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## Pakistan's Nuclear and Missile Capabilities: Implications For India

Shalini Chawla



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## Article

# Pakistan's Nuclear and Missile Capabilities: Implications for India

Shalini Chawla

### Abstract

*Following the 1971 war with India, which led to its break-up, Pakistan came to believe that acquisition of nuclear weapons at any cost was the only way to neutralise India's military superiority and provide the umbrella for its new strategy of covert war. Pakistan boasts about tactical nuclear weapons and Full Spectrum Deterrence that involves making a first strike to counter not only a conventional strike but even a perceived threat from India. The paper discusses Pakistan's rapid expansion of its nuclear arsenal, missile development and acquisition of nuclear capable aircraft with the assistance of China and North Korea. The article argues that the critical task for India is to address Pakistan's nuclear posture which revolves around a projection of a low nuclear threshold and calculated irrationality.*

Nuclear weapons are central to Pakistan's strategic thinking and positioning vis-à-vis India. Islamabad relies on a nuclear strategy based on an offensive *first use doctrine* and has made every effort to project a low nuclear threshold with an element of uncertainty. Post-1971 India-Pakistan war which led to the break-up of the country, Pakistani leadership was convinced that acquisition of nuclear weapons, (even) at the cost of undermining the economic development of the country, is the only way to neutralise India's conventional military superiority, and most importantly, and provide the umbrella for its covert war against India. Pakistan has used the nuclear card rather frequently in the past to deal with a crisis vis-à-vis India. After the revocation of Article 370 by India on August 5<sup>th</sup> 2019, Pakistani Prime Minister Imran Khan in his unrelenting tweets/speeches has repeatedly highlighted various aspects of nuclear threat at the national and global level. This stems from the basic

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Shalini Chawla is a Distinguished Fellow at the Centre for Air Power Studies, New Delhi.

*(Disclaimer: Some Sections of The Paper are taken from Author's Book Nuclear Pakistan, New Delhi, Knowledge World, 2012).*

insecurity of the state and its failure to develop its strengths. Islamabad has long tried to balance its domestic vulnerabilities with the nuclear weapons which it treats as the ultimate guarantor of its security and survivability.

Pakistan launched its nuclear weapons programme in the 1970s and acquired the nuclear weapons by 1987, although the overt nuclearization happened much later in 1998. Nuclear build-up has been prioritized in overall defence planning and economic difficulties and crisis (as in the 1990s and in the last five years), do not seem to have adversely impacted the expansion of the nuclear arsenal. It is estimated that Pakistan has a nuclear weapon stockpile of 140 to 150 warheads. The stockpile is likely to increase over the next ten years.<sup>1</sup> Although it is not possible to arrive at a certain number, an approximate idea of Pakistani nuclear warhead stockpile can be derived from the amount of weapon-grade fissile material produced. The International Panel on Fissile Materials estimated at the end of 2016 that, "Pakistan had an inventory of approximately 3,400 kilograms of weapon-grade (90 percent enriched) highly enriched uranium (HEU), and about 280 kg of weapon-grade plutonium. This material is theoretically enough to produce between 236-283 warheads".<sup>2</sup>

Keeping this nuclear capacity and strategic orientation in view, this study discusses Pakistan's missile programme, analyses the implications for India of the expansion of its nuclear delivery systems and, very importantly, Pakistan's nuclear posture which projects a low threshold. Pakistan's nuclear history, build-up and thinking adequately explain its nuclear behaviour and the brinkmanship that we see today.

## **Nuclear Delivery Systems**

Pakistan's nuclear delivery systems can be put under three categories:

- Land-based missiles.
- Cruise missiles.
- Aircraft

## **Land-Based Missiles**

### ***Pakistan's Missile Development***

Pakistan's deep interest and involvement in missile development can be traced back to the early 1960s when the Shah of Iran opened the doors of the Iran Electronics Industries (IEI) missile repair facility in Shiraz to Pakistan.<sup>3</sup> Both at that time were members of the US-led Central Treaty Organization (CENTO) alliance. Pakistan's efforts towards launching

the space programme also dates to 1961 when the Space and Upper Atmosphere Research Commission (SUPARCO) was formed. Although Pakistan's efforts to acquire nuclear weapons started in earnest in the early 1970s after Zulfikar Ali Bhutto's announcement of plans to build a bomb, its serious search and efforts for missiles as launch vehicle took place in the late 1980s when its nuclear weapon programme was near completion. Ballistic missiles are easier to employ at a relatively lower cost than manned aircraft. The reasons why Pakistan has adopted an aggressive missile acquisition programme can be attributed to mainly the following factors.

First, Pakistan's deep desire to stand at par with India's conventional military capability. Second, Pakistan tried hard to acquire the Mirage-2000 from France but the economic crisis, the US sanctions and strict conditionalities of the International Monetary Fund did not allow the acquisition. Therefore, procuring Chinese missiles was seen as a cheaper option to build up its nuclear delivery capability. Third, although Pakistan acquired the F-16s from the US in 1980s there was a realization that the aircraft as a delivery system have limitations both in terms of range of delivery of nuclear weapons and penetration of India's air defence system. Ballistic missiles provide a much more credible deterrence, against which there is no credible defence. Finally, during the Afghan War in the 1980s, Pakistan was exposed to the threat of conventionally armed short range missiles from the Soviet Union. The Soviet forces fired Scud missiles across the Durand Line targeting the Mujahideen camps inside the Pakistani territory. Added to this was the demonstrated threat of missiles during the Iran-Iraq War in the 1980s. The evolving role of missiles was sufficient to influence the Pakistani thinking in favour of a missile acquisition and development programme.

### **Ballistic Missiles**

Pakistan's missile development programme has been primarily carried out with China's assistance and, to some extent, support from North Korea, after the United States imposed sanctions on China. Since 1972, Pakistan has sought Chinese assistance for its nuclear development programme and China has also been its predominant source of foreign technological support for missile development efforts. Chinese missile assistance to Pakistan ranges from providing equipment and training to transferring of the complete missiles.

#### ***Chinese Transfer of M-9 and M -11***

The development of the Chinese M series of Short Range Ballistic Missiles (SRBMs) commenced in the early 1980s and the three versions are known as the M-9,

M-11 and M-18. These designations were apparently used for export versions.<sup>4</sup> All M series missiles use solid fuel, and have short operational preparation time. Also, they are transported by highly mobile cross-country transporters which have the capacity to launch the missiles.<sup>5</sup> Information from various sources indicates that Pakistan had negotiated the deal for the M-11 during Gen. Zia's regime. According to US officials, Pakistan agreed to pay China \$15 million as partial payment on its 1988 contract with the state-owned China Precision Machinery Import-Export Corporation (CPMIEC) for an undetermined number of M-11 missiles, launchers, and support equipment.<sup>6</sup> China reportedly started discussing the transfer of M-11 missiles to Pakistan in the early 1990s. In the same period, the National Development Complex (NDC), a subsidiary of the Pakistan Atomic Energy Commission (PAEC), reportedly acquired complete, though unassembled, M-11s and possibly an undisclosed number of M-9 SRBMs from Beijing.<sup>7</sup> The M-9 SRBMs, which are capable of carrying both nuclear and conventional warheads, were delivered to Pakistan in early 1991. The M-9 is reported to have a range of 600 km. It is a single stage missile with an inertial guidance system, which signifies that the missile is programmed before the launch and does not receive any external guidance after launch. China has never openly admitted selling the M-9 missiles to Pakistan, but has indicated that it would sell missiles to "whoever can pay for them".<sup>8</sup>

Pakistan reportedly received the M-11 missile (which the Chinese refer to as the Dong Feng-11) in 1991, when US intelligence discovered their transfer, along with the accompanying transporter-erector-launchers, to Pakistan.<sup>9</sup> The M-11 is capable of carrying nuclear as well as conventional warheads. Pakistan received the M-11 variant as a single-stage, solid fuelled missile with a range of 300 km, carrying an 800 kg warhead.<sup>i</sup> Discussions on the possible sale of M-11 missiles and related technology to Pakistan started in the late 1980s and apparently the contract was signed in 1988. The US intelligence agencies reported in 1995 that the M-11 deal moved ahead after Pakistan apparently paid \$15 million to China for the missiles, launchers and support equipment. The M-11s were shipped to Pakistan in 1993, but their assembly was not confirmed.<sup>10</sup> The US spy satellite photographs taken in April 1995 showed missile canisters at a facility in Sargodha, Pakistan. China also sent two teams of missile technicians to Pakistan to provide training, and unpack and assemble the M-11s.<sup>11</sup> These developments are important to understand the overall Chinese support in Pakistan's missile build-up.

i "Although the DF-11 has a range of 300 km, the Chinese continued work on a version with a longer range. China's 50th anniversary military parade on October 1, 1999, marked the first public Chinese display of a new version of the M-11 short-range missile, the CSS-7 Mod 2, more commonly known as the M-11 follow-on. The new Mod 2 missile is about two metres longer than the Mod 1, and believed to have a longer range, a larger warhead and greater accuracy than the earlier M-11. The accuracy of these missiles will improve in the future if China is able to apply Global Positioning System (GPS) guidance technology to provide highly accurate location information for missile launchers or pre-surveyed launch sites." as cited in Pike, John. "DF-11 [CSS-7] - China Nuclear Forces." Weapons of Mass Destruction (WMD). Globalsecurity.org, n.d. <https://www.globalsecurity.org/wmd/world/china/df-11.htm>

Beijing made pledges in 1991 and 1994 when it signed the 31-nation Missile Technology Control Regime (MTCR) as well as a 1994 US-China agreement not to deploy M-11s in Pakistan.<sup>12</sup> After Washington received the reports of the transfer of the M-11 to Pakistan, limited sanctions were imposed on China in 1993.<sup>ii</sup> Various reports at the international level have claimed that China sold over 30 M-11 missiles to Pakistan, despite repeated denials by both governments. Again, in 1996-97, there were reports of Chinese assistance for indigenous Pakistani M-11 production.<sup>iii</sup>

The M-11 is a road-mobile, single-stage, solid propellant, short-range ballistic missile. The basic variant of the M-11 termed Dong Feng in China has a range of 280-350 km and delivers a single warhead of 500 kg. The basic variant of the M-11 uses an inertial guidance plus terminal radar guidance, giving a Circular Error Probability (CEP) of 500-600 m. The improved M-11A (which Pakistan is reportedly producing) uses inertial/Global Positioning System (GPS) guidance system with optical correlation terminal targeting, resulting in a greater accuracy of below 200m CEP.<sup>13</sup>

Pakistan has a missile factory located in Rawalpindi for the manufacture of medium range ballistic missiles. In all likelihood, it is manufacturing the M-11 or a similar missile, it is unclear whether this facility has the capability to manufacture complete missiles or only some major components.

### ***Hatf-1***

Development of the Hatf-1 solid-propellant unguided rocket and ballistic missile programme started in the early 1980s and was revealed by Pakistan in early 1989. Although Islamabad claims it to be its indigenous production, there are enough reports which provide evidence of Chinese assistance. Apart from China, certain European companies have also provided assistance to Pakistan.<sup>14</sup> There have been unconfirmed reports that the initial Hatf-1 and 2 project designs were both based upon a 1960s French sounding rocket design, known as Eridan.<sup>15</sup>

Reports suggest that the Hatf-1 is a 70 km range unguided rocket, with a length of 6.0m, a body diameter of 0.56 m and a launch weight of approximately 1,500 kg. The rocket is a single stage solid propellant system, with a payload of 500 kg that could be conventional High Explosive (HE), chemical or submunitions.<sup>16</sup> There have been also reports of the development of the improved version Hatf-1A, 100-km range missile. It is believed

ii Sanctions had a significant impact on the sales of high technology goods to China. Those goods were a major portion of the \$12 billion US trade with China in 1992.

iii Statement by Gordon Oehler, Former Special Assistant to the Director, CIA and Director DCI's Nonproliferation Center; Hearing of the Senate Foreign Relations Committee on Proliferation of Chinese Missiles; Gary Millhollin, Director; Wisconsin Project on Nuclear Arms Control; June 11, 1998

that the Hatf-1 entered into service in 1992 and the Hatf-1A in 1995. The guided Hatf-1B, a further improved version with an upgraded kit fitted to the existing missile, was reported to have been flight tested in February 2000 and is believed to have entered operational service in 2004.<sup>17</sup>

### ***Hatf-2 (Abdali)***

The original version of the Hatf-1 SRBM was started in 1987, and was first deployed in 1989 as a two-stage version of the Hatf-1 missile. The Hatf-2 uses the Hatf-1 as a second stage, and has a range of 300 km with 500 kg payload.<sup>18</sup> There are unconfirmed reports that the Hatf-2 is an upgraded version of the Hatf-1B and was developed with Chinese aid and technical assistance. Although the production for the Hatf-2 started in 1987, the programme was reportedly delayed, in all probability due to the acquisition of the M-11 in the early 1990s. A new programme was later commenced in 1997 by the Pakistan National Development Complex (now NESCOM) with a reduced range of 180 km and was called the Hatf-2 or Abdali.<sup>19</sup> The Abdali missile was first flight tested in May 2002, and appears similar in size and shape to the Argentinean Alacran SRBM and the Chinese TY-3, TY-13 and TY-14 research rockets, which confirms the Chinese assistance in the build-up of the missile.<sup>20</sup> Due to their limited range, it is unlikely that the Abdali missiles can carry nuclear warheads.

### ***Hatf-3 (Ghaznavi)***

There has been much speculation about the origin of the Hatf-3 Ghaznavi missiles. The programme for the development of the Hatf-3 was terminated after Pakistan received the M-11 from China. The technology for the M-11 was used to develop future missiles – the Shaheen-1 and Shaheen-2 – in Pakistan. The programme for the Hatf-3 - Ghaznavi was initiated in 1997 by Pakistan National Development Complex (NESCOM). The first flight test was made in May 2002. The other three test flights for the Ghaznavi took place in October 2004, November 2004 and December 2006.<sup>21</sup> Technical evaluation of the missile images suggests that the Hatf-3 is a version of the M-11 or may even be a repainted M-11. The later versions of the missile may have GPS or terminal guidance system.<sup>22</sup>

The Ghaznavi missile is 8.5 m long, has a body diameter of 0.8 m, and a launch weight of 4,650 kg. The missile has a single stage solid propellant motor providing it a minimum range of approximately 50 km, a maximum range of 290 km, and it can carry a single warhead of 700 kg.<sup>23</sup> The M-11 Chinese missile now has a range of 350 km and, thus, there are apprehensions that perhaps the Ghaznavi also has a range of up to 350 km.<sup>24</sup> The Ghaznavi can carry two kinds of warheads – a longer nuclear warhead and a shorter conventional warhead. Ghaznavi missile became operational in February 2004 and the

final production was completed in 2007.<sup>25</sup>

### ***Hatf-4 (Shaheen-1)***

The Hatf-4 or Shaheen-1 is believed to be a scaled up version of the M-11 missiles supplied to Pakistan in 1993. Since 1996, there have been suggestions that a solid propellant missile was being developed by Pakistan with Chinese assistance. Ground tests of the motor for this missile were reported in 1997 and 1998.<sup>26</sup> Development of Hatf-4 took place between 1993 and 1997 and it was first tested in 1999.

The Shaheen-1 is a single stage, solid propellant missile with an inertial guided system and a maximum range of 750 km.<sup>27</sup> Not much technical information is available about the missile. In early April 2013 Pakistan conducted a test launch of an improved version of Hatf-4. There are reports of an improved version of Shaheen-I with an enhanced range of 900km.<sup>28</sup>

### ***Hatf-5 (Ghauri)***

Pakistan's second most crucial partner in the missile development programme has been North Korea. Pakistan, has been extending military assistance to North Korea in return. It is believed that one of the nuclear devices tested in 1998 at Chagai was of North Korean origin.<sup>29</sup> Pakistan's link with North Korea was established in 1993 during the second tenure of Benazir Bhutto. The Pakistani Prime Minister visited Pyongyang after having talks with North Korean President Kim Il Sung. According to Pakistani officials, the Pakistani delegation went with plans for North Korea's Nodong missile.<sup>30</sup> While Pakistan's clandestine missile transactions with China have been closely monitored by the US, the same does not stand true for its clandestine missile technology transfer from North Korea. The US intelligence community has been warning the US Administration about the North Korea–Pakistan links and missile transfers since 1997.<sup>iv</sup>

**It is believed that one of the nuclear devices tested in 1998 at Chagai was of North Korean origin.**

The development programme for the Hatf-5 or Ghauri commenced in 1993 at the Khan Research Laboratories and was publicly announced in 1997. Although North Korea has consistently denied providing assistance, the US intelligence sources did monitor the North Korean flights to Pakistan. The flights mostly involved IL-76 transports; the

iv In 1997, Jane's Defence Weekly reported that Gordon Oehler, former Director of the CIA's Nonproliferation Center said that Pakistan has recently announced the development of a 1,500km range missile called Ghauri. Even though Pakistan claims the Ghauri to be an indigenously produced missile, US analysts believed that China and North Korea provided the necessary technical advice



transports apparently carried technical experts, including telemetry crews.<sup>31</sup> The number of North Korean flights increased and this was followed by the visit of North Korean Chief of Staff and head of the strategic forces, which was indicative of the fact that the two nations have entered into an agreement which allowed North Korea access to Pakistan's range of facilities in exchange for military technology.<sup>32</sup>

Reportedly, the 5-10 No dong missiles assembly sets were sent to Pakistan between 1994 and 1997 for trials and to set up a manufacturing facility.<sup>33</sup> The Ghauri missile, which resembles the shape of the Russian 'Scud B' is an outcome of coordinated inputs from both North Korea and China. There were reports regarding an arrangement among Pakistan, China and North Korea whereby China would provide the soft technology and engineering for the Ghauri, and North Korea would act as an agent for the transfer of Chinese technology and provide the hardware and components from its Nodong missile programme.<sup>34</sup>

The first flight test of the Ghauri, single stage, liquid propellant missile, with a range of 800-1,200 km, was in April 1998. An improved version, known as the Ghauri-2, was reportedly under development in 1998, with an enhanced range of 1,500 to 1,800 km, and was first flight tested in April 1999.<sup>35</sup> It is estimated that the Ghauri-3 programme has been under development since 1994, with a range of 3,000 km and the first stage motor tests were reportedly done in July and September 1999.<sup>36</sup>

### ***Hatf-6 (Shaheen-2)***

There were unconfirmed reports regarding the development of the Shaheen-2, also designated as Hatf-6, which is a two-stage solid propellant ballistic missile. Some reports also suggested that it was ready for testing in June 1999.<sup>37</sup> However, two Shaheen-2 missiles were displayed during the Pakistan Day Parade in Islamabad on March 23, 2000.<sup>38</sup> One of the missiles was carried on a 12-wheel transporter erector launcher, while the other Shaheen was carried on a missile transporter. These vehicles are apparently much larger in size than the 8 wheel launcher used by the Shaheen-1.<sup>39</sup>

On March 9, 2004, Pakistan test-fired the nuclear capable Shaheen-2 ballistic missile. Samar Mubarakmand, Chairman, National Engineering and Science Commission made a statement that the missile was a two-stage rocket weighing 25 tons with a diameter of 1.4 m, length of 17.5 m, and a range of 2,500 km.<sup>40</sup> The Shaheen-2 is believed to be based upon the earlier Chinese two-stage solid propellant missile M-18, which was demonstrated in 1988. The maximum range of the Shaheen-2 missile was 2,000 km, which has now been increased to 2,500 km, sufficient to target any important part of India.<sup>41</sup>

### **Shaheen-III**

In early March 2015, Pakistan test launched a surface-to surface ballistic missile-Shaheen-III. Details about the missile are not available in the public domain. Reports suggest that the missile is capable of carrying a nuclear or conventional warhead to a range of 2,750 km.<sup>42</sup> It is believed that the missile employs a multistage solid-fuel rocket motor and uses inertial guidance to reach the operational range of 2,750km.<sup>43</sup> Shaheen III uses Chinese 16 wheel transporter erector launcher (TEL). Reportedly, Pakistan started negotiations with the China Precision Machinery Import-Export Corporation (CPMIEC) and exported "two 16x16 WS-21200s for use as TELs for Shaheen-III missiles".<sup>44</sup>

### ***Hatf -9 (Nasr)***

On April 19, 2011, Pakistan tested its short range surface to surface multi tube ballistic missile Hatf-9 (NASR). The official press release for NASR said:

"[The NASR Weapon System] has been developed to add deterrence value to Pakistan's Strategic Weapons Development programme at shorter ranges. NASR with a range of 60 km, carries nuclear warheads [emphasis added] of appropriate yield with high accuracy, [and] shoot and scoot attributes. This quick response system addresses the need to deter evolving threats."<sup>45</sup>

Although, a missile of 60 km range is more likely to be a free flying rocket, Pakistan has claimed the missile to be nuclear capable, which is possible. In all probability the missile is a four-tube adoption of a Chinese-design multiple rocket launcher (MRL), possibly the A-100 type, on an eight-wheeler truck, capable of carrying four ready to fire ballistic missiles.<sup>46</sup> According to Jane's (2016-2017), "The Hatf-9 is a single-stage solid-fueled rocket motor missile with fin stabilization. The payload is expected to be around 400 kg, and could be high explosive (HE), submunitions, or nuclear with blast yield of 0.5 to 5kt".<sup>47</sup> The missile is fired from a modified four-tube transporter-erector-launcher chassis of the AR 1A/A-100E (8x8) multiple launch rocket system (MLRS) procured from China.<sup>48</sup>

Pakistan's position has been that Hatf-9 is a counter to India's Cold Start doctrine which envisions limited conventional action from the Indian side in response to the sub conventional attacks on India originating from the Pakistani territory. Hatf-9 belongs to the category of Tactical Nuclear Weapons (TNWs) and, according to Pakistan, is capable of inflicting damage on India's armed brigades and divisions.

## Abadeel

In January 2017 Pakistan tested the Abadeel surface-to-surface ballistic missile (SSM). Abadeel is a three-stage solid fuel missile, designated to carry both conventional and nuclear warheads, reportedly has a maximum range of 2, 200 kilometres and is capable of carrying Multiple Independently Targetable Re-entry Vehicles (MIRVs).<sup>49</sup> According to the ISPR, “the development of the Abadeel weapon system was aimed at ensuring survivability of Pakistan’s ballistic missiles in the growing regional Ballistic Missile Defence (BMD) environment.”<sup>50</sup> Some unconfirmed reports suggest that the development of Abadeel commenced in 2000s and its basic design has similarities with Pakistan’s solid fuel MRBMs such as Shaheen II and Shaheen III and China’s CSS-7 SRBM.<sup>51</sup> Pakistan test fired the missile in 2017 and sees this as a way of “enforcing deterrence”<sup>52</sup>. However, it is unlikely that the induction of this capability will happen anytime soon.

## Cruise Missiles

### *Hatf-7 (Babur)*

The first flight test of Babur (Hatf-7) cruise missile was reported in August 2005.<sup>53</sup> Development of the Babur, also designated as Hatf-7, which is an air, ground, ship and submarine launched short range, turbojet powered, single warhead cruise missile, commenced reportedly in 1990 itself, given Islamabad’s quest for enhancing its options of delivery systems. In July and August 1998, two US RGM/UGM-109 Tomahawk cruise missiles were recovered almost intact in southern Pakistan, and it is believed that these may have been used for reverse engineering or even to contribute basic technology for the development of the Babur.<sup>54</sup> But this does not deny the Chinese technical input in the development of the Babur, as the missile looks similar to the Chinese Hong Niao-3, the US RGM-109 and also has similarities with the Russian SS-N-27 Club (3M14 version) cruise missile.<sup>55</sup> The payload is 450 to 500 kg and the warheads can be high explosive (HE), either unitary or submunitions or nuclear. The maximum range was 500 km but has been increased to 700km.<sup>56</sup> Enhanced versions of Babur have been tested by Pakistan.

Pakistan claimed that it is developing a sea-based nuclear force to be able to match India’s nuclear triad. In January 2017, Pakistan conducted the first test of its SLCM, the Babur-3 from a submarine. It is estimated that Babur -3 has a range of 450 km and will be carried on Pakistan’s diesel-powered Agosta 90B submarine. Reports suggest that the Pakistan military “seems to confirm the missile ejecting horizontally, which could eventually lead to deployment through submarine torpedo tubes rather than a vertical launch system.”<sup>57</sup>

### ***Hatf-8 – Ra'ad***

In May 8, 2008, Pakistan tested a nuclear-capable, air launched cruise missile, the Hatf-8 – Ra'ad, with a range of 350 km. The first test-launch for the Ra'ad was carried on in 2007. The Hatf-8 missile has been developed exclusively for launch from aerial platforms, enabling Pakistan to achieve a greater strategic capability on land and at sea.<sup>58</sup> Reports suggests that the Hatf-8, has special stealth capabilities and is a low altitude terrain following missile with high maneuverability, and can deliver all types of warheads, with high accuracy.<sup>59</sup> Although the missile was initially launched from a Pakistan Air Force (PAF) Dassault Mirage III combat aircraft, it is planned to be integrated with, and launched from, other PAF platforms like the JF-17s. The maximum range for Ra'ad is 350 kms and general understanding is that the nuclear option is less likely with the missile. However, according to the Jane's, "Pakistan claims to have developed a nuclear warhead that is small enough to be housed in a MK-84-sized bomb body, so it may have the ability to build a warhead for the Ra'ad".<sup>60</sup>

## **Aircraft**

### ***Acquisition of the F-16s***

Pakistan openly announced its nuclear weapon capability in 1987 and, it can be presumed that in the early 1980s, it was clearly exploring opportunities to acquire the delivery systems when it had entered into an alliance with the US in the war against Communism in Afghanistan. Gen Zia-ul-Haq managed to negotiate a generous aid package of \$3.2 billion (the military component of the aid package was worth \$1.6 billion) military assistance programmes from the US. This included the sale of 40 F-16s Falcon fighters/interceptors, one of the most advanced military aircraft in the world. The F-16 is a flexible design, capable of high performance in both the air superiority and ground attack roles. The flight controls are digital, computer-controlled fly-by-wire, complemented by advanced navigation and avionics systems.

The second US aid package worth \$4.02 billion for a period of six years, commenced in 1987, but was suspended in 1990 due to the arms embargo imposed under the Pressler Amendment. This was highly disappointing for Pakistan as it dried up the American supply of equipment to Pakistan. Although the Brown Amendment passed in 1995 permitted Pakistan to take possession of the military equipment frozen by the United States, it excluded the F-16s. What was even extremely disturbing for Pakistan was that the US refused to export 28 F-16s which Pakistan had paid for (and which were also manufactured) against the 1988 order for 110 F-16s.

However, post 9/11, the US aid and weapons sales were restarted following Pakistan's role as the chief ally in the global war against terrorism, which led to removal of US sanctions on Pakistan. Pakistan's alliance with the US helped in the recovery of Pakistan's economy and opened up the supply of the long desired defence equipment from Washington, including the much awaited F-16s. Pakistan received 14 F-16 A in 2005-2008 and 18 F-16C Block-50/52 in 2010.<sup>v</sup>

### ***The JF- 17s***

China and Pakistan entered into deals for the co-development of a fourth generation fighter aircraft, the JF-17 (earlier called the FC-1). China delivered two Joint Fighter (JF-17) Thunder advanced jets to the Pakistan Air Force in March 2007 for flight tests and evolution. The JF-17 is designated to be a low cost, high multi-role combat aircraft to meet the tactical and strategic requirements of the Pakistan Air Force, thereby reducing the country's reliance on imports. The JF-17 is co-developed by Pakistan and China and is being built by China's Chengdu Aircraft Industry Corporation (CAC) and Pakistan Aeronautical Complex (PAC), Kamra. There have been reports that the design was developed by the MiG complex in Russia and transferred to China after the Russian Air Force cancelled procurements. The JF-17 is fitted with the RD-93 engine and the initial batch of JF-17s delivered to Pakistan were fitted with the Chinese radar, the KLJ-7 multi-mode pulse Doppler radar. In 2007, the Pakistan Air Force Chief announced that Pakistan has increased its initial target of buying 150 JF-17s to acquiring up to 250 aircraft.<sup>61</sup>

The JF-17 (FC-1) is fairly flexible in terms of avionics and weapon configurations. The JF-17 in service in the PAF is presumably fitted with the Italian Grifo S-7 fire-control radar. The radar has 25 working modes and a non-breakdown time of 200 hours. Further capabilities include look-down, shoot-down and ground strike abilities.<sup>62</sup> Pakistan has received Block I, Block II and Block III. The latest in the series, was rolled out on December 27<sup>th</sup>, 2019. According to a Jane's report published on Jan 2, 2020, the aircraft is armed with two PL-5EII short-range air-to-air missiles (AAMs) and has additional features similar to the Chinese fifth generation J-20 fighter aircraft and J-10 C fighter. Reportedly, significant changes in Block III include: new active electronically scanned array (AESA) radar, new wide-angle holographic head-up display and an imaging infrared (IIR)-based missile approach warning system.

China has reportedly overhauled the JF-17 Block I. The PAF fleet currently has 85 JF-17 Block I and II, that are operationally deployed. There are also reports of 8 KF-17 Block III.<sup>63</sup>

<sup>v</sup> For details see, Shalini Chawla, "Pakistan Air Force: Modernisation Trends", *Strategic Advantage of Air Power: Select Writings of Air commodore Jasjit Singh*, ed. Manpreet Sethi and Shalini Chawla (New Delhi, 2019, Knowledge World).

### ***A-5s and French Mirage Vs***

Pakistan acquired 60 A-5s from China, and as of mid-1999, only 49 remained in service. Reportedly, some of the A-5s are capable of carrying nuclear bombs. But given their payload capability, the bomb would have to be quite small. The aircraft offers enhanced combat performance, particularly at low and super-low altitude.<sup>64</sup> Pakistan could also potentially use the French Mirage Vs for the nuclear-strike mission. The nuclear capable cruise missile Raad–Hatf-8 could be potentially deployed to the Mirage V squadrons in the future.

**Table: Pakistan's Nuclear Missiles**

Type	Range (km)	Payload (kg)
<b>Ballistic Missiles</b>		
Hatf-1	70 km	500Kg
Hatf-2	180 km	500 kg
Hatf-3 (Ghaznavi)	290-350 km	700 kg
Hatf-4 (Shaheen 1)	750 km	700kg
Hatf-5 (Ghauri)	1,500-1,800 km	12,00 kg
Hatf-6 (Shaheen 2)	2,500 km	700kg
Hatf 9 (NASR)	60 km	400kg
Shaheen III	2,750 km	
Abadeel	2,200 Km	
<b>Cruise Missiles</b>		
Hatf-7 (Babur)	500 km Increased to 700km	450 -500kg
Hatf-8 (Ra'ad)	350 km	500 kg

*Source: Table prepared by author using the data from various issues of IHS Jane's Weapon Strategic and HIS Jane's Weapons Air Launched , 2015-2016, 2016-2017.*

### **Implications for India**

Pakistan's missile delivery systems have been developed significantly in the last two decades. It claims that its missile capability is sufficient to target all major Indian cities.

Lt Gen F.S. Lodhi asserted the need for accelerated missile development immediately after the overt nuclearisation of Pakistan:

In the modern defence concept, the missile system is the most essential element. In fact, it is now the core of any viable defence structure and the cutting edge of an adequate defence capability of any nation. It cannot, therefore, be ignored by the defence planners. In Pakistan's security environment, an adequate missile defence will prove an effective and reliable deterrent. The essence of deterrence worldwide, is a country's power to retaliate in kind. It was, after all, the power of deterrence that prevented a third World War between the Western allies and the Soviet empire for over 50 years.<sup>65</sup>

The details of the missiles clearly indicate that Pakistan has focused on increasing the ranges, diversify its targets and achieve greater flexibility in operational deployments. It seems to be extremely proud of the *Full Spectrum Deterrence*, which it feels counters India's position regarding a possibility of limited conventional war under the nuclear overhang. Khalid Kidwai, former DG Strategic Plans Division, has asserted the requirement of Full Spectrum Deterrence for Pakistan:

"What they (India) were finding attractive, and what was probably encouraging them to find the space for conventional war, below this gap, was the absence of a complete spectrum of deterrence....That is what we have been calling the full spectrum deterrence."<sup>66</sup>

Implications of Pakistan's India-centric nuclear arsenal and missile capability has to be understood in terms of Islamabad's 'intent' and its 'nuclear posturing'. Pakistan started to think about nuclear weapons seriously after its humiliating defeat in the 1971 war, though it never fails to blame India's peaceful nuclear explosion at Pokhran in 1974 for its nuclear weapon programme. Nuclear weapons were seen as the sole guarantor of Pakistan's security against India, which remains in the Pakistani mind its enemy number one till date! The 'India threat' was created by the Pakistani military and treated as 'indispensable' in order to sustain its dominance in the social, political and economic dynamics of the democratically weak state. The central assumption on which Pakistan has built up its nuclear arsenal is that a credible nuclear deterrent would compensate for the inferiority of its defence forces and its smaller size vis-à-vis India. Pakistan received generous support from China for its nuclear and missile programmes and in its pursuit of nuclear weapon status. It received financial support from Saudi Arabia and Libya and it did share nuclear data and expertise with Iran, Libya and Iraq. The basic rationale for Pakistan acquiring nuclear weapons has been its expectations to neutralize India's perceived conventional superiority and the way it was

employed by it in the 1971 war. In practice, nuclear weapons have been an instrument of blackmail for Islamabad, and assist it in conducting the sub-conventional war against India without the fear of Indian military retaliation. Nuclear weapons and the threat of conflict escalation are also used by Islamabad to attract global attention on 'Kashmir'.

Pakistan acquired the nuclear weapon capability in 1987 and this was reflected in its resolve to accelerate its covert war in Jammu and Kashmir and other parts of India in the late 1980s and 1990s. After the overt nuclearisation in 1998, Pakistan pronounced some notions regarding its nuclear thinking which form the basis of its doctrine and strategies. Pakistan even today does not have an officially announced doctrine and only statements made by its policy makers outline the basic elements of its nuclear doctrine. There is an unofficial code adopted by the Pakistani leadership, based on *Indo-centricity*, *credible minimum deterrence* (now *full spectrum deterrence*), *strategic restraint* and *first use*. Interestingly and rather ironically, the code asserts the principles of a peaceful programme for maintaining a balance against India, though it includes making a first strike in response to not only a conventional counter-attack by India but also a perceived threat from India. Islamabad's effort has been to maintain a low nuclear threshold with an element of uncertainty.

Pakistan very conceitedly (rather often) talks about its Tactical Nuclear Weapons (TNWs)- NASR which in its opinion would deter India from a conventional military response.

**...it would not be incorrect to state that Pakistan has very rationally adopted the posture of irrationality.**

TNWs present a distinct set of complex challenges given the nature of the weapon and the complex security dynamics within the Pakistani state. Pakistan for a long time asserted about the need for *Credible Minimum Deterrence* and eventually, announced a *Full Spectrum Deterrence* with the acquisition of TNWs and sea based nuclear deterrent. Full Spectrum Deterrence for Pakistan

implies full spectrum of platforms – land, air and sea; and full spectrum of scenarios. With TNWs and sea based deterrence Islamabad feels confident in exercising *flexible deterrence options*.<sup>67</sup>

Pakistan's nuclear posture does reflect some distinct contradictions. It talks about being a restrained and responsible nuclear power but at the same time relies on a *first use* doctrine and boasts about the *TNWs* and *Full Spectrum Deterrence*. It continues to assert that it wants peace and no war with India but does not miss an opportunity to flag the threat of a nuclear war. Post Revocation of Article 370, Pakistan Prime Minister Imran Khan has repeatedly talked about a high probability of a nuclear war between India and Pakistan.



Thus, it would not be incorrect to state that Pakistan has very *rationaly adopted the posture of irrationality*.

Pakistan has emphasised rapid expansion of its nuclear arsenal, missile development and acquisition of the nuclear capable aircraft. The critical task for India is to challenge Pakistan's nuclear posture which revolves around a projection of a low nuclear threshold. India certainly needs to continue to focus on modernizing its missile capabilities with greater range, accuracy and maneuverability. It is also important for India to continue the focus on its conventional and nuclear build-up. Emphasis on clear signaling to Pakistan is critical in India's strategic posturing.

Pakistan's nuclear posturing did suffer a blow to some extent with India's airstrikes in Balakot on February 26<sup>th</sup>, 2019 in retaliation to the terror attack in Pulwama claimed by Jaish-e-Mohammed (JeM) on February 14<sup>th</sup>, 2019. The Balakot strikes demonstrated New Delhi's resolve to retaliate militarily, using the strategic space above terrorism and below the nuclear threshold. Evidently, India has crafted a space for conventional war below the nuclear threshold.

Looking into the history of Pakistan's missile development programme and its nuclear posture the following conclusions can be drawn:

1. Pakistan's insecurities and its reliance on nuclear weapons has grown with the growing asymmetries between India and Pakistan.
2. Pakistan will continue to raise the nuclear threat to justify the nuclear build-up to its own people, blackmail India and also, attract international attention to Kashmir.
3. Pakistan will continue to work towards building a secure second-strike nuclear delivery force.
4. Efforts towards the development of cruise missiles will continue.
5. Pakistan's conventional military modernization will continue with a focus on build-up of the air force and maritime strike capabilities of the navy. This is an important factor as although Pakistan's effort has been to deny India any space for conventional war, the military is aiming for a robust conventional force for Pakistan!

## References

1. Kristensen, Hans M., Robert S. Norris, and Julia Diamond. "Pakistani Nuclear Forces, 2018." *Bulletin of the Atomic Scientists* 74, no. 5 (2018): 348–58. <https://doi.org/10.1080/00963402.2018.1507796>.
2. These estimates are based on Table A.1 of the International Panel on Fissile Materials, "Global Fissile Material Report 2015." International Panel of Fissile Materials, 2015. <http://fissilematerials.org/library/gfmr15.pdf>. The 8th annual report of the International Panel on Fissile Materials, p.44
3. Schultz, Ann Tibbitts. *Buying Security: Iran Under The Monarchy*. San Francisco: Westview Press, 1989. p.54, as cited in "Pakistan Profile: Missile Chronology", *NTI* at [http://www.nti.org/e\\_research/profiles/Pakistan/Missile/3068\\_3069.html](http://www.nti.org/e_research/profiles/Pakistan/Missile/3068_3069.html)
4. "Nuclear Weapons Database: Pakistan's Possible Nuclear Delivery Systems." Centre for Defense Information , <http://www.cdi.org/nuclear/database/panukes.html>.
5. Pike, John. "DF-11 [CSS-7] - China Nuclear Forces." *Weapons of Mass Destruction (WMD)*. Globalsecurity.org, n.d. <https://www.globalsecurity.org/wmd/world/china/df-11.htm>.
6. Bill Gertz, *Washington Times*, October 4, 1994, p. A8; Barbara Starr, *Jane's Defence Weekly*, October 15, 1994, p. 6 as cited in "China's Missile Exports and Assistance to Pakistan –Statements and Developments" at [http://cns.miis.edu/archive/country\\_india/china/mpakchr.htm](http://cns.miis.edu/archive/country_india/china/mpakchr.htm)
7. "Missile Overview", *NTI* at [http://www.nti.org/e\\_research/profiles/Pakistan/Missile/index\\_3066.html](http://www.nti.org/e_research/profiles/Pakistan/Missile/index_3066.html)
8. Gertz, Bill. "China Can't Say No to Arms Buyers." *Washington Times*, May 28, 1991.
9. Gertz, Bill. *Betrayal: How the Clinton Administration Undermined American Security*. Washington, D.C: Regnery Publ, 1999., p. 159, as cited in "Pakistan Profile: Missile Overview", *NTI* at [http://www.nti.org/e\\_research/profiles/Pakistan/Missile/index.html](http://www.nti.org/e_research/profiles/Pakistan/Missile/index.html)
10. Gertz, Bill. "Pakistan Deploys Chinese Missiles." *Washington Times*, June 12, 1996.
11. Ibid
12. Gertz, Bill. "Pakistan Deploys Chinese Missiles." *Washington Times*, June 12, 1996.
13. "DF-11." *SinoDefence*, October 2, 2017. <http://sinodefence.com/df-11/>.
14. *Jane's Strategic Weapon System*, Issue 48, 2008, p.108
15. Ibid

16. Ibid
17. Jane's Strategic Weapon System, Issue 48, 2008, p.108
18. Ibid
19. Jane's Strategic Weapon System, Issue 48, 2008, p.108
20. Ibid
21. Chandrashekhar , S., Arvind Kumar , and Rajaram Nagappa. "Assessment of Pakistan's Ballistic Missile Programme: Technical and Strategic Capability." ISSSP, January 1, 2006. <http://issp.in/an-assessment-of-pakistans-ballistic-missile-programme-technical-and-strategic-capability/> , p.10
22. HIS Jane's Weapons Strategic, 2016-2017, Edited by James C O'Hollaoran, p 72.
23. Ibid, p. 73
24. Ibid, p.73
25. Ibid, p. 73.
26. Ibid, p74
27. Ibid, p. 74
28. Ibid, p.74
29. "Pakistan and North Korea Connection " Asia Times Online , [http://www.atimes.com/atimes/South\\_Asia/DJ22Dfo1.html](http://www.atimes.com/atimes/South_Asia/DJ22Dfo1.html).
30. "Bhutto Ends Visit to North Korea." Agence France Presse, December 30, 1993. , International News; in Lexis-Nexis Academic Universe, December 30, 1993, web.lexis-nexis.com, at "NTI: Country Overview: Pakistan Missile Chronology" at, [http://www.nti.org/e\\_research/profiles/Pakistan/Missile/chronology\\_1992\\_1993.html](http://www.nti.org/e_research/profiles/Pakistan/Missile/chronology_1992_1993.html)
31. "Pakistan's Missile 'Was a Nodong'", *Jane's Missiles & Rockets* (Coulsdon, Surrey), vol. 2, no. 5, May 1998, pp.1-2
32. Ibid
33. Ibid
34. Joseph Bermudez, "A Salient Partner", *Janes Defence Weekly* (Coulsdon, Surrey), May 20, 1998

35. *HIS Jane's Weapons Strategic*, 2016-2017, James C O'Hollaoran, p 75.
36. *Ibid*, p.75
37. *Ibid*, p. 77
38. "Shaheen-II / Eagle-I / Hatf-6 / Ghaznavi, Weapons of Mass Destruction (WMD)," at <http://www.globalsecurity.org/wmd/world/pakistan/shaheen-2.htm>
39. *Ibid*
40. *Ibid*
41. *HIS Jane's Weapons Strategic*, 2016-2017, James C O'Hollaoran, p 77.
42. *Ibid*, p. 79.
43. *Ibid*, p.79.
44. "Pakistan's New Shaheen-III MRBM uses Chinese transporter, says Source" , <http://www.janes.com/article/61862/...iii-mrbm-uses-chinese-transporter-says-source>, cited in Pakistan Defence , <https://defence.pk/pdf/threads/pakistans-new-shaheen-iii-mrbm-uses-chinese-transporter-says-source.437117/>
45. Rodney W Jones, "Pakistan's answer to Cold Start?", *The Friday Times*, at <http://www.thefridaytimes.com/13052011/page7.shtml>
46. *Ibid*.
47. *HIS Jane's Weapons Strategic*, 2016-2017, Edited by James C O'Hollaoran, p 78.
48. *Ibid*, p.79
49. "Pakistan Conducts First Flight Test of Ababeel Surface-to-Surface Missile." DAWN.COM, January 24, 2017. <https://www.dawn.com/news/1310452>.
50. *Ibid*.
51. Missile Defense Project, "Ababeel," Missile Threat, Center for Strategic and International Studies, September 12, 2017, last modified June 15, 2018, <https://missilethreat.csis.org/missile/ababeel/>.
52. Sayeed, Saad. "Pakistan Tests Its Second Nuclear-Capable Missile in a Month amid Indian Ocean Becomes 'Nuclearization'." *Business Insider*, January 24, 2017. <https://www.businessinsider.com/pakistan-tests-its-second-nuclear-capable-missile-in-a-month-amid-indian-ocean-becomes-nuclearization-2017-1?IR=T>.
53. *HIS Jane's Weapons Strategic*, 2015-2016, Edited by James C O'Hollaoran, p. 172.

54. Jane's Strategic Weapon System, Issue 48, 2008, p.108
55. Ibid
56. HIS Jane's Weapons Strategic, 2015-2016, Edited by James C O'Hollaoran, p. 172.
57. Taheran, Shervin. "Arms Control Today." Pakistan Advances Sea Leg of Triad | Arms Control Association. Accessed February 15, 2020. <https://www.armscontrol.org/act/2018-06/news-briefs/pakistan-advances-sea-leg-triad>.
58. Khan, Iftikhar A. "Cruise Missile Fired from Aerial Platform." DAWN.COM, May 9, 2008. <https://www.dawn.com/news/301999/cruise-missile-fired-from-aerial-platform>.
59. Ibid
60. HIS Jane's Weapons Air Launched, 2016-2017, Edited by Rahul Udoshi, p 296.
61. Interview, Air Chief Marshal, Tanvir Mahmood Ahmed, Pakistan's Chief of Air Staff, *Jane's Defence Weekly*, April 4, 2007, p.34
62. "JF-17 Thunder / FC-1 Xiaolong Multirole Combat Aircraft." Airforce Technology, n.d. <https://www.airforce-technology.com/projects/fc1xiaolongjf17thund/>.
63. The Military Balance 2019. London: Oxford University Press, 2019, p. 299
64. Pike, John. "FANTAN A-5, Q-5 (NANCHANG) Pakistan Aircraft Special Weapons Delivery Systems." GlobalSecurity.org, n.d. <https://www.globalsecurity.org/military/world/pakistan/a-5.htm>.
65. "Patron Lt Gen (Retd) SARDAR FS LODI Goes over the Whole Gamut of the Advent of Missile Technology in Pakistan." Pakistan's Missile Technology, May 1998. <http://www.defencejournal.com/may98/pakmissiletech.htm>.
66. "A Conversation with Gen. Khalid Kidwai." Carnegie, March 23, 2015. <https://carnegieendowment.org/files/03-230315carnegieKIDWAI.pdf>.
67. Dr Adil Sultan, "South Asian Stability-Instability Paradox: Another Perspective", IPRI Journal XIV, no. 1 (Winter 2014): 21-37, <https://ipripak.org/wp-content/uploads/2014/04/Article-no.-2-dr.-Adil.pdf>