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## India and Pakistan: Danger of Nuclear and Missile Arms Race?

**by Angathevar Baskaran**

Since conducting nuclear tests in 1998, India and Pakistan have embarked on a policy of 'minimum nuclear-deterrence.' Both developed and launched a number of missiles and integrated some into their military. A series of events at the international border and a December 2001 attack on the Indian Parliament heightened tensions and led to international concerns over potential dangers of a nuclear and missile arms race in South Asia.

India's nuclear program, started in the 1950s, established a large civil and military infrastructure and developed a nuclear device by the early 1970s, when Pakistan started its program. By the late 1970s, technology allowed others such as Pakistan to construct nuclear weapons without needing extensive basic research themselves. Thus Pakistan is not far behind India in nuclear capability. It has sufficient capability in feed-stock production, uranium enrichment processes, nuclear weapons design and development, arming, fusing firing, and testing. While India appears to have superiority in heavy water production, tritium production and plutonium extraction, Pakistan has a clear superiority in uranium enrichment processes and India's plutonium and tritium production capacity gives it an advantage in developing high yield weapons.

India's current advantages with a larger stockpile of weapon-grade material and a greater capability to produce more weapon-grade materials than Pakistan are likely to disappear in the medium to long-term. In the long-run, India is unlikely to produce more than a certain number of weapons, to maintain its 'minimum nuclear-deterrent posture.' Therefore, we should not expect a nuclear race in South Asia.

While India is likely to direct its nuclear weapons against both Pakistan and China, Pakistan only needs to match India's capability. That means a determined and foreign-assisted Pakistan will sooner or later be able to match India's capability in those areas where it is behind. Pakistan has been receiving technology assistance from China over the years including a 25-kiloton warhead design, significant quantities of HEU, 5,000 custom-made ring magnets for high speed centrifuges, help with a 40-Mwt heavy water research reactor at Khushab and the design for a small tritium (neutron) initiator. It is believed that Pakistan, rather than closing down its uranium enrichment facilities completely as claimed in 1990-1991, continued to operate them at 'a much lower (than weapons-grade) level of enrichment.' If true, it could have produced over 400 kgs of 90 per cent uranium by 2001, using its full capacity since its 1998 nuclear tests.

The gap between the two countries appears larger in missile than in nuclear technology. India's missile program involves two main families of missiles - Prithvi and Agni. Its program is highly indigenous with relatively little dependence on imports. If the civil space program is taken into account, India has already established strong capabilities in solid and liquid propulsion technologies, guidance systems including micro-processors, and re-entry technology. Its capability in guidance system grew significantly in the 1990s as reflected in the joint Indian-Russian development of BrahMos supersonic cruise missiles using Russian liquid fuel Ramjet propulsion systems and Indian guidance systems.

Pakistan's missile program started with rocket technology from France, followed by M-11 SRBMs from China in the early 1990s. It has developed two main families of missiles: (i) Shaheen (SRBM

and IRBM) based on Chinese M-9/M-11 solid propulsion technology; and (ii) Ghauri (SRBM and IRBM) based on North Korean No-dong 1 and Taepo-dong 1 liquid propulsion systems. The missile technology relationship with North Korea strengthened in the 1990s. It is not a coincidence that when North Korea developed the Taepo-dong 1- a two-stage ballistic missile based on liquid propulsion-Pakistan announced that it started developing an IRBM. It is quite likely that Pakistan could acquire Taepo-dong I or II from North Korea and launch it as an indigenously developed missile (Ghauri III). India's missile program provides Pakistan legitimacy for conducting such a test, and its close US ties would help counter any negative reaction. Pakistan may also have intermediate and long range ballistic missiles capabilities within five years. Once it masters the Korean missile systems, it may find it relatively easy to improve critical subsystems using imported components such as Global Positioning Systems (GPSs) available for civil use.

However, Pakistan has faced serious difficulties building industrial capacity to produce high-tech items. Its missile development projects largely depend on foreign assistance, and past experience suggests that it is highly unlikely that export control regimes will prevent either China or North Korea from assisting Pakistan. Using the facility at Fatehgarh, built with Chinese assistance, Pakistan will be able to produce short and medium range versions of Shaheen in batches. However, India's experience absorbing the Viking liquid engine technology from France indicates that Pakistan will take many years to master such technology and will need most of the critical subsystems from China and North Korea to test launch Ghauri III and Shaheen II (IRBMs) - particularly the case with Ghauri III, a two-stage liquid system that needs new or improved subsystems and components.

In missile technology, India will maintain a degree of superiority over Pakistan for some time. Whether Pakistan will be able to close this gap in the near future will largely depend on foreign assistance. But Pakistan may ignore 'catching up' and instead, it may decide first to acquire missile systems in different range categories and then standardize and optimize them through incremental improvements.

Although recent nuclear and missile developments suggest that India and Pakistan are pursuing a strategic arms race, it is unlikely to be intensified any time soon. While it is clear that the nuclear build-up between India and Pakistan cannot be stopped or eliminated, it is likely to be contained and managed due to inherent economic and technological complexities.

Dr. Angathevar Baskaran is in the Business School faculty at Middlesex University, London.

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