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Article:	**Pakistan's Nuclear Program: Transformation from Credible Minimum Deterrence to Full Spectrum Deterrence**
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Abstract

This research paper is based on the concepts related to Pakistan's nuclear program and nuclear posture adopted by it in the start. This starts from the concept of Credible Minimum Deterrence, which was adopted by Pakistan after becoming nuclear power. At that time Pakistan's economic condition and strategic interests only allowed Pakistan to go for war denying deterrence to balance the threat caused by India's conventional superiority over Pakistan. It required a minimum number of weapons to deter. Later on with the technological developments in Indian nuclear program, changes on regional level, Indian civil military deals with USA and introduction of Cold Start Doctrine compelled Pakistan to go for technological improvements in its nuclear missile program and change in its nuclear posture. Furthermore, it is explained in the paper that Pakistan has now decided to go for Full Spectrum Deterrence (FSD) to respond Indian Cold Start Doctrine. Full Spectrum Deterrence is to make sure that there are no gaps left in Pakistan's deterrence capability. The objective of this paper is to understand the concepts related to Pakistan's evolving nuclear posture and the challenges faced by FSD in present.

Keywords: Cold Start Doctrine, Credible Minimum Deterrence, Full Spectrum Deterrence, Tactical Nuclear Weapons, National Command Authority.

1. Introduction:

Security is the foremost aspect necessary for the survival of any state, especially if there is rivalry among the states. South Asian region holds the same dynamics where India and Pakistan have their rivalry since their independence in 1947. Both the states have continued to strengthen themselves in terms of security. India and Pakistan became nuclear powers in 1974 and 1998 respectively. Pakistan's earlier nuclear posture was based on Credible Minimum Deterrence (Ahmed, Hashmi & Kausar, 2019). The country had two specific choices about its nuclear deterrence;

a) The way to deny deterrence.

b) The nuclear war to fight deterrence.

The first option required a minimum number of weapons to deter India in the region due to the trust deficit (Salik, 2009), whereas for the second option, Pakistan had to maintain a large nuclePar arsenal, preserve multilateral variety of delivery means and an updated missile defense program. At that time, Pakistan's economic condition and strategic interests only allowed Pakistan to go for war denying deterrence to balance the threat caused by India's conventional superiority over Pakistan. Later on with the technological developments in Indian nuclear program and changes in the strategic environment, Indian civil military deal with USA and introduction of Cold Start Doctrine compelled Pakistan to go for technological improvements in its nuclear missile program and modify its nuclear posture. Pakistan has now decided to go for Full Spectrum Deterrence while responding to India's new strategy known as Cold Start Doctrine and Pro Active Operations (PAO) in order to open diverse range of options for its decision makers. Full Spectrum Deterrence is to ensure the fact that there are no gaps left in Pakistan's deterrence capability. This research paper will basically analyze the question related

to rationale behind FSD and the challenges faced by Pakistan in the terms of economic and technological capability for this transformation in nuclear posture.

2. Pakistan's Nuclear Program

Pakistan always needed to maintain its security and strategic stability in the region as well as to maintain the regional balance of power and therefore when India tested its nuclear weapons again in 1998, to ensure the survival and keep the security up to date, Pakistan also tested its nuclear weapons on May 28th, 1998 celebrated as Youm-e-Takbeer in Pakistan. After nuclearization, Pakistan decided to go for the "Strategic Restraint Regime" along with India (Khan, Khan, & Hyder, 2018). The proposed regime consisted of three basic points:

1. Balanced Conventional forces.
2. Nuclear restraint.
3. Resolution of disputes.

India had always opposed the regime while subsequently trying to suppress Pakistan. India also deployed its armored formations on the border adjacent to Pakistani territory in addition to its offensive doctrine named as Cold Start, which is also against Pakistan and poses threat South Asian region serious enough to concern international community for peace and stability of the region. In response to Indian maneuvers, Pakistan initiated to develop low-yield nuclear weapons (Akhtar, 2016).

3. Pakistan's Nuclear Posture:

Pakistan has not yet acknowledged its nuclear policy since its nuclearization, though it is assumed that Pakistan may exploit nuclear first use option so to deter both nuclear and non-nuclear attacks from its opponents. Pakistan's nuclear doctrine is to tackle the conventional asymmetry and threats from India to its national security as well as to maintain strategic stability

of South Asia. The major attributes of Pakistan's nuclear doctrine as generally discussed are as follows:

1. Credible Minimum Deterrence.
2. Nuclear First Use Posture.
3. Reliable Command, Control, Communication, Computerization and Intelligence Network.
4. Massive Retaliation.

Though it is a fact that Nuclear Weapons will be used as the last option, specifically when it will be a matter of Pakistan's survival and its territorial integrity Pakistan may opt for nuclear first use policy because of conventional dominance of India. Pakistan has set the limit of invoking a nuclear strike against India if India crosses four areas called as the red lines by Pakistan. These policies were announced by the former Director General SPD. Pakistan will use nuclear weapons in case of space threshold, military threshold, internal stability threshold and economic threshold.

5. Credible Minimum Deterrence:

Pakistan had various options for deterrence after becoming nuclear power state in 1998. In order to understand why Pakistan went for Credible Minimum Deterrence, we need to understand the options which were available at that time. The options were as follows;

1. Assured Destruction. This option was very costly and at that time Pakistan was economically weak state that is why Pakistan simply did not adopt this strategy.
2. Limited deterrence, again because of poor economic conditions and no advancement in technology.
3. Virtual Deterrence.
4. Opaque deterrence (Khan, 2016 & Abdullah 2018).

Pakistan opted for the policy of Credible Minimum Deterrence because at that time Pakistan's economic condition and strategic interests only allowed Pakistan to go for war denying deterrence to balance the threat caused by the India's conventional superiority over Pakistan (Ali, 2017). Before the introduction of Full Spectrum Deterrence (FSD), Pakistan's nuclear policy revolved around the concept of Credible Minimum Deterrence. The notion of "minimum" was implemented by Pakistan even before its nuclear tests in 1998. Pakistan's former Chief of Army Staff, General Aslam Beg, also said in an interview in September, 1992 that "In the case of Weapons of Mass Destruction (WMD), it is not the number that matters, but the destruction that can be caused by even a few". The logic behind this concept was that if few could deter then why to go for more. Pakistan had decided to adopt a policy of Credible Minimum Deterrence for following reasons:

1. Pakistani defense establishment was of the view that minimum number of weapons may possibly be enough to deter India in the region.
2. Pakistan had not joined NPT nor had it expressed its intentions to join it, hence the country was facing pressure from international community to have minimum number of weapons.
3. The minimum number of weapons will be easy to handle with regard to command and control.
4. Minimum was cost effective as greater number of weapons would require bigger budget and stronger industrial base, so minimum was affordable for a developing country like Pakistan. Pakistani leaders had also indicated that the policy of CMD is flexible and it may be altered according to the evolving strategic environment (Malik, 2019).

5. Pakistan's Evolving Nuclear Posture: Full Spectrum Deterrence:

Full Spectrum Deterrence initiated during the Cold War, between USA and Soviet Union (USSR). Both nations were enhancing their deterrence capabilities, which included full spectrum of targeting through a Single Integrated Operational Plan (SIOP). Pakistan's transformation in its nuclear posture from subsumes Credible Minimum Deterrence to Full Spectrum Deterrence occurred due to India being its neighbour as well as the ever changing strategic environment of South Asian region (Malik, 2019).

Nuclear posture of Full Spectrum Deterrence was approved by National Command Authority (NCA), on September 5, 2013. It was first mentioned by ISPR in a press release that "Pakistan would maintain a Full Spectrum Deterrence capability to deter all forms of aggression." General (R) Khalid Kidwai, who lead Pakistan's Strategic Plans Division (SPD is a Pakistan's agency responsible for protection of Pakistan's nuclear and strategic assets) for 15 years, also mentioned Full Spectrum Deterrence at International Nuclear Policy Conference held at Carnegie in 2015. Pakistan's approach as a nuclear state has experienced a substantial change. The policy of FSD will cover all the threats including, the threat of a conventional attack and threat of the first use of nuclear weapons. After Pakistan conducted its nuclear tests, the country had adopted the policy of Credible Minimum Deterrence. The primary focus of this policy was to keep the size of the nuclear arsenal small quantitatively. Pakistan's former scientists were of the view that 60–70 nuclear warheads would be enough for the country to counter India (Biswas, 2017). However, after the introduction of FSD, Pakistan has delivered a clear message to India that Pakistan will uphold the capability for a FSD at all costs in order to deter India. Pakistan became a nuclear state not by choice but because of the increasing conventional asymmetry with India. Pakistan had chosen to attain the policy of CMD. It meant that Pakistan will use its nuclear

capability only when the enemy goes beyond Pakistan Nuclear Threshold. Now because of Cold Start Doctrine (CSD) of India, Pakistan is shifting towards FSD. According to India, Pakistan would not use nuclear weapons against India's limited invasion, by starting a conventional conflict. Pakistani decision makers had arguments over the fact that Pakistan's current arsenals operates only at the strategic level. So there was a need to fill the gap at tactical level to encounter such threats without fear of nuclear escalation. Because of these reasons it was not possible for Pakistan to continue its nuclear posture of CMD. To encounter the CSD, Pakistan developed Tactical Nuclear Weapon (TNW) NASR, which is a low yield, sort range nuclear weapon to be used in battlefield. It is a qualitative response to Cold Start and Pro Active Operations (PAO), introduced by India. FSD is a defensive response to India's offensive CSD. Full spectrum offers a range of options to the decision-makers by effectively changing Pakistan's Nuclear Policy in the form of employing nuclear deterrence against conventional attack (Lyon, 2013).

6. Rationale for Full Spectrum Deterrence:

As if to know that nuclear powers always try to maintain strategic stability against their adversary by keeping balance in their armaments and employment strategies (Colby, 2013). In case of India and Pakistan, India introduced Cold Start Doctrine and on the other hand Plaits adopted the policy of Full Spectrum Deterrence. There are some reasons that Pakistan transformed its nuclear posture from "CSD" to "FSD", which is a response to India's complete spectrum of threat. Basically Pakistan needed "limited nuclear options to fill the gap between doing too much, like nuclear war, to doing too little like vulnerable to enemy's attack", they maintain. FSD, it is said that, fulfills this very purpose for Pakistan. FSD's aim is to fill the gap created by the conventional superiority of India in military terms (Waseem & Khan, 2015). India

has policy of No First Use but all the steps taken by India like CSD, Pro Active Strategy, Civil Nuclear military deals with USA, have otherwise effects on the strategic and security environment of the region as well as on Indian Ocean and therefore pointing towards India's offensive moves and strategies, which compelled Pakistan to finally transform its nuclear posture having maximum credibility.

Since long time, India was finding space for conventional war because of the absence of a complete spectrum of deterrence. That is why Pakistani nuclear establishment called for Full Spectrum Deterrence. For this purpose, Pakistan went for advancement in its nuclear program by introducing low yield, short range, battlefield Tactical Nuclear Weapon called as NASR, to be used at tactical level. Another reason due to which Pakistan has gone for FSD is the security and strategic balance of the region which is disturbed.

7. Cold Start Doctrine:

After the failure of Sunderji Doctrine, Cold Start Doctrine was given by India in April 2004, to fill the gaps in Sunderji Doctrine. The doctrine consists of a limited war approach that aims to invade Pakistani terrain expeditiously and with a short of risk or invoking any conflict between nuclear rivals. It is an attempt to cause maximum harm before the demand of ceasefire by international powers. It would also be designed to avoid giving Pakistan any justification for eliciting a response that requires involving nuclear ability. It is also known as the Pro Active Strategy. Despite having military inferiority, Pakistan has been accused of asymmetrical conflicts against India. Indian military forces remained frustrated and enraged during the crises and conflicts between the time periods of 2000-2008 they were not able or willing to invade Pakistani territory. To give a lesson to Pakistan, India has developed a military doctrine named as "Cold Start", which replaced outdated Sunderji Doctrine. Indian Doctrine of Cold Start which

lacks any backing from Indian leaders that may be called as non-combatant leaders, has chances to threaten strategic stability in South Asia. India is now more poised about winning the conflict against Pakistan. India is confident about the fact that by using CSD or Pro Active strategy, it would be a piece of cake for India to capture Pakistani territory to bring Pakistan's government on the negotiation table for bargaining. Thus in this way India aims to meet it military and political objectives to the extent to justify its stance against Pakistan. In response to it, the conventionally smaller Pakistan, which seems to be customarily contingent on its nuclear capability aimed at aggression, will think of utilizing the benefits of first strike (Khan, 2012).

The idea of Cold Start has been driven first during operation Parakaram, which was propelled as after the terrorist strikes on Indian Parliament in December 2001. The operations had uncovered some main flaws in the India's offensive strategy including weak mobilization of troops towards the border in case of emergency response. After the attack, Indian strike corps took almost a month to reach the border. This flaw had given Pakistan advantage and enough time to take counter measures, and for USA to pressurize Indian military to back off. Now CSD is a step by India to correct those flaws. According to CSD India will keep following a strategy to hold corps on call to be alert to plan attack in response and in a position to reach the main perimeter area. The doctrine contemplates moving up to eight independent battle groups with their own armored and mechanized brigades near the forward positions instead of depending on strike corps that are based deep in heart of the nation. India has an advantage that Pakistan has deficiencies of geographical depth and that has put Pakistan to a vulnerable position to be attacked from conventionally superior India. The arms race and introduction of such doctrines will destabilize the strategic environment of South Asia and will take the states more towards nuclear confrontation.

8. Steps Taken for Full Spectrum Deterrence:

To fulfill the requirements to cover the full spectrum Pakistan is working continuously to increase the number of nuclear weapons and warheads. It also has made technological improvement in its nuclear technology as estimated and predicted by United States Defense Intelligence Agency in 1999 (Kristensen & Norris, 2016).

9. Tactical Nuclear Weapons: Nuclear-Capable, Short-Range Missile Systems:

To counter the stability-instability paradox in South Asia, emergence of the Indian CSD, the strategy of PAO, and the chances of Two Front War, Pakistan transformed its nuclear posture from CSD to FSD (Abbasi, 2015). Pakistan is taking steps to counter all the threats posed by the adversary, which is India. In this regard the development of TNWs is the first step towards attainment of FSD. Basically a TNW is a non-strategic weapon which is generally smaller in size and explosive power (Kristensen & Korda, 2019). According to some Pakistani strategists, the development of TNWs has worked in creating a strategic balance as it communicates the threat of usage of "less in destruction" nuclear weapons on Indian forces invading Pakistan. It will also work effectively to deter India to move on further towards full scale war. As of its practicality it is worth to be noted that these weapons are really going to serve Pakistan's main interests in terms of their efficacy (Barry, 2018). It is known that Pakistan has never announced its nuclear doctrine, whatever is known comes from the press releases by ISPR, which is a media wing of Pakistan military, National Command Authority and the Strategic Plan Division. Pakistan did the successful testing of its tactical nukes in 2011, which was nuclear capable ballistic missile NASR with a range of 60km and later on RAAD, which has a range of 350 km. Later on, with the approval of FSD posture, Pakistan called NASR as the TNW and inducted it to fill the category of tactical weapons out of all three categories of full spectrum of nuclear weapons (Biswas,

2017). This short range nuclear weapon has the capability to counter the threats below the strategic level in case Indian conventional forces invade into Pakistani territory. This development by Pakistan has put many states in a deep concern in general and United States of America in particular (Kristensen & Norris, 2016).

According to ISPR press release, Pakistan developed TNWs because of following reasons;

1. Introducing the Nasr was a direct response to India's CSD, which seeks to take advantage of gaps in Pakistan's former nuclear posture.
2. Usage of TNWs would have strategic impacts.
3. Pakistan's FSD is a strategy to deter limited conventional war below Pakistan's existing thresholds for nuclear use.
4. Pakistan will control TNWs just like other strategic nuclear forces, maintaining centralized command and control at all times under the NCA.
5. Pakistan's NASR missiles "will not be deployed to forward positions, nor will use be delegated to field commanders" (Ahmed, 2016).

Though short range missiles are developed to encounter CSD by India, it is said that the development of NASR and RAAD has replaced the older missiles with latest technology having modern delivery systems. Both of these missiles are significant in terms of carrying nuclear weapons, ideal to counter Indian Cold Start forces and to deter and keep the Cold Start "cold." These short range weapons could be deployed as a first use option in battlefield against the conventional forces of India used in the PAO by deterring the emerging threat. It means that Pakistan now is capable to encounter conventional attack by using both its strategic and tactical nuclear weapons. These tactical weapons would be used to deter those battle groups which have their own armored and mechanized brigades contemplated in India's CSD (Khan, 2012).

The onset of TNWs has invoked the action reaction process practiced in this region. As both states will react quickly and will begin arms race in conventional as well as nuclear weapons. On one hand Indian security architects have warned Pakistan for a possible use of TNWs and its impacts on South Asian region. Pakistani security engineers as on the contrary, have justified the development of TNWs against India's war fighting posture which is CSD and PAO to balance out strategic environ of South Asia. However, some states concerned with CSD and TNWs are also accusing India and Pakistan for developing aggressive and war fighting designs of strategies which may escalate the conflicts and can create deterrence instability. The deployment of TNWs at a shared border can escalate the conflict and the weaker states could lose control of nuclear escalation (Khan, 2012).

10. Challenges to Full Spectrum Deterrence:

As Pakistan has adopted the policy of FSD, it will also have to face some challenges in present and in near future.

A) Economic Capability of Pakistan:

It is believed that a large budget is required to meet the expenses for the advancements in nuclear technology. Pakistan is a developing country facing some major economic problems but the dedication to attain huge amount of FSD has raised some serious question. Khalid Kidwai gave a satisfactory answer about this question in a conversation with a former high ranking U.S. security official and scholar Peter Lavoy narrating the validity, misconception and calculations related to the issue based on the irresponsible reporting as well (Lavoy, 2015). It is also important to note that Pakistan's nuclear program is the extension or a part of the overall defense posture and therefore probably 3 or 3.5% of the GDP overall is dedicated to it. He reemphasized

the importance of maintaining the strategic balance with a nuclear opponent at its eastern neighbor.

B) Technological Advancements for Full Spectrum Deterrence:

Pakistan has a plan to go further in the development of FSD posture but it is not very clear that to what extent Pakistan will achieve technological advancement in this respect. There comes a question that Is Pakistan technologically advances enough to peruse posture of FSD? Hans M. Kristensen & Robert S. Norris wrote in a report *Pakistani nuclear forces, 2016* that in terms of fissile material, Pakistan's fissile material production setup in Kahuta and Gadwal is reputable and it will expand more. Pakistan has also constructed four production reactors at Khushab, having a capacity to produce 25 to 50 kg of plutonium per year, which is four times India's plutonium production rate. The National Defense Complex is responsible for the expansion and construction of nuclear capable missiles. Pakistan Ordinance Factories (POF) in Wah serves the role for production of warheads. After the 2013 test, it was stated by ISPR that Abdali "carries nuclear as well as conventional warheads" and "provides an operational level capability to Pakistan's Strategic Forces."

Pakistan has also developed RAAD that have "stealth capabilities" and "pinpoint accuracy," and is described as "a low altitude, terrain hugging missile with high maneuverability". Same is the case with Babur (Kristensen & Norris, 2016). Authorities in Islamabad are of the view that RAAD can deliver nuclear and conventional warheads convincingly up to 350 km with accuracy, and "complementing Pakistan's deterrence capability" attaining "strategic standoff capability on land and at sea" (Jaspal, 2018)..

Regarding fissile material for nuclear devices it can be said that in comparison to India, Pakistan is in about one to four ratio (Biswas, 2017).

C) Tactical Nuclear Weapons:

While taking about the two South Asian adversaries, the value and usage of TNWs often comes into question. If to talk about Pakistani territories, the city of Lahore, Bahawalpur, Garh, Kasur, Sialkot, and Shakar are within 25km. It is said that the presence of nuclear weapons in these short distance areas would be dangerous for India and Pakistan. According to a research in 1971, it was concluded that "Once the nuclear thresholds were crossed, both sides would be under pressure to use their nuclear weapons quickly before they were destroyed." The deployment of TNWs is also an issue regarding communication, command, and control. The deployment of nuclear weapons in South Asia invokes the risk of conflict escalation between India and Pakistan and it does not assure the deterrence stability (Khan, 2012). India is also taking the development of NASR as a challenge to take arms control initiative through bilateral agreement with Pakistan or unilaterally, by banning short range nuclear missile development, hence to weaken Pakistan's posture of FSD (O'Donnell, 2017).

In order to tackle with Pakistan's TNWs, India would take high measures of its intelligence, reconnaissance along with inspection and exploration to find NASR missiles, nuclear warheads and also command and control systems. If found, India would apply airpower, ballistic missiles, long range artillery, attack helicopters, air assault forces and Special Forces in full power for incursion (Jaspal, 2018). India can also readjust its military maneuvers and plans so as to hostage Pakistan's short range, low yield NASR.

11. Indian Shift in Nuclear Technology Developments: Threats to Pakistan:

India has also taken some moves in response to Pakistan's evolving posture of Full Spectrum Deterrence as it has decided to revise the nuclear force posture of most powerful state of the region (Narang, 2018). India signed several civil nuclear military deals with USA and received

NSG special waiver in reference to nuclear assistance creating strategic implications for the region. As a result of all these circumstances, Pakistan has also demanded an equal footing to maintain the strategic balance in South Asia (Khan, 2012).

12. Justification of FSD before International Community

In last 10 years, USA has shown concerns over the security measures taken for nuclear weapons particulate for TNWs in Pakistan. In 2007 USA was quite confident about the safeguards for the nuclear weapons. But later on in 2016's assessment, USA became worried and indicated its reservations about the disposition of TNW or non-strategic nuclear weapons from Pakistan. According to USA, TNWs are more vulnerable to the exposure as they are being taken to the battlefield to the field where they cannot be made as secure. To tackle this situation, National Command Authority in Islamabad had a thorough examination of the "security and safety mechanism" in order to ensure there are no red flags. The nuclear arsenals of Pakistan are in safe hands and their security status is exhibiting "deep satisfaction" under the prevailing safety measures of installations relevant to weaponries in Pakistan. Additionally, it is also being assured with "full confidence" that the expertise and the regulatory mechanism in charge of the nuclear weapon system maintained high levels of procedures throughout the whole process. Satellite images also show that to handle the security threats from terrorists, security measures have also been improved and maintained to avoid any risks. This basic principle of fool proof security has been applied to nuclear and military facilities alike during the last decade. Samar Mubarak Mund representing the National Defense Complex as the Director explained has been of the view that "a Pakistani nuclear warhead is assembled only at the eleventh hour if it needs to be launched. It is stored in three to four different parts at three to four different locations. If a nuclear weapon

doesn't need to be launched, then it is never available in assembled form" (Kristensen & Norris, 2016).

13. Conclusion

It can be concluded that, Pakistan will continue to make appropriate choices with reference to its nuclear program that will safeguard its self-interest. Pakistan has evolved its nuclear posture and has attained the policy of Full Spectrum Deterrence to encounter all forms of threats from India at all levels including strategic, operational and tactical. It has reduced its dependence on super powers and has developed its own tactical nuclear weapons. India introduced Pro Active Strategy in the form of Cold Start Doctrine and in response to this doctrine; Pakistan transformed its nuclear posture from Credible Minimum Deterrence to Full Spectrum Deterrence. Pakistan also developed Tactical Nuclear Weapons to tackle India's superiority. To cover all the aspects of Full Spectrum Deterrence, Pakistan is improving its nuclear technology. Pakistan is also making sure the practicality of Second Strike Capability by introducing sub marine launched nuclear cruise missile Babur III. Pakistan has shown full confidence in command & control and security measures taken for the security of its strategic assets and materials. In response to FSD, India is also thinking to revise its nuclear posture in order to encounter the threats posed by FSD. Though Pakistan is a developing state but for the security planners, its survival is more important.

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