Impact of Ballistic Missile Defence System on Strategic Stability in South Asia

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Introduction

During 2017, India and Pakistan conducted several missile tests introducing various types of offensive and defensive weapons in the region. Both the countries also remained engaged in improving the ranges and technological sophistication of their existing arsenal. They also completed their nuclear triads i.e. the capability of delivering nuclear weapons by land, air and sea based platforms. India, however, acquired an edge over Pakistan through the successful launches of its nuclear-capable intermediate-range ballistic missile (IRBM) Agni-IV[1] and intercontinental ballistic missile (ICBM) Agni-V[2]. India's Defence Research Development Organisation (DRDO) announced that India is looking into the possibility of equipping its Agni-V ICBM with multiple independently-targetable re-entry vehicles (MIRV).[3] The country has also announced that it is working on the development of the Agni-VI ICBM with a strike-range of 8,000–10,000 km, capable of being launched from submarines as well as from land.[4]

Apart from modernising its missile systems, India continues working on its two-layered ballistic missile defence system (BMD).[5] Though India has successfully conducted several tests of its BMD system in a separate mode, the system is yet to be tested in an integrated mode i.e. using both low-altitude Prithvi Air Defence (PAD) and high-altitude Advanced Air Defence (AAD) interceptor missiles. The country has been working on its BMD system since 1995 but has not yet deployed it.[6] India is also fielding its indigenously developed Akash

surface-to-air (SAM) system for intercepting cruise missiles.[7] To further strengthen its missile defence shield, India is in the process of procuring Barak-8 air and missile defence system from Israel[8] and S-400 air and missile defence system from Russia.[9]

The Indian endeavour of equipping Agni-V with MIRVs and developing missiles with intercontinental range would undoubtedly escalate an arms race with both China and Pakistan. Moreover, India's deployment of the BMD system would create a security dilemma and undermine strategic stability in the region.[10] The deployment of the system would minimise India's vulnerability to Pakistan's nuclear weapons, thus decreasing the strategic stability between the two countries which relies on nuclear deterrence. To counter India's BMD system and maintain strategic stability, Pakistan test-fired sea-based nuclear-capable submarine-launched cruise missile (SLCM) Babur-3 and MIRV capable Ababeel IRBM in January 2017.[11]

This paper seeks to understand India's BMD system by studying its various components and its implications for regional strategic stability. It will analyse the impact of cruise missiles and MIRVs in relation to security dynamics of South Asia. It will not only help in understanding the impact of BMD on strategic stability but will also highlight the Indian military asymmetry vis-à-vis Pakistan. It will examine the following questions.

> What are the different types of anti-ballistic missile systems that are being developed and procured by India and what are their capabilities? What are the implications of India's BMD system for regional strategic stability? Should Pakistan develop or procure its own BMD system? What

different policies can Pakistan and India adopt to maintain regional strategic stability?

The study would remain restricted to analysing only the strategic assets of India and Pakistan and their impact on regional strategic stability. It does not include the Chinese strategic developments and their implications. The paper would utilise both primary and secondary sources. Data from books, documents, speeches, news, research papers, and reports would be collected. As India and Pakistan's nuclear strategies are not officially defined and explained in detail, as a matter of policy, primary sources for both the countries' strategic technology and policy will be official statements made in various forums.

Overview of Ballistic Missile Defence System

Before discussing India's BMD system and its impact on strategic stability, it is important to understand some technical aspects of the BMD system. A BMD system is used to detect, track, intercept and destroy incoming ballistic missiles and/or their warhead payloads.[12] An operational system consists of sensors to detect a missile launch and to track the missile and warhead; interceptors to disable or destroy the missile or warhead; and a command and control system. An incoming ballistic missile can be intercepted either by explosion of intercepting missile's warhead or by modern hit to kill impact technology. Both are considered kinetic kills. The BMD systems can be deployed on the ground, in the air, at sea, or in space. Depending on their technological capabilities, they can destroy target missiles and their payloads during any of the three stages of flight: i.e., the boost, midcourse, and terminal phase.[13]

The boost phase is the first stage of a missile's flight when it starts ascending just after launch. It is noteworthy that interception during this stage has the advantage of destroying the missile before it disperses its payload. In case of early interception there is a possibility of payload being dispersed in the launching territory. This possibility renders a deterrent effect for the offensive state.[14] However, the main challenge associated with boost-phase interception is the short time associated with powered flight, typically between 60 and 300 seconds depending on the missile's range and propellant type.[15]

The midcourse interception refers to exo-atmospheric interception of the target missiles after their completion of boost phase. During this phase, all objects follow ballistic trajectories under influence of the earth's gravitational field. Since this phase is the longest phase of a missile's flight, it provides more time for observing the target missile and offers multiple interception opportunities.[16] However, in this stage interception may become challenging as it is also the phase where decoys[17] are released along the warhead and distinction between the two becomes difficult. The terminal phase interception refers to endo-atmospheric interception of the target missile after the completion of midcourse phase. During the terminal phase the payload re-enters the earth's atmosphere. In this phase interception becomes easier as the decoys slow down considerably because they are likely to be lighter than warheads. Under these conditions, warheads may be distinguished more easily permitting the BMD systems to launch interceptors against the exposed warheads.[18]

With the introduction of new models and interception methods, the BMD system is considered an effective technology in terms of minimising the vulnerability of

states to ballistic missile attacks. The proliferation of nuclear-capable guided ballistic missiles in recent years has intensified the desire of states to be able to defend themselves by developing BMD systems. The aspiration to acquire a BMD system is not new and dates back to 1944 when Germany launched the first ballistic missiles attack against England.[19] After the end of World War-II, the US and the former Soviet Union became the first two states that started developing their BMD systems.[20] The US began developing its missile defence system during 1950s and by the end of the decade it started deploying Nike Zeus system and a more capable the Nike X system in 1960s against the USSR.[21] Meanwhile, the US also started developing the Sentinel System for national defence against the USSR and the nascent Chinese ballistic missile threat after the country's nuclear test in 1964 and the parallel development of ballistic missiles.[22] However, fearing that a national defence system would initiate an arms race with the USSR, the US replaced its Sentinel Programme with the Safeguard Programme that was only limited to defending its intercontinental ballistic missiles (ICBMs).[23] Like the US, the USSR also initiated research on its BMD system during 1950s and created the A-35 missile interception system by the end of the 1960s, albeit with some technological limitations.[24]

The ABM Treaty in 1972 limited the deployment of BMD systems of both the US and the USSR to only two sites with no more than 100 interceptors per site. The protocol to the ABM treaty further limited the deployment of BMD systems in both countries to only one site with 100 interceptors.[25] Despite the ABM treaty, several BMD programmes including President Ronald Reagan's Strategic Defence Initiative in 1983, President George H.W. Bush's Global Protection against Limited Strikes (GPALS) in 1990 and President Bill Clinton's

National Missile Defence (NMD) programme in 1999 remained under consideration but could not develop owing to financial constraints.[26] It was decided during George W. Bush's Presidency in 2002 to move forward with NMD development which ultimately led to withdrawal of the US from the ABM Treaty.[27]

Following the withdrawal, the US proceeded with working on its NMD system. The US Congress updated its NMD Act in 2016, originally enacted in 1999,[28] in order to maintain and improve the capabilities of its layered BMD system for defending its territory, deployed armed forces and allies. In January 2017, US President Donald Trump announced a Nuclear Posture Review together with the deployment of NMD system review which would be completed in early 2018.[29]

Meanwhile, the USSR also proceeded with the development of its BMD systems.[30] In 1995, the country deployed the latest version of its A-35 BMD system, called the A-135 system. Russia continues to move forward with the development of both air defence and anti-missile systems. The country has deployed S-300 and S-400 BMD systems capable of intercepting missiles of short, medium and intermediate ranges. For ICBMs, Russia is working on its S-500 system.[31]

Like the US and Russia, Chinese defence engineers have been researching on BMD system for decades, though the country long opposed the development of BMD systems by the US and Russia. By the early 1980s, the enhanced ranges and precision of both US and Russian ballistic missile capabilities created a sense of insecurity in China. In order to defend against first strike, China undertook research on missile defence systems during the early 1980s. A more substantive programme to develop a BMD system started in March 1986 known as

the 863 Programme.[32] China conducted its first interceptor missile test in 2010 and second test in 2013.[33] In March 2017, some Chinese experts indicated the possibility of limited deployment of the BMD system but cautioned that China would have to be careful to constrain expenditures on such a programme.[34] Besides the US, Russia and China, South Korea and Japan also possess BMD systems delivered by the US.[35] India is in talks with Russia for the procurement of S-400 system while developing its indigenous BMD system.[36]

The pursuit to develop BMD systems has altered regional strategic dynamics due to the emerging security dilemmas. The deployment of BMD systems by the US in an effort to protect itself and its allies is destabilising its strategic stability with Russia and China. Such a scenario has compelled Russia and China to respond by building up nuclear forces BMD systems. Chinese balancing act in turn makes India vulnerable and pushes it to build-up its nuclear forces together with its own BMD system which is adversely affecting Pakistan's security. Pakistan would thus need to rebalance the strategic stability by increasing its nuclear warheads. In sum, the action-reaction dynamics associated with the BMD system would likely result in greater instability.

Indian BMD System

With a rationale to defend its territory against ballistic missiles,[37] India is not only developing its own BMD system but also procuring various such systems. However, the major drivers for developing a BMD system are prestige and attainment of great power status. Accordingly, India has modernised its military capabilities, with BMD being one of the many capabilities to enhance India's status.[38]

As India considers the survivability of its nuclear forces in not revealing the exact locations of where its BMD systems are stored, the country prefers area BMD systems rather than a point BMD system.[39] A point BMD system is basically used for the defence of particular places like country's strategic forces, missile silos, or important industrial places while an area BMD system is used for the defence of major cities or the whole country.[40] In 2012, Dr V.K. Saraswat, former Chief for Missile and Strategic System at the DRDO, assessed that India's BMD system would cover an area of 200 sq. km and, therefore, the country's major cities including Mumbai would get the BMD system, once it becomes fully operational.[41]

It is unclear exactly when India began developing its indigenous BMD system as the Indian government did not make a public announcement during the 1990s about its programme. However, according to some Indian media reports, the country started working on its missile defence system in 1996 and gained significant advancement only during the last decade.[42] The Indian BMD system is a two-layered system comprising the Prithvi Air Defence (PAD) for high altitude interception (exo-atmospheric) and Advanced Air Defence (AAD) for low altitude interception (endo-atmospheric). PAD is capable of intercepting target missiles at an altitude of 80-120 kilometres while AAD is designed to carry out interception at an altitude of 20-40 kilometres. Technically PAD is used for midcourse interception and AAD for terminal phase interception.[43] Reports suggest that India's BMD system would be launched in two phases. Phase-I of the BMD system remains focused towards undertaking enemy missiles with a 2,000 km range while the Phase-II would allow interception of missiles within 5,000 km range.[44] This implies that Phase-I is designed for intercepting short and medium-

range ballistic missiles (SRBMs and MRBMs) while Phase -II is designed for intermediate and intercontinental-range ballistic missiles (IRBMs and ICBMs).[45]

The first successful test of the PAD interceptor was conducted in November 2006. In 2007, an AAD interceptor was tested successfully.[46] In 2012, India's Defence Research and Development Organisation (DRDO) announced that its BMD system is now capable of intercepting target missiles successfully. The announcement was made following the tests of all major elements of the BMD system. However, the system has not yet been tested in an assimilated mode, with both inside and outside interceptor missiles together. The DRDO had also claimed that its two-tier missile shield would be deployed by 2014.[47] However, the system is in testing mode until now. India also plans to replace its PAD missile with its newly designed exo-atmospheric interceptor missile named the Prithvi Defence Vehicle (PDV), capable of intercepting its targets at an altitude of 80 to 180 kilometres.[48]

Indian scientists and political leaders claim they have developed all the elements of their BMD system indigenously. However, it is an open secret that India's BMD programme was assisted by numerous foreign suppliers. The leading states were Israel, Russia, and the US. To complete its BMD system, DRDO approached foreign manufacturers for key components including radars and launch control centres.[49] In order to attract foreign suppliers India took a U-turn on its policy on the ABM Treaty, which India had supported initially. India in 2001 endorsed President Bush's extensive NMD programme.[50] This was the beginning of India's strategic partnership with the US. During the Cold War, India was opposed to the development of the BMD systems. The

Indian opposition was rooted in the security concern that the US BMD system would make USSR develop its own BMD system which would ultimately motivate China to respond with the development of its own BMD system. Though India was concerned regarding the demise of the ABM treaty, the Bharatiya Janata Party (BJP)-led government took a policy shift on the development of the BMD system with an aim to forge a strategic partnership with the US. Consequently, the US-India 123 Agreement, signed in 2005, mentions the collaboration in the development of missile defence.[51]

Indian endeavours to develop its BMD system revolved around the acquisition of variants of Russian S-300 system, the Israeli Arrow-2 and the US PAC-3 systems.[52] Since the Arrow-2 system had been jointly developed by the US and Israel and its procurement required an approval from the US, it could not materialise because the US did not approve it until now. Moreover, the sale of the PAC-3 system to India has not materialised until now, following years of its approval by the US in 2005.[53] However, India did manage to acquire a component of Arrow, 2-3 Green Pine radars in early 2000s[54] and acquired three Phalcon Airborne Early Warning Command and Control Systems (AWACS) in 2010.[55] With the acquisition of these two systems, India's surveillance, detection and interception capabilities received a strategic advantage against Pakistani ballistic missiles and aircraft. India is also expecting the delivery of Russian S-400 BMD system by the end of 2017.[56] The agreement for the procurement of five regiments of S-400s was signed between India and Russia in October 2016 during the eighth BRICS summit.[57]

Impact of BMD Systems on Strategic Stability

Generally, a BMD system carries two important aspects; first it gives a sense of protection to an actor who possesses it and second it acts as an alternative to offensive ballistic missiles. However, it also creates a regional security dilemma by endangering the security of other states. Consequently, a BMD system undermines nuclear deterrence among states, influences an arms race and produces a misperceived sense of security which in turn may result in miscalculation during a crisis.[58] Strategic stability amongst nuclear armed states means nuclear deterrence remains effective through balanced military power and the minimal incentive for the initiation of armed conflict.[59] Therefore, India's possession of various BMD systems would affect the three major components of strategic stability; deterrence stability, arms race stability and crisis stability.[60]

The notion of deterrence has three important aspects i.e. capability, credibility and communication. A state deterring another state requires persuading its adversary that it has effective military capability, that it can inflict unacceptable damage, and that it has the will to carry out the threat.[61] Effective deterrence also rests on the condition of mutual vulnerability of states. The fear of mutual assured destruction (MAD) prevents both the adversaries from initiating a war aimed at achieving political goals. One state's ability to inflict destruction on its adversary makes the cost of an attack by the adversary more than its relative gains. It is credibility of such threats which prevents an adversary from initiating a war.[62]

Theoretically, the deployment of a BMD system would not allow a state to prevent an inadvertent escalation of war to a nuclear level. Therefore, if one state initiates a

war and escalates it to a nuclear level, the other state's retaliatory attack or second strike might not carry significance in presence of a missile defence system. It implies that the possessor of a BMD system would remain confident that its defensive system would keep the repercussions associated with a retaliatory attack low. Such a scenario may lead to the actual use of nuclear weapons during a conflict led by an inadvertent escalation. Arguably, the introduction of a BMD system in South Asia would keep India less fearful of an inadvertent escalation and more open towards undertaking military adventurism against Pakistan. There are serious concerns that if India deploys its BMD system in combination with other such systems, the deterrence stability between India and Pakistan may not remain effective.[63]

Besides disturbing nuclear deterrence between two states, a BMD system also affects the arms race stability. Arms race stability is based on the premise that in the absence of incentives, states do not expand their nuclear forces. An Indian BMD system would surely affect Pakistan's nuclear force. It would push the country to alter its nuclear arsenal not only qualitatively but also quantitatively. With an aim to overwhelm the Indian missile defence system, Pakistan would enhance and increase its offensive capabilities. Therefore, deployment of a BMD system would engage both the countries in an unending arms race.[64]

In the presence of a BMD system, brinkmanship becomes a greater possibility. A BMD system affects the crisis stability between two states in such a way that it makes a state more confident during an ongoing crisis. A state with a BMD system would be willing to tolerate the risk of crisis if its defence is sufficient enough to absorb an adversary's retaliatory strike. A sense of minimising

the affects of retaliatory attack would not only further destabilise the crisis stability but also motivate a BMD system possessor to consider a first strike against an adversary.[65] For example, a BMD possessor state might think that its pre-emptive strike would substantially destroy adversary's offensive force and that its BMD system would enable it to absorb the adversary's retaliation, thus leaving it in a better position. This means that both pre-emption and BMD systems act as reinforcement to each other. Thus, it can be said that anything that intensifies the possibility of a pre-emptive strike is dangerous for crisis stability.[66]

In South Asia, the introduction of BMD system is destabilising for strategic stability. The BMD system would encourage both India and Pakistan to conduct pre-emptive strikes. India's BMD system might tempt the country to carry out a pre-emptive strike against Pakistan during a crisis. It is because the country's missile defence systems would act as an incentive to pre-empt in a time of crisis.[67] Such a situation would undermine the deterrence stability in South Asia and would force Pakistan to reconsider its deterrence policy.[68] Pakistan may change its nuclear posture by mating its nuclear weapons with delivery systems. The country may also put its nuclear forces on a hair-trigger alert, moving from recessed deterrence to an active deterrence posture.[69] To cope with the situation, Pakistan's National Command Authority (NCA) may delegate power to junior commanders for using nuclear weapons in order to guard its nuclear weapons by using them rather than losing them in an Indian pre-emptive strike. The decentralisation of command and control would surely prove to be catastrophic for the region.[70] Hence, an Indian BMD system would not only risk crisis stability but also undermine strategic stability in the region. Indian nuclear experts also endorse the possibility of

India's temptation for pre-emptive strike in an intense crisis because an effective BMD system provides the country assurance of having sufficient survivable nuclear forces that could be used as a second strike. They believe that crisis instability would create first strike incentives for Pakistan as well. It is because crisis instability lowers nuclear thresholds which enhance risks of pre-emption.[71]

Keeping in view the BMD system's impact on arms race stability, the deployment of the Indian BMD systems would also undermine the prospects of already neglected strategic restraint regime in South Asia. Pakistan has repeatedly suggested to India to apply strategic restraint regime in South Asia and for concluding regional arms control agreements which India has not considered yet.[72] The deployment of the BMD system would not only hamper the materialisation of regional arms control agreements in South Asia but also prevent both the states from ratifying various international disarmament agreements like Comprehensive Nuclear Test-Ban Treaty (CTBT), and from concluding negotiations on Fissile Material Cut-off Treaty (FMCT). Therefore, it can be said that BMD systems are detrimental to nuclear non-proliferation regime as well.

Pakistan and the Search for Strategic Stability

Currently, the nuclear policies of both India and Pakistan are guided by the principle of mutual assured destruction since both states have sufficient strategic forces. Though Indian conventional military power outweighs Pakistan,[73] the latter's nuclear posture of full spectrum deterrence plugs the gap at the conventional level.[74] If any of the states consider a first strike, it would definitely consider its retaliatory cost because both countries have diverse ranges of ballistic and cruise missiles capable of targeting each others' territory.

Pakistan with its nuclear force is capable of inflicting sufficient destruction on the Indian territory. However, if India deploys its BMD systems, it would hamper Pakistan's assured penetration capability of ballistic missiles. Such a defensive shield would give India a sense of security from Pakistan's retaliation and, thus, it would badly affect strategic stability.[75] In such a situation, Pakistan would consider multiple avenues for maintaining its strategic stability vis-à-vis India. The country could either consider developing or procuring its own BMD system or further build-up of its offensive strike weapons in order to overwhelm Indian defences and reassure its ballistic missile penetration capabilities.

Currently from a financial point of view, the prospects of developing or procuring a BMD system is considerably dim for Pakistan. Technically, Pakistan can develop a point BMD system with the help of its short-and medium-range ballistic missiles. However, a point BMD system would not help Pakistan in countering Indian ballistic missiles since the country has a vast array of missiles with short to intercontinental range. For a considerable area defence, Pakistan would require to develop an area or strategic BMD system. However, such a system would put a strain on Pakistan's economy.[76] It is because only the developmental cost of a theatre BMD system remains at $2 to $10 billion[77] while Pakistan's total defence budget for the fiscal year 2017-2018 is $8 billion. Therefore, developing a BMD system would not be in Pakistan's interest.[78] Similarly, the exorbitant cost of procuring a BMD system would not allow Pakistan to buy it from any other country. The official stance of the country regarding the development or procurement its own BMD system is still unclear. However, even if Pakistan opts to develop or procure a BMD system, it would be detrimental to the strategic

stability in the region with its negative impact on nuclear deterrence and arms race stability.[79]

Apart from developing a BMD system, the more feasible way to counter Indian BMD system would be enhancing Pakistan's nuclear and missile forces both quantitatively and qualitatively. Pakistan may opt for an increase in the number of its nuclear warheads and ballistic and cruise missiles. The country already has ballistic and cruise missiles of multiple ranges.[80] With the successful test of nuclear-capable submarine-launched cruise missile (SLCM) Babur-III in January 2017, Pakistan achieved its second strike capability.[81] Pakistan's Inter-Services Public Relations (ISPR) said that Babur-III is capable of evading hostile radars and air defences, in addition to other stealth technologies.[82] In order to further augment its strike capabilities, the country also conducted the first test of its Ababeel surface-to-surface ballistic missile. With a strike range of 2200 kilometres, the missile is capable of delivering multiple warheads using MIRV technology.[83] According to the ISPR, "The development of the Ababeel weapon system was aimed at ensuring survivability of Pakistan's ballistic missiles in the growing regional Ballistic Missile Defence (BMD) environment."[84] The sea-based cruise missiles together with MIRV capable ballistic missiles give Pakistan a considerable penetration power. In order to overwhelm Indian BMD systems Pakistan may consider increasing the number of such missiles in its arsenal which would be cost-effective for the country as well.

Pakistan can also consider qualitative technologies for further improving and assuring its penetration capabilities. For example, stealth technologies like skin cooling in order to prevent heat detectors from detecting heat emerging from missile.[85] Another option is to use decoys along with warheads in ballistic missiles aimed at

confusing the BMD system in recognising the actual warhead. With the application of manoeuvrable re-entry vehicles or warheads (MaRVs)[86], a BMD system can miss the missile trajectory thus it could fail in intercepting it.[87]

Conclusion

India's progress in the development of its BMD system and country's cooperation with the US, Israel and Russia are creating uneasiness in Pakistan. The introduction of an Indian BMD system in South Asia is a destabilising factor for the regional strategic stability as it erodes Pakistan's nuclear deterrence. The notion of nuclear deterrence rests on mutual vulnerabilities of states.

An Indian BMD system actually minimises the country's vulnerability against Pakistan's nuclear force. Consequently, it would give India a sense of security and in turn reduce Pakistan's credibility of nuclear deterrent. The invulnerability would make Indian military less fearful of inadvertent escalation, hence, prompting military adventures against Pakistan. Furthermore, Indian invulnerability may lead it to a pre-emptive strike against Pakistan in an intense crisis situation. An Indian BMD system would also instigate an arms race between India and Pakistan. To counter India and maintain the strategic stability, Pakistan may consider its nuclear force insufficient to tackle the Indian threat. Consequently, Pakistan would consider both qualitative and quantitative improvements in its nuclear weapons and delivery systems. In order to maintain the strategic stability, Pakistan would also need to opt its choices wisely to avoid a spiral of unending arms race and economic strains.

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Decoys are deceptive devices like iron bolts or shafts used to counter a BMD system. The ICBMS or IRBMs can carry decoys that serve as dummy warheads. During the terminal phase of the missile launch these decoys separate from the missile at the same time as the real warhead.

These decoys confuse radars of the BMD system in recognising the real warhead.

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