able to buildup its missile targeting capabilities to IRBM ranges. Similarly, all ranges shown are maximum ranges claimed by Pakistan and its long range missiles cover all of India's metropolitan cities.

Pakistan’s Missile Targeting Strategy

Pakistani missile targeting strategies can be analysed from the above groupings in terms of ranges and characteristics. From a deductive analysis, the targeting strategy in terms of the different series appears to be as under.

The HATF Series

HATF series formed the initial component of the Pakistani missile arsenal. It was also planned as a counter to India’s Prithvi missile. Besides the nuclear capability of HATF II and III, in the conventional mode it was designed as an offensive weapon to knock off Indian armour concentrations. In the defensive mode, it would be used in dual roles to destroy Indian bridge-heads in Pakistani territory. Its chief use could be said to be along Pakistani borders with India, both inside and outside.

The GHAURI series

With its extended range, the GHAURI series could effectively reach virtually the whole of India but it seems that the strategic targeting of this missile would be more towards Mumbai and Peninsular India in which lie India’s most sensitive installations. GHAURI is a mobile system and could be used for counter-value strikes. Pakistan claims that GHAURI can carry nuclear, chemical and anti-tank warheads. The development in Pakistan's ballistic missile program was the flight testing of the Ghauri (Hatf-V) missile in April 1998. The Ghauri is liquid-fuelled and is Pakistan's imported version of the North Korean Nodong, itself a fancy Scud. Official Pakistani statements claimed the missile had a maximum range of 1500 km carrying a 700 kg payload, but analysis by the U.S. Department of Defense of the Nodong put the range closer to 1000 km. According to Dr. A. Q. Khan, who is credited with being the father of Pakistan's nuclear and ballistic missile programs, the Ghauri flew 1100 km in its flight-test in April, supporting the Pentagon's analysis. Press reports put the tested range as being between 700 km and 1200 km.

The Ghauri is reported to have a relatively large diameter - 1.25 m. Pakistan is capable of producing nuclear warheads approximately the size of a soccer ball and weighing 400 kg, a size which would easily fit on a 1.25 m missile. Dr. Khan claims

the Ghauri is now "fully operational." When asked if Pakistan is now capable of deploying nuclear weapons, he replied, "No doubt about it, one should not be under any illusions." He said it could be done within "not months, not weeks, but within days."

The **SHAHEEN series**

SHAHEEN II unveiled on Pakistan Day Parade on March 23, 2000 was Pakistan's answer to India's Agni II. It has all India coverage, but can be said to have Mumbai and Peninsular India as the main target. With its ground mobility and solid state propellant systems it should logically form the backbone of Pakistani nuclear deterrent. With mobility comes survivability and therefore the SHAHEEN II could impart to Pakistan a second strike capability in the future. The above is a broad analysis of Pakistani's missile targeting strategy.

Future Perspectives

In terms of future perspectives, the following can be said about Pakistan's missile build-up:

- Pakistan's missile force would form the main delivery system for its nuclear weapons.
- Pakistan's emphasis on a "credible minimum deterrent" would call for matching responses to India's missile developments in terms of ranges and payloads. This would imply that the GHAURI and SHAHEEN series would receive priorities in terms of range and payload modifications.
- Pakistani SRBMs and MRBMs priorities would be more to build up numbers to withstand both conventional and nuclear attrition.
- In terms of ICBM capability, Pakistan would definitely aspire for it, but a host of factors are stacked against her. Even China, Pakistan's nuclear weapons and missiles benefactor, would hesitate to impart ICBM capability to Pakistan, for strategic reasons.

Despite the dismal state of Pakistan's economy, her nuclear weapons and missiles build-up programmes have never stood impeded. China for strategic reasons and oil-rich Middle East countries for Islamic solidarity reasons have provided the wherewithal and finances. Substantial amounts of drug money also stand ploughed into these programmes by the Pakistani military. It has become a practice for Pakistan to fire missiles from their cupboards whenever there is one rocket fired by India for

peaceful purpose. So this is a routine threatening posture which cannot be taken lightly. It is better to stock our shelves also with such missiles for defence purposes.[16]

Role of Outside Powers

Pakistan has an extensive nuclear-capable ballistic missile program, as the April 1998 test-firing of the Ghauri missile illustrated. The program is almost entirely imported, despite official Pakistani claims to the contrary. Pakistan has received assistance from the People's Republic of China and the Democratic People's Republic of Korea (DPRK). Pakistan's limited scientific and industrial base has forced it to rely on continuous outside help. Pakistan possesses both the 300 km M-11 (Hatf III) missile acquired from China and the 1000 km Nodong (Ghauri) missile bought from North Korea. Pakistan has also imported plants to manufacture these missiles. Pakistan's missile program is important for two reasons. First, Pakistan is a nuclear weapon state. Missiles give Pakistan the means to deliver its nuclear warheads farther and with more certainty than it could with aircraft. Second, the May nuclear weapons tests of both Pakistan and India illustrate the high tensions and spiralling arms race in South Asia. Ballistic missiles, which shorten warning times, increase the chances of accidental or pre-emptive nuclear conflict.

North Korea has been an important missile partner for Pakistan. North Korea admitted publicly in June 1998 that it is developing and exporting ballistic missiles to make money, though it did not specify to whom. The Commission to Assess the Ballistic Missile Threat to the United States, led by the Honourable Donald Rumsfeld (Rumsfeld Commission), believes that in addition to supplying the Nodong, North Korea supplied production facilities for the missile. This enables Pakistan to indigenously produce a fleet of missiles and reduce its dependence on imports. Intelligence and satellite images reportedly have revealed the delivery of warhead canisters from North Korea to Pakistan's Kahuta Research Laboratories (KRL) in June 1998 and have disclosed increased activity at KRL's missile facility, suggesting that production of the Ghauri may be in full swing. And US intelligence has reportedly concluded that Pakistan received a shipment of maraging steel from Russia, useful for missile production, via the North Korean Changgwang Sinyong Corporation (aka North Korea Mining Development Trading Corporation). The United States

Department of State imposed sanctions against both Changgwang Sinyong Corp. and KRL for this relationship. In return for its help as a supplier, North Korea is able to receive performance data from Nodong tests by its customers. North Korea itself has only tested the Nodong once, to a 500 km range. But most important, Pyongyang receives hard currency, meaning that its exports will continue to fuel rogue states' missile programs.

M-11

The Rumsfeld Commission confirmed that complete M-11 missiles were sent to Pakistan from China. Pakistan has reportedly received more than 30 M-11s, which have been observed in boxes at Pakistan's Sargodha Air Force Base, west of Lahore. Intelligence officials believe Chinese M-11s have probably been in Pakistan since November 1992, when China was "reconsidering" its stance on missile exports after the sale of US F-16 aircraft to Taiwan. Since then, Pakistan has been constructing maintenance facilities, launchers and storage sheds for the missiles, all with Chinese help. China and Pakistan deny these reports. Pakistan calls the M-11 the Hatf-III. The missile has a range of more than 300 km and a payload of 500 kg. It is a two-stage, solid-propelled missile capable of carrying nuclear warheads. The missile was reportedly test-fired in July 1997. China has also been helping Pakistan construct its own facility to produce the M-11. China has provided blueprints and equipment to help build an M-11 factory near Rawalpindi. US intelligence has reportedly been aware of the site since 1995, when construction is said to have begun.

Other Missile Developments

In the future, an even longer-ranged missile is likely, according to the Rumsfeld Commission. The Commission estimates that Pakistan's current ballistic missile infrastructure "will support development of a missile of 2,500-km range," which would put all of India within range. Gradually Pakistan is heading towards a higher range of missiles and the following **Table 4.4** given below highlight the slow and steady improvement in acquiring nuclear capable missiles.

Missile	Range	Payload	Launch Weight	Propulsion
Hatf-1	80 km	500 kg	1500 kg	Single-stage, Solid Propellant, Mobile platform. Status: Flight-Tested
Hatf-3 (Tarmuk) (Chinese M-11)	300 km	500 kg	N/A	Two-stage, Solid propellant Mobile platform Status: Flight-Tested
Hatf-5 (Ghauri)	1000 km	700 kg	16,000 kg	Single-stage, Liquid Propellant Mobile platform. Status: Flight-Tested.

Table: 4.4 Nuclear Capable Missiles

Pakistan's Missile Capability

Pakistan started planning its missile program to equip its forces with short and medium range missiles to enhance its defense capabilities in 1987. It has, now, various types of missiles programs, including ballistic missiles, based on highly accurate technology. It developed its ballistic missile program rapidly to counter the enemy's attack. Anza was developed under the shoulder-fired ground-to-air missile program. Later on, an anti-tank Baktarshikan missile program was introduced in 1987. Pakistan tested its short range surface-to-surface ballistic missile in 1988. The pace of production of short-range missiles is reasonable.

The modest range of Hatf I is 80 kilometers and it can carry a load of 500 kilograms. Efforts continued to improve its performance, resulting in Hatf II with an enhanced range of 250 kilometers and the same payload of 500 kilograms. Both are free flight missiles with inertial guidance systems following a ballistic trajectory. The Hatf II was produced in 1989. Both were possibly designed and developed by the

Space and Upper Atmosphere Research Commission (SUPARCO). The testing of Hatf III seems to be a major break-through in the development of missiles technology in Pakistan. It has a range of 600 kilometers with a payload of 500 kilograms and a proper terminal guidance system giving it an accuracy of 0.1 per cent. The main features of Hatf III missile are its two-stage rocket ability for war-head separation, a terminal guidance system and five different types of warheads. The most difficult part of the missile was its guidance system which was developed by Pakistani engineers and scientists. The test firing of Hatf III was necessary to tackle difficult situations in hard times.

There is a possibility of conventional and nuclear clash between India and Pakistan. Naturally Pakistan needs to develop its missile program to a large-scale industry. India deployed its medium-range ballistic missiles near Pakistan's border in 1997. It was a matter of serious concern for Pakistan. In fact, it was a dangerous signal for Pakistan's safety. Pakistan carried out its medium range surface ballistic missile program in 1998. It is pertinent to mention here that ballistic missile reaches its target faster than other weapons and it is difficult to defend against its attack. The missile system plays a vital role in modern defense technology.

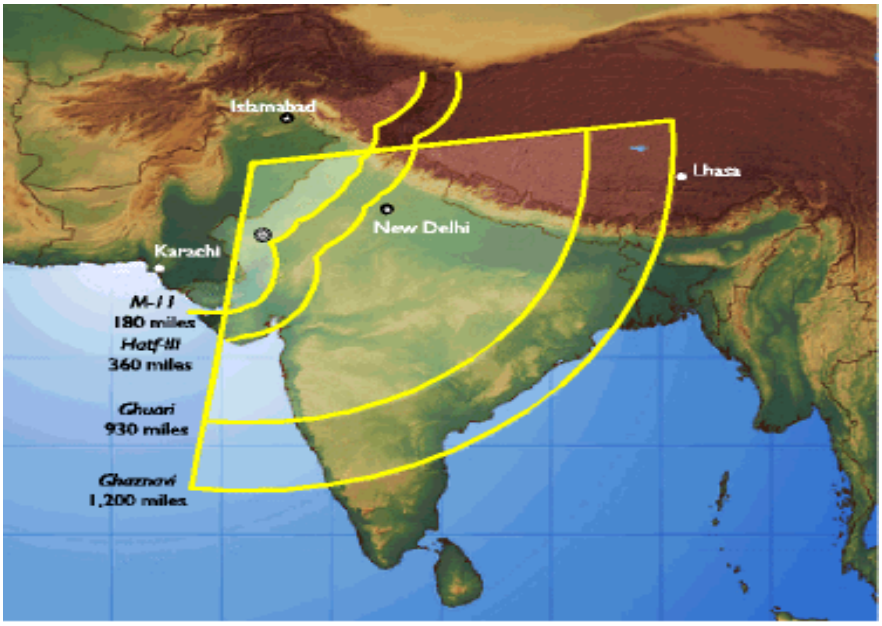
Pakistan made a successful test of medium range surface ballistic missile Hatf V named Ghauri in 1998. It can cover a vast area of India excluding southern and eastern regions, along the Bay of Bengal. It can target its prey 1500 kilometers away. It weighs 16 tons and can carry a payload of about 700 kg. Its flight time is 8 minutes. Its terminal guidance system has been developed by skilful, diligent and dedicated Pakistani scientists and engineers working on the research and development of missile technology. It may have its impact on regional circles. It contributes enormously to the military strength of the nation. A potential aggressor would think a hundred times before attacking Pakistan. The Ghauri series are liquid-fuelled ballistic missiles while Shaheen series are solid-fuelled ballistic missiles. The missile system plays key role in the modern war games based on scientific strategies. It is now an essential element in the defense planning of a nation. Moreover, it is an effective and reliable deterrent. Pakistan is now in a position to retaliate its enemies with great force. India, in the past, created a dangerous security atmosphere and violated Pakistan's air space. Naturally

Pakistan was right to take measures for its security. Shaheen I and Shaheen II, medium range solid-propellant missiles, are the solutions for the enemy's evil designs.

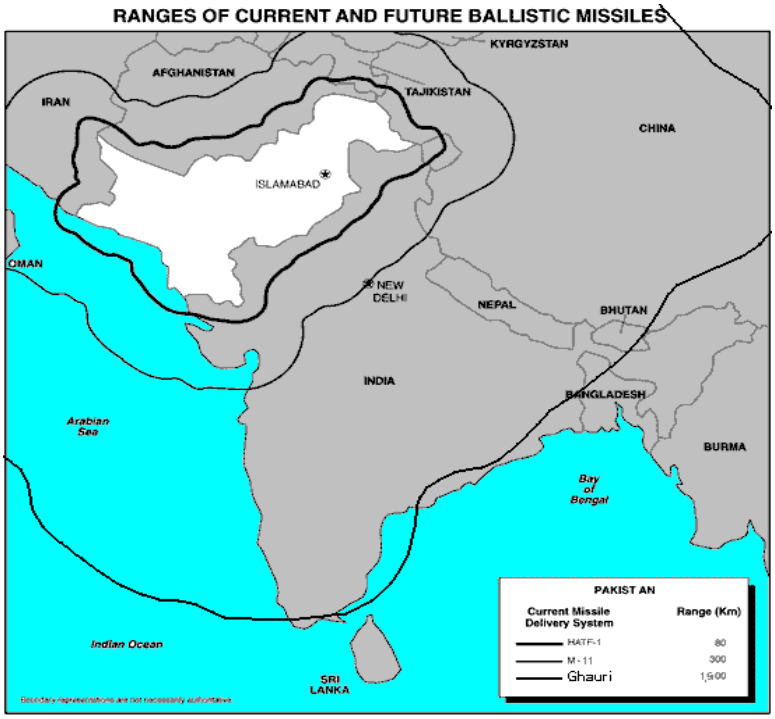
The missile technology is still in the research and development phase in Pakistan. It is key part of the Integrated Missile Research and Development Program. The successful tests of Hatf V and Hatf VI confer on Pakistan a reliable indigenous missile capability. Pakistan tested Hatf VII Babur ground-launched cruise missile in 2005. It has a range of 700 km and can carry a payload of 450 kg. It can carry nuclear warheads and is guided by stealth technology. Pakistan possibly relies mainly on ballistic missiles to overpower India's defense system. Pakistan has developed Inter-continental Ballistic missile too which is ready for test flight. History tells us that weak nations have no place in the world community in the presence of ruthless imperialistic forces. Pakistan's missile program is an effective and reliable deterrent and provides foundation for lasting peace and security all over the world. Pakistan should deal with the world forces on the basis of sovereign equality and fundamental principles based on human values. Pakistan possesses several different types of missiles and these are led and supervised by the Armed Forces of Pakistan. Several lethal types of missiles are under development process. It is believed that Pakistan is already working on long range Missiles Shaheen 4 and Taimur. Pakistan's missile Shaheen-IA was reportedly shot southward to the Indian Ocean and managed to cover some 4,000-4,500 kilometers. This missile covers the whole of Indian region. Indian Agni-V intercontinental ballistic missile Agni-V has a range of 5,000 km. It can target any part of China and some regions of Europe. It is generally believed that Pakistan and India have more capable missiles yet not announced publicly. Pakistani scientists and engineers have Intercontinental range ballistic missiles technology in their range.

Pakistani engineers and scientists are making rapid progress in the field of MIRV technology. It means military would be in a position to fit several warheads on the same ballistic missile and launch them at separate targets in different regions. Pakistan has acquired ballistic missile technology without outside assistance. Nonetheless, it is believed that China has assisted Pakistan in its efforts. It is the duty of every government to protect the country from foreign aggression and internal subversion. Pakistani scientists and engineers have ability to build missiles of short,

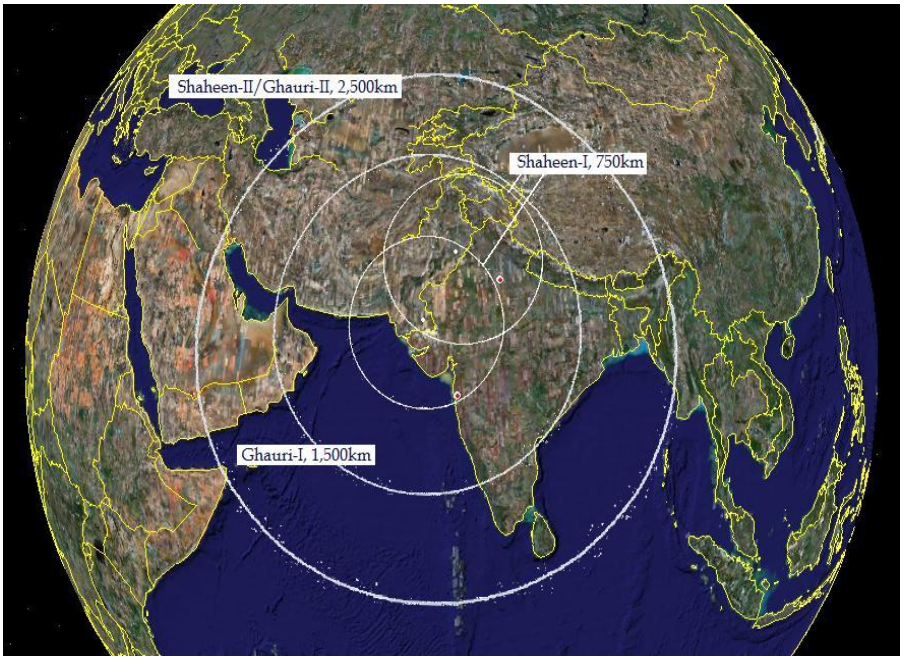
medium and long range with proper guidance systems which make Pakistan strong as can be seen in the map given below.[17] Thus the missiles of Pakistan have different ranges covering different targets that are reflected in the following maps (**Map 4.1, 4.2** and **4.3**).[18]



Map 4.1: Missile Ranges Covering India



Map 4.2: Ranges of Current and Future Ballistic Missiles Covering Pakistan's Immediate Neighbours



Map 4.3: Long Range of Ballistic Missiles of Pakistan

Pakistan's Nuclear Posture

A nuclear posture is based on several national activities. First, it is seen from the relationship of a country to the international nuclear non-proliferation regime. The second source consists of official statements of Pakistani policy-makers, bearing in mind that they may be a mixture of truth, half-truth and disinformation. Third, a nuclear posture is a pose attached to nuclear capability.

History of Pakistan's Missile Development Programme[20]

It is further important to know a brief history of Pakistan's Missile Development Programme. Historical perspectives will help us know the significance of their progress and achievements and evaluate the rapid strides made by Pakistan over a period of time. The history of their missile development has many dimensions namely: Space Research and a Nascent Missile Program, Arms Race with India, Interagency Competition, and Foreign Assistance, Interagency Harmonization and Technological Maturity and lastly recent developments and current status.

Space Research and a Nascent Missile Program (1960 to 1990)

Pakistan began to develop rocketry expertise in the early 1960s at the Space Sciences Research Wing of the Pakistan Atomic Energy Commission (PAEC). In September 1961, the PAEC Space Sciences program began sending lead engineers and scientists to the United States for rocket launch training with the National Aeronautics and Space Administration (NASA).[21] In June 1962, Pakistan successfully launched a two-stage rocket.[22] By the account of at least one US missile proliferation official, Pakistan's sounding rocket program directly enabled its future missile programs.[23]

Functioning *defacto* as an independent agency since 1964, President Muhammad Zia-ul-Haq formally established the Space and Upper Atmosphere Research Commission (SUPARCO) as Pakistan's national space agency in 1981.[24] In 1989, a year after India's Prithvi test, Pakistan launched the Hatf-1 and Hatf-2 missiles.[25] Both American and Indian observers denoted the Hatf-1 and Hatf-2 as SUPARCO-modified French sounding rockets.[26] Analysts also concluded that SUPARCO benefited from substantial technical assistance from China.[27] The Hatf-1 and Hatf-2 suffered from limited range and accuracy. The lack of mass production efforts suggests that Pakistan intended their use primarily as training tools.[28] Thus, despite the successful test-flights of SUPARCO's Hatf-1 and Hatf-2, US assessments into the 1990s continued to name American F-16 combat aircraft sold to Pakistan in the 1980s as Pakistan's most likely nuclear delivery option[29].

Arms Race with India, Interagency Competition, and Foreign Assistance (1990 to 2001)

Despite political reforms during the Benazir Bhutto government, 1988 to 1990, democratization efforts in Pakistan did not moderate the country's zeal for missile acquisition.[30] With the limited scope of the democratization, President Ghulam Ishaq Khan, a strong ally of Dr. A.Q. Khan, and General Aslam Beg continued to dominate military and national security issues. Insurgency in Kashmir further exacerbated relations with India and strengthened the military's control over nuclear and missile programs. Finally, the relatively unstable political regimes in both India and Pakistan in the early 1990s prevented sustained dialogue and normalization of relations. Thus,

democratization failed to abate the organizational, security and cognitive factors encouraging missile proliferation, and no "democratic peace" occurred in Pakistan. Unlike India's more regional outlook, Pakistan's security concerns remained focused on the threat from India. Interestingly however, Indian-Chinese relations indirectly motivated Pakistani missile proliferation. India's disastrous military campaigns against China, and the emergence of a nuclear China in the early 1960s, motivated both an Indian arms build-up as well as India's refusal to participate in missile control agreements with absent Chinese participation.[31] The difficult relationship between India and China thus increased the perceived security threat in Pakistan and created an irresolvable logistical hurdle to any India-Pakistan missile control regime.[32]

In 1990, the Bush administration imposed Pressler Amendment sanctions on Pakistan, banning military assistance to Pakistan while it maintained a nuclear weapons program.[33] Pakistani officials, noting the resulting lack of a realistic option for improving Pakistan's limited Air Force, and further motivated by the Indian military's continued technological gains, concluded the necessity of intermediate-range missile development.[34] In the decade that followed, intense clandestine missile projects culminated with the successful launch of several intermediate-range missiles. In doing so, Pakistan demonstrated the effectiveness of an organizational structure characterized by contentious interagency competition between the Chinese-assisted solid-fuel PAEC program under Dr. Samar Mubarakmand and the North Korea-assisted liquid-fuelled program at Khan Research Lab (KRL) under Dr. A .Q. Khan[35].

China, motivated in part by competition with Soviet-armed India, agreed to sell M-11 missiles, launchers, and support equipment to Pakistan in 1988.[36] SUPARCO subsequently surfaced as the destination for numerous illicit materials transfers. In 1995, the United States warned European suppliers of potential illicit procurement attempts.[37] In 1996, Taiwan and Hong Kong seized numerous shipments of several tons of Ammonium Perchlorate (AP), a solid-propellant component, bound for SUPARCO from North Korea and routed through China.[38] Intelligence sources also detected numerous M-11 component deliveries to a new missile factory at Tarwanah, which itself bears a strong physical resemblance to the M-11 plant in Hebei, China.[39] In June 1991, the Bush administration imposed missile sanction laws against

SUPARCO and two Chinese firms for M-11 missile technology transfers.[40] In August 1993, the Clinton administration imposed new sanctions after discovering additional M-11 exports to Pakistan.[41] These sanctions weakened Chinese largesse, and Pakistan responded by turning to other sources.[42] In 1993, Prime Minister Benazir Bhutto, who would come to regard herself as the "mother of the missile program," travelled to Pyongyang and secured the transfer of Nodong missile technology on behalf of Dr. A.Q. Khan and his solid-fuelled missile development program at Khan Research Lab (KRL).[43] Fearing obsolescence, and unsuccessful through much of the 1980s, A.Q. Khan leveraged North Korean assistance to quickly transform KRL into a vibrant rival for PAEC.[44] Some report that A.Q. Khan struck additional technology transfer deals with North Korea outside the purview of Pakistan's state negotiations.[45] Circumstantial evidence points to an agreement by either the Pakistani government or A.Q. Khan to exchange nuclear secrets for missile technology.[46]

By the end of the decade, both programs demonstrated intermediate-range missile launch capabilities. On 3 July 1997, SUPARCO successfully launched the Hatf-3/Ghaznavi missile. Analysts immediately noted design similarities with the Chinese M-11 missile; some even speculated that the Ghaznavi was merely a renamed imported M-11.[47] KRL test-fired yet another liquid-fuelled Hatf-5 / Ghauri missile with a better range covering vital Indian targets. Winning the race for an intermediate-range missile, KRL's Ghauri brought New Delhi within range.[48] Analysts immediately noted design similarities with the North Korean Nodong missile.[49] A year later, KRL launched the Hatf-5A/Ghauri-2, with increased range capable of striking most of India. A day later, PAEC successfully fired the Hatf-4/Shaheen-1, introducing solid-fuelled intermediate-range capabilities to the Pakistani arsenal. The successful launches of the Ghauri and Shaheen missiles occurred nearly concurrently with the debut of India's Prithvi and Agni-2- missiles. The chronology of Pakistani missile tests is consistent with arms competition not only with India, but also between KRL and PAEC.

Interagency Harmonization and Technological Maturity (2001 to 2007)

In October 1999, General Pervez Musharraf seized power and overhauled Pakistan's nuclear command-and-control structure.[50] While the official justification for the reforms was to "establish harmony between Pakistan's poorly coordinated and

competitive" agencies, some speculate that Musharraf also sought to "knock out the one person in Pakistan most likely to eclipse him: the Father of the Bomb".[51] Under the new organizational scheme, weaponization and delivery activities were transferred from PAEC and KRL to the National Development Complex (NDC).[52] While uncertainty exists about whether KRL retained the Ghauri program, NDC nevertheless now stands as Pakistan's primary missile development agency.[53] The period between 2002 and 2006 marked a flurry of missile test-flights in a "tit-for-tat" pattern with India, with the two countries generally scheduling flight tests within days of each other, and often concurrent with politically sensitive events such as elections.[54] In total, three Hatf-3/Abdali tests, six Hatf-4/Shaheen-1 tests, five Hatf-5/Ghauri-1 tests, and five Hatf-6/Shaheen-2 tests occurred.[55] Thus over a period of time, Pakistan acquired both solid and liquid fuelled capabilities with ranges between 1,500 to 2,500 km with 1000 kg payload bringing almost all of India within nuclear strike range.

Recent Developments and Current Status (2007 till date)

In 2005, India and Pakistan signed an agreement requiring both parties to provide advance notice of any ballistic missile tests.[56] Since 2007, testing activity of the Ghauri and Shaheen missiles has slowed and the majority of new developments have appeared in cruise, rather than ballistic missile systems.[57] Potential causes for this include India's investment in a ballistic missile defense system, the Ghauri and Shaheen missiles acquiring sufficient range and payload to target strategic locations in India, international pressure against intermediate- and long-range ballistic missile tests, and a shift in focus towards developing a tactical nuclear capability.[58]

The 2005 inaugural test-flight of the Hatf-7/Babur cruise missile stunned many observers for its technological complexity and its undetected development.[59] The extent of foreign assistance remains unclear - analysts identified design similarities with Chinese cruise missiles as well as with American Tomahawk missiles, which previously crash-landed over Pakistan.[60] In 2007, Pakistan test-fired the Hatf-8/Ra'ad cruise missile, adding air-launch missile capabilities to the Pakistan Air Force[61]. While Pakistan officially claimed that NDC indigenously developed the Hatf-8, some believe that the modest range of the missile suggests foreign assistance by a country unwilling to contravene MTCR range and payload restrictions.[62] A short range nuclear capable

ballistic missile referred to as Hatf-9/NASR was tested in April 2011. Observers immediately speculated that the Hatf-9/NASR test indicated potential Pakistani intention to develop a tactical nuclear capability —an interest potentially motivated further by India's "Cold Start" doctrine.[63]

Despite flight test successes however, analysts remain sceptical about Pakistan's indigenous design and manufacturing capabilities. The lack of robust government-industry-university R&D linkages, a known dependence on foreign suppliers for key raw materials such as steel alloys, and the technological inexperience of private industry cast doubt upon Pakistan's missile design claims.[64] While Pakistani scientists increasingly participate in basic science collaboration with foreign laboratories, such as the European Organization for Nuclear Research (CERN), the country's industrial base lacks a demonstrated history of producing quality high-tech products.[65] A history of indigenous design claims refuted by intelligence sources further complicates assessments.[66] Analysts estimate that even gaining liquid propulsion expertise will take until at least 2013.[67] Thus, Pakistani missile development could remain dependent on foreign assistance for both materials and expertise in the near-term. Nevertheless Pakistan has maintained a successful missile acquisition strategy in spite of foreign dependence and a history of MTCR and US Arms Export Control Act and Export Administration Act sanctions, and already boasts one of the top ten ballistic missile manufacturing capabilities in the world.[68]

Barring unprecedented industrial growth and a substantially enhanced defense-industrial base, Pakistan will likely continue its strategy of developing advanced missile systems with foreign assistance rather than pursuing the more expensive and less feasible option of pure indigenous development or advanced aircraft acquisition.[69] Continued state patronage, fuelled by competition with India, the high prestige accorded to Pakistan's nuclear arsenal, and the symbolic value of diversifying missile delivery systems will likely sustain continued missile development in Pakistan.[70]

The Formation of Strategic Command and Control System

President Pervez Musharraf announced the formal creation of Pakistan’s National Command Authority on 2 February 2000. Prior to this announcement, a

defacto nuclear command and control arrangement existed as part of the national military command structure, which had provided, and continues to provide, guidance over conventional military operations. The new NCA operates much like the structure that preceded it, although its membership is more formally (and publicly) articulated, and at least one dedicated communications system reportedly has been created to enable the NCA to issue guidance to operational strategic forces during serious military crises and war.

The National Command Authority

On 2 February 2000, the National Security Council of Pakistan announced the setting up of a National Command Authority (NCA) and delegated all employment and deployment control over all strategic forces and strategic organizations to this apex nuclear decision-making body.[71] It is chaired by the President, and the Prime Minister serves as its vice-chair. In the NCA, Islamabad created a consolidated and centralized authority for all nuclear decisions relating to policy planning, procurement, deployment and use of nuclear weapons. Prior to this formal and public announcement, a *de facto* nuclear command and control arrangement did exist as part of the national military command structure.[72] In November 2000, the NCA took formal control of all nuclear laboratories, including the Khan Research Laboratories (KRL), which previously functioned almost independently. The NCA is composed of the Employment Control Committee (ECC) and the Development Control Committee (DCC), and the Strategic Plans Division (SPD) serves as its Secretariat.

The ECC is the main body where 'major nuclear decisions are taken, including defining the nuclear strategy of the country. It assesses the existing or emerging threat to the country, provides policy direction during peace time, and decides the deployment and employment of nuclear weapons if the necessity should arise. It is composed of senior military and political leaders with the President as its chair,[73] the Prime Minister as vice-chair, and the Foreign Minister as deputy-chair. It also includes the ministers for defence, the interior, and finance,[74] the three services chiefs, the Chairman of the Joint Chiefs of Staff Committee (JCSC), and the Director-General (DG) of the SPD (who serves as its secretary).

The chief function of the DCC is to implement weapons development plans and upgrade the nuclear forces in accordance with the strategic force goals set by the ECC. The DCC has the overall control of technical, financial and administrative matters relating to weapons development. It is also assigned the responsibility of controlling all the strategic organizations, including national laboratories and research and development organizations and entrusted with the development and modernization of nuclear weapons and their delivery vehicles. It is chaired by the President. Other members of this body include the Prime Minister (vice-chairperson), the chairman of the Joint Chiefs of Staff Committee (deputy-chair), the three services chiefs, the DG of the SPD (secretary), and the heads of the concerned strategic-scientific organizations.

The SPD acts as the Secretariat of the NCA and coordinates all nuclear activities in Pakistan. It functions under the chairman of the Joint Chiefs of Staff Committee and is located at the Joint Services Headquarters. It is headed by a three-star general. The DG of the SPD plans and coordinates the command, control, communications, computers, and intelligence systems, and reports directly to the President, the Prime Minister, and the chairman of the JCSC. The SPD also assists in developing nuclear policy, and has an arms control agency and a nuclear security watchdog.Pakistan, through the SPD, has established firm control over the strategic organizations and has brought them into a coherent whole. It has created standard procedure for their operation and security. Pakistan has plausibly undertaken considerable measures to prevent strategic assets from theft, misuse, and recurrence of the Khan phenomenon. As the central coordinating body of all nuclear activities, the SPD has emerged as a ‘nuclear enclave’ within Pakistan.

Figure 4.1: Pakistan National Command Authority

As part of the command and control structure, Pakistan has created strategic force command in all services of its military — the Army, the Air Force and the Navy. Each of the services exercises training, technical and administrative control over its strategic forces. But operational control lies with the NCA and, if necessary, the military direction has to come from the NCA to the chairman of the JCSC for any required action. Through this, Pakistan has, at least theoretically, created a chain of command for the use of nuclear weapons. The organizational diagram of the **National Command Authority (NCA)** is given in **Figure 4.1.**

The SPD has gone to great lengths to improve the country's command and control infrastructure. One of the greatest flaws in the system was the lack of formal oversight over the strategic scientific organizations. The security setup arranged since the beginning of the program was designed to protect it from outside interference, spying and physical threats (including sabotage). There was no formal reporting channel of the security apparatus that could have the ability to account for shipments (in and out), personal travels, etc. Also, there was no formalized procedure of nuclear material protection, control and accounting (MPC&A).[75] The nuclear security and safety aspect was always believed to be highly classified national secret because it revealed the capacity and capability of the country. This was a fatal flaw in the system, which SPD had grappled with since its formation.[76]

The apex body is the Employment Control Committee (ECC), a senior leadership group comprising both military and civilian policymakers. This decision-making group provides policy direction and is the authority over strategic forces. This body is chaired by the President and also includes the Prime Minister (who is Vice Chairman), Foreign Minister (Deputy Chair), Ministers for Defense, Interior and Finance, the three service chiefs, the chairman of the Joint Chiefs of Staff Committee (JCSC), and the Director General of SPD (who serves as the organization's secretary). The Finance Minister was not on the original ECC approved by Prime Minister Nawaz Sharif. He was added shortly after Musharraf assumed control of the government in October 1999.

The membership of the ECC has undergone some change even after the Pakistan Government announced it publicly in February 2000. When Musharraf first talked openly about the NCA, he was then Chief Executive of the country, and he indicated that the chair of the NCA would be the head of the government. Then after the October 2002 elections, when Zafarullah Khan Jamali became Prime Minister, Musharraf announced that the chair of the NCA would become the President, a post he then occupied, and that the vice-chair would be the Prime Minister.In practice, the DCC is chaired by the DG-SPD, and the operational directors of each of the military services attend in place of the service chiefs. Pakistan is aggressively pursuing its nuclear weapon program and poised to leave behind countries like France and Britain within a decade if no change in policy takes place. The Organisational structure of the Strategic Plans Division is given in the **Figure 4.2**

Figure 4.2 Strategic Plans Division

While India and Pakistan may continue to strive for missile advantages to serve perceived deterrent objectives, outside actors have some tools for influencing this competition. Encouraging the positive dialogue between Delhi and Islamabad started in mid-2004 is an obvious one. But it is also useful to shift this competition into defensive systems, to help reduce the desirability of greater numbers offensive systems being developed and stockpiled. The **Table 4.5 Drivers for Pakistan** highlights the various factors instrumental for Pakistan's missile development programme.

Drivers for Pakistan	**1955-1989**[77]		**1990-1998**		**1999-present**	
	%	**Rank**	**%**	**Rank**	**%**	**Rank**
Head of State pressure	20	1	10	7	5	7
Chinese support	20	2	15	2	15	3
Nuclear and missile scientists' pressure	20	3	25	1	10	6
Nuclear balance with India and its nuclear posture	15	4	10	4	15	4
Conventional balance with India	15	5	15	3	20	1
International prestige	5	7	5	8	5	8
Anti Americanism	5	8	10	5	10	5
Bureaucratic politics within the military	0	6	10	6	20	2

Table 4.5: Drivers for Pakistan

Pakistan's Security and Survivability

Pakistan's strategy for ensuring the security and survivability of its nuclear deterrent during periods of peace, crisis and war also needs to be examined in the context of intense missile race and rivalry. The basic requirement of strategic deterrence is based on the threat perception. The basic point is that projected developments in India's nuclear and conventional military capabilities eventually could threaten the survivability of Pakistan's strategic deterrent, which has always been a major concern for the country's defense planners. The expanding international partnerships[78] and emerging strategic threats posed by India is a major concern for the Government of Pakistan.

Dimensions of Pakistan's Nuclear Deterrence Policy

Pakistan has relied on nuclear weapons to deter Indian aggression for over two decades, but a thoroughly considered and planned nuclear deterrence strategy took shape only after the country conducted its first nuclear explosive tests in May 1998 — a development that was prompted suddenly and unexpectedly by India's surprise nuclear test series earlier that month.[79] Before then, nuclear weapons had not been integrated into Pakistani military plans; the armed forces had no nuclear employment doctrine to speak of, and command and control over the nuclear arsenal and delivery systems was only vaguely defined, and loosely organized.[80] Even after the 1998 nuclear tests, Pakistani defense planners gradually recognized that premising national security on nuclear weapons required a multitude of new undertakings related to doctrine, command and control, force structure, delivery systems, and the vetting and training of specialized personnel assigned to various strategic force responsibilities.

Pakistan's efforts to establish an effective nuclear force posture, strategic organization, use doctrine, deterrence strategy, and command and control system were severely complicated, but also ultimately facilitated, by three serious crises namely: (1) the forced reorientation of Pakistan's foreign and defense policies after the 11 September 2001 terrorist attacks against the United States and the subsequent US-led war on terrorism; (2) the 2001-2002 military standoff that nearly produced a major war with India; and (3) the revelations in early 2003 of the A. Q. Khan network's illicit

transfers of nuclear weapons technology and materials to Iran, Libya and North Korea. Because of the sweeping changes Pakistan has made in its nuclear programs, strategic organizations, and force posture in the wake of these traumatic events, Pakistani security planners now have a much more effective — and "normal"— nuclear deterrence posture. However, the emergence of new political and military challenges arising from the US-India strategic partnership —particularly, the US-India initiative for civilian nuclear cooperation and possible defense technology and military equipment transfers — will further test the ability of Pakistan's military leadership to maintain a robust, credible and secure nuclear deterrent.

Today, Pakistan's strategic deterrence strategy consists of five major elements: (1) an effective conventional fighting force and the demonstrated resolve to employ it against a wide range of conventional and sub-conventional threats; (2) a minimum nuclear deterrence doctrine and force posture; (3) an adequate stockpile of nuclear weapons and delivery systems to provide for an assured second strike; (4) a survivable strategic force capable of withstanding sabotage, conventional military attacks, and at least one enemy nuclear strike; and (5) a robust strategic command and control apparatus designed to ensure tight negative use control during peace time and prompt operational readiness (positive control) at times of crisis and war. Each of these features is described below.

Conventional-Military Components of Deterrence

Pakistan's nuclear weapons are considered to be absolutely essential to deter India from undertaking a wide range of coercive political-military behaviour that could undermine Pakistan's territorial integrity and political sovereignty. However, it is important to recognize that Pakistani defense planners still consider their conventional armed forces to be the first line of defense against Indian conventional military attack and the backbone of the country's overall deterrence posture. It could be said that 95 percent of Pakistan's strategic deterrent relies on a robust conventional military capability and deliberate and repeated demonstrations of the Pakistan leadership's readiness to employ it decisively if attacked, or even seriously threatened with military attack.

Pakistan's military conduct during the 2001-2002 crises with India revealed this orientation. When India mobilized its armed forces for attack shortly after the 13 December 2001 terrorist strike against the Indian Parliament, Pakistan responded by immediately putting its own armed forces on a war footing. Pakistani military leaders were very satisfied that their ground forces were able to reach their designated strike positions more quickly than their opposite numbers, thus eliminating the element of surprise and nullifying any advantage that India might have by striking across the border first. It is widely speculated that Indian Prime Minister Atal Bihari Vajpayee decided against a military attack when his troops had moved into their strike positions by the middle of January because Pakistani troop deployments indicated that Islamabad was well prepared to counter-strike at locations of its choosing, thus eliminating any advantage India would have gained by attacking first. As President Pervez Musharraf wrote in his memoir, "We went through a period of extreme tension throughout 2002, when Indian troops amassed on our borders during a hair-trigger, eyeball-to-eyeball confrontation. We responded by moving all our forces forward. The standoff lasted ten months. Then the Indians blinked and quite ignominiously agreed to a mutual withdrawal of forces."[81]

A similar experience in coercive diplomacy occurred a few months later, when Indian and Pakistani troops were still fully deployed along the international border and the Kashmir line of control. When the Pakistani leadership received tactical intelligence that India once again was preparing to attack in early June 2002, the Pakistani military command's response was to instruct its soldiers to counterattack immediately after the first Indian violation of the international border. Not only that, but following the traditional approach of Pakistani deterrence strategy, orders were given for at least one additional counter-attack to take place in reaction to the Indian strike.[82] By demonstrating its readiness to use conventional military force in response to any Indian provocation, Pakistan hoped then, and still hopes today, to compensate for its disadvantage relative to India in conventional troop numbers and equipment quality with greater resolve, and the willingness to run greater military risks.[83]

If an Indo-Pakistani military crisis were to deepen, the weight of deterrence would shift more to nuclear weapons. Pakistan's nuclear posture, which during peace

time is recessed and structured mainly for secrecy and safety, would reflect a much greater emphasis on usability and operational readiness. This is also what senior Pakistani defense planners have referred to when they expressed concern about the degradation of Pakistan's conventional military capability lowering the threshold for nuclear weapons use: the shorter the period of time that Pakistan's conventional military (notably the Pakistan Army and Air Force) could hold out in a war, the quicker the National Command Authority (NCA) would be to order the deployment — and possibly the employment — of nuclear weapons.

A key point that emerges from this understanding of the close connection of conventional military force and nuclear force in Pakistan's deterrence strategy is the realization that escalation dominance at all rungs of the military ladder — from low-intensity conflict to conventional war and thence to nuclear war — is deemed absolutely essential for the weaker power to survive. Pakistani defense planners firmly believe that if they allow India to seize the advantage at any level of violence — from sub-conventional through conventional to nuclear warfare — then India is sure to exploit it, and all will be lost.

Minimum Nuclear Deterrence Doctrine

Pakistan has not formally declared a nuclear employment doctrine. But this does not mean there is no doctrine. On the contrary, Pakistan has operational plans and requirements for nuclear use integrated within its military war-fighting plans. In contrast to India, which has stated the basic parameters of its nuclear use doctrine but remains quiet about its strategic command and control structure, Pakistan has disclosed the basic features of its nuclear command and control organization,[84] but no official has discussed how the government plans to employ its nuclear weapons. In fact, Lieutenant General Khalid Kidwai, director of Pakistan's SPD, the military organization created in 1999 to oversee the development, custody, and employment of nuclear weapons — affirmed to a pair of Italian physicists in 2002 that Pakistan would not make its nuclear doctrine public, as India did in August 1999.[85]

The primary purpose of Pakistan's nuclear arsenal, which Pakistani officials have openly stated, is to deter an Indian conventional military attack. As noted above,

Pakistan prioritizes conventional military readiness for deterrence and war fighting. If this fails, Pakistani officials plan to be the first to use nuclear weapons as a last resort to prevent the loss of Pakistan's territory, or the military defeat of Pakistan's armed forces. In the most authoritative statement on the subject, Pakistani Foreign Minister Abdul Sattar indicated in June 2001 that the government had adopted "minimum credible deterrence as the guide to [its] nuclear program.[86] Planning for how and under what circumstances Pakistan's nuclear weapons would be employed has been only broadly outlined over the years. As early as December 1974, Prime Minister Zulfiqar Ali Bhutto declared for the first time the basic principle of Pakistan's nuclear weapons use policy. He stated: "Ultimately, if our backs are to the wall and we have absolutely no option, in that event, this decision about going nuclear will have to be taken".[87]

Three decades later, at the peak of the 2002 crisis, when Indian and Pakistani forces were deployed against each other in a military standoff unprecedented in duration and intensity, President Pervez Musharraf repeated Bhutto's policy formulation. Musharraf stated in an interview published in April 2002 in the German magazine, Der Spiegel: "Nuclear weapons are the last resort. I am optimistic and confident that we can defend ourselves with conventional means, even though the Indians are buying up the most modern weapons in megalomaniac frenzy." Nuclear weapons could be used, Musharraf said. "If Pakistan is threatened with extinction, then the pressure of our countrymen would be so big that this option, too, would have to be considered." In a crisis, he said, nuclear weapons also have to be part of the calculation.[88]

In a rare departure from established procedure, Lieutenant General Khalid Kidwai selectively removed some of the traditional ambiguity over the circumstances in which Pakistani defense planners have thought about the employment of nuclear weapons. As the military crisis deepened with India in January 2002, Kidwai told a couple of Italian physicists that Pakistani nuclear weapons would be used only "if the very existence of Pakistan as a state is at stake." Kidwai elaborated: "Nuclear weapons are aimed solely at India. In case that deterrence fails, they will be used if:

1. India attacks Pakistan and conquers a large part of its territory (space threshold);

2. India destroys a large part either of its land or air forces (military threshold);
3. India proceeds to the economic strangling of Pakistan (economic strangling);
4. India pushes Pakistan into political destabilization or creates a large-scale internal subversion in Pakistan (domestic destabilization)".[89]

The last two elements of the four nuclear use triggers are fuzzy and should not be considered in isolation. They are offshoots or preludes to a conventional war that India might undertake. In this respect, "economic strangulation" chiefly implies an Indian naval blockade or possibly also the placement of Indian dams on rivers flowing from Kashmir that could be used either to dry up or flood Pakistan's Punjab plains, depending on how India's military operations were to unfold. Similarly, "ethnic conflict" is a redline peculiar to South Asia. In Pakistan, this is seen as a threat to national survival reminiscent of India's assistance to the Mukti Bahini guerrillas that led to the breakdown of Pakistan's control over East Pakistan in 1971, and subsequently resulted in the creation of Bangladesh. Pakistani apprehension over Indian-abetted ethnic conflict also derives from memories of Indian machinations in Pakistan's Sindh province in the 1980s, which were believed to have been conducted as a quid pro quo for Pakistan's alleged support to the Sikh insurgency in Indian Punjab. This concern is exacerbated today by Pakistani allegations of Indian complicity (via Afghanistan) in the ongoing ethnic crises in the two states of Pakistan that border Afghanistan - Baluchistan and the Northwest Frontier Province. Pakistan is unlikely to bring nuclear weapons directly into play in such a scenario (though a naval blockade is an act of war), as they could not play any credible role in resolving the crisis. But any conventional force posturing in conjunction with this would certainly up the ante.

Pakistan's official position is that the main function of its nuclear arsenal is to prevent India from destroying or otherwise overwhelming the country. However, the precise Indian actions that could be interpreted as posing an existential threat have not been articulated. Kidwai's four existential threats for possible use are credible, but also vague. The statement was almost certainly intended to be imprecise so as to enhance Pakistani deterrence. If Pakistan were more explicit about nuclear red lines, this might enable India to adjust the scope of its strategic plans and military operations accordingly. By not specifying the precise Indian actions that would trigger Pakistan's use of nuclear weapons, Pakistani defense planners hope to create uncertainty in the

minds of Indian policymakers as to how far they can press Pakistan on the battlefield. The second objective of Pakistan's nuclear weapons policy is to deter an overwhelming Indian conventional military attack against Pakistan's armed forces. Islamabad considers that India's advantages in geography and nearly all categories of conventional military capability make nuclear force indispensable for Pakistan's defense. Pakistani military officials believe that clearly communicated resolve to use nuclear weapons and a robust conventional military posture are the key requirements for effective deterrence. In their view, one would not work without the other. According to this logic, if India attacks, Pakistan would counter-attack with conventional forces; each side would inflict significant damage on the other and India would be forced to refrain from escalating the conflict out of a fear of Pakistan's nuclear response.

The conviction that nuclear force is required to augment Pakistan's conventional military deterrence of a possible Indian conventional attack is reinforced by the common perception among Pakistani elites that Pakistan successfully deterred attacks by India on at least six occasions — during the military crises of 1984-85, 1986-87, 1990, 1998, 1999 and 2001-2002.[90] This interpretation gained even more credibility in light of President Musharraf's December 2002 statement that war with India was averted because of his repeated warnings that if Indian forces crossed the border, Pakistan would not restrict its response to conventional warfare.[91] Despite the fact that war was only narrowly averted in 2002, Pakistani military planners now appear to have even greater confidence in their ability to manage the risks of strategic deterrence.

The Pakistan government's approach to employing nuclear weapons thus rests on a calculation of its vulnerability to India's conventional and nuclear forces, and even to India's possible use of non-military instruments to threaten Pakistan's territorial integrity, political stability, and economic viability (as per Kidwai's reference to economic strangling and domestic destabilization). Armed with few viable defense options apart from its expanding nuclear arsenal, and ever concerned about such wide-ranging threats, Pakistan is likely to continue to embrace a flexible and non-specified doctrine for using nuclear weapons.

If at all possible, Pakistan does not intend to fight India with nuclear weapons. Pakistani civilian and military policymakers recognize that their government and perhaps even their country are not likely to survive a nuclear exchange with India. But operational military plans must include all contingencies. Pakistan's targeting policy probably includes a mix of counter-value and counter-force targets. At present, Pakistan has nuclear-capable F-16 and Mirage 5 aircraft, which have limited range and penetration capability. Pakistani ballistic missiles, both liquid and solid fuel, can reach key strategic points in India. Cruise missiles also have been tested and gradually will be integrated into operational plans. Pakistan's strategic development strategy includes continuous research experiments and flight-tests to improve the accuracy and penetrability of existing nuclear delivery systems. Pakistan's nuclear use doctrine probably calls for holding multiple Indian industrial centers, military-industrial complexes, defense facilities, and military bases and formations at risk. Should India push Pakistan to the brink — whether by attacking, occupying, destroying, or strangling — Pakistan's National Command Authority could very well decide to use nuclear weapons.[92]

Nuclear Weapons Stockpile and Delivery Systems

Pakistan possesses two means of delivering nuclear weapons: ballistic missiles and fighter planes. Pakistan began developing ballistic missiles in the 1980s. The first missiles developed were the *Hatf*-I and *Hatf*-II, with ranges of approximately 80 kilometers and 300 kilometers respectively. However, the *Hatf*-II was never deployed and its development was abandoned around 1997.[93] The *Hatf*-III has been deployed, though this is the M-11 short range ballistic missile that Pakistan obtained from China and has a range of approximately 300 kilometers.[94] It may be noted that Pakistan has been acquiring M-11 missiles since 1992 and it is estimated that it has approximately thirty of these missiles.[95] Pakistan has the *Ghauri* intermediate-range ballistic missile, though this is based on the *Nodong* missile imported from North Korea.[96] It also deploys the *Shaheen*-I, a short-range ballistic missile based on the M-9 made in China, and it is currently developing the *Shaheen*-II, a mobile ballistic missile with a payload of 1,000 kgs and a range of about 2,500 kms.[97] As for fighter planes capable of carrying nuclear bombs, Pakistan purchased a total of 40 F-16A and F-16B aircraft

from the United States between 1983 and 1987, eight of which are no longer in service. Pakistan has equipped itself with two more nuclear-capable fighter planes, the *Mirage*-V made in France and the Chinese-made A-5 fighter-bomber.[98]

Pakistan's nuclear force requirement is a tightly held national secret. Islamabad's stated goal is to maintain a credible minimum deterrent, defined primarily around Pakistan's assessment of India's nuclear force inventory, penetrability and targeting requirements, and unspecified future adversaries and contingencies. In addition, Pakistani decision-making for its strategic force structure is based on the requirements of survivability, which include a sufficiently large weapons stockpile to ensure dispersal to multiple launch sites and a second-strike capability. A key strategic consideration thus is the maintenance of "sufficient" fissile stock material, as well as the creation and operation of fissile material production facilities with adequate capacity to meet both short-term and long-term requirements.

In Pakistan's normal peace time force posture, nuclear weapons are believed not to be deployed. That is, they are not mated with their delivery systems. Nuclear warheads and missile delivery systems could be stored in secure locations that are separate from one another — but not too far apart. Delivery aircraft are naturally located at one or more of the country's ten major air bases or ten forward operating air bases. In the last ten years, Pakistan has started to set up strategic forces in all three services, two of which (land and air), are presently functional. Pakistan relies on a combination of aircraft and ballistic missiles for nuclear delivery missions. Two aircraft in its inventory, the US-supplied F-16 Fighting Falcon multi-role fighter and the French Mirage 5PA are particularly well suited to this role. At present, Pakistan has about 50 Mirage 5s and 35 1980s-vintage F-16s, although at the end of 2006 the United States agreed to provide mid-life upgrades for Pakistan's existing F-16s and to transfer another 18 models to the Pakistan Air Force.[99]

Aircraft / Missile	Range	Source	Status
F-16 A/B	925 km	United States	35 planes in inventory
Mirage 5 PA	1,300 km	France	50 planes in inventory
Hatf 1	80-100 km	Indigenous	In service since mid-1990s
Hatf 2 (Abdali)	180 km	Indigenous / China	Tested in May 2002,in service
Hatf 3 (Ghaznavi)	300 km	Indigenous / China	M-11, tested May 2002, in service
Hatf 4 (Shaheen 1)	600-800 km	Indigenous / China	First tested October 2002, in service
Hatf 5 (Ghauri 1)	1,300-1,500 km	Indigenous / DPRK	No Dong, tested May 2002, in service
Hatf 5 (Ghauri 2)	2,000 km	Indigenous / DPRK	No Dong, tested April 2002, in development
Hatf 6 (Shaheen 2)	2,000-2,500 km	Indigenous / China	First tested March 2004, in development
Hatf 7 (Babur)[101]	500 km GLCM	Indigenous / China	First tested August 2005, in development

Table 4.6 Pakistani Nuclear Delivery Systems[102]

With non-proliferation sanctions severely curtailing Pakistan's ability to modernize its air force during the 1990s, Islamabad went on a major campaign to procure technology and parts for a variety of ballistic missiles for nuclear delivery roles. Today, Pakistan possesses a missile force comprising road and rail mobile solid-fuel missiles (Abdali, Ghaznavi, Shaheen 1 and 2), as its mainstay, and the less accurate liquid-fuel missiles (Ghauri 1 and 2) for long-range strikes against deep population centers in India. Pakistan is also working on a ground-launched cruise missile (GLCM), called the Babur, which was tested first in August 2005 and again in March 2006. **Table 4.6** lists the main air and missile delivery systems in Pakistan's inventory.

Conclusion

Thus Pakistan's missile build-up all along has been India-centric. Unlike India, which has to take the China threat into consideration, Pakistan has the luxury to focus its entire missile build-up on Indian developments. Strategically, Pakistan has today not only offset India's overwhelming conventional military superiority by its nuclear weaponization but also acquired a missile force which, in terms of speed of acquisition, outstrips India's pace of development of missiles. China prominently, and DPRK by proxy, have significantly contributed to Pakistan's missile build-up. China has even provided a complete plant in 1995 to produce nuclear capable M-11 missiles and their variants in Pakistan. China has persistently defied international non-proliferation norms and US pressures against Chinese proliferation of WMDs in Pakistan. No indicators are available to suggest that China would desist in future too. China's South Asian policy objective to strategically de-stabilise India would continue unabated, despite protestations to the contrary. Pakistan's force planning is facilitated by its relatively uncomplicated strategic threat evaluation. Pakistan's single-point focus and the ease with which it has circumvented international laws to acquire its missile force have enabled it to meet its basic strategic requirements in a very short time, and Pakistan's acquisition of longer-range missiles has expanded and improved its capability.

In contrast to India, Pakistan's missile force is well matched with its needs. Pakistan has missiles of the ranges required, and its medium-range missiles are ready to be operationalized. The development of the country's short- and medium-range missiles has progressed almost in parallel, giving the overall system structure a balanced look. Simultaneously, Pakistan is developing (acquiring) land attack cruise missiles of both the ground- and air-launched variety, and a sea-based version.

A major factor is that Pakistan's missiles were supplied wholesale by China and Korea, and even the production factories were built by them. Also, Pakistan seems to have had no economic problems, since these supplies come under special financial arrangements with China — not to mention the generous aid given by the United States for its War on Terror and the clandestine financial support from several Arab states. Pakistan's missile forces closely match its strategic needs, and it is currently engaged in expanding its cruise missile capability. India has no political or military options to

limit Pakistan's nuclear weaponization and missile build-up. Pakistan can only be limited by India imposing an economically unaffordable counter build-up in these fields - uneconomical for Pakistan and her benefactors too. Needless to say, this is imperative if peace and stability have to prevail in South Asia.

Thus the motivations and compulsions that drive the India-Pakistan missile race are not only security considerations, but also a host of other factors. The complexity of India's economic, political and security environments determines that there are many factors that would determine military missile race and rivalry between India and Pakistan. Further, the "complex dynamic" in missile acquisitions is primed by different threats - Pakistan fears India, India feels threatened by China, and China feels the need to match the United States. This circle cannot be squared. These "missile races" will therefore, continue. In real terms, Pakistan's nuclear and missile build-up does not change the basic outcome matrix much. And hence the cycle of intense missile race seems to continue due to a variety of factors, and therefore the second hypothesis of this study is that, the divergence in Indian and Pakistan missile development and testing can be seen as a result of change in the national security orientation towards each other and the perceived credibility gaps in deterrence. In addition, strategic, security and political variables are also driving India-Pakistan missile race and rivalry. Having examined the missile development of both the countries in **Chapters III** and **IV,** the next chapter entitled **"Strategic Assessment of Missile Race"** would focus on the implications arising out of the India-Pakistan missile proliferation.

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99 . John Grevatt 2007, 'USAF Awards Lockheed Martin Pakistan's F-16 Upgrade,' Jane's Defence Industry, 1 January.

101. The Hatf-VII cruise missile is also known as Babur, named after Zahiruddin Muhammad Babur, founder of the Mughal Empire on the Indian subcontinent in the early 16th century. Successful tests on the missile system, which has a range of about 435 miles and technically gives Pakistan a seaborne nuclear strike capability, began in 2005.

102. Information reflected in the table is from various sources, including 'Pakistan: Air Force,' Jane's World Air Forces, 28 November 2006, and 'Pakistan: Armed Forces,' Jane's Sentinel Security Assessment: South Asia, 22 November 2006, both accessed on 31 March 2014.