EVOLUTION OF PAKISTAN'S NUCLEAR PROGRAMME: DEBATES IN DECISION-MAKING

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Nuclear decision-making in Pakistan is a complex field of inquiry. Since the 2008 general election, resignation and exile of president Pervez Musharraf, the political elite in the country have been locked in a serious contest to ensure primacy of the parliament. The 18th constitutional amendment has augmented the constitutional powers of the prime minister. Simultaneously, after the general election; the armed forces are again dedicated to the role laid down for them in the Constitution.(1) Indeed, aside from other things, these happenings in the national politics have had a direct impact on nuclear decision-making in the country. The composition of the National Command Authority reflects the pluralist approach to the current nuclear decision-making in Pakistan.

Pakistan has not specifically announced its nuclear doctrine to date, though a few important aspects of its nuclear doctrine are well known, and are more or less incontrovertible. Many features, however, are open to debate, and a few of them have attracted inordinate attention in the domestic and external strategic discourse. Indeed, the gradual transformation of both the political system and political culture is conducive to the critical examination of nuclear decision-making in Pakistan. President Asif Ali Zardari's statement on the use of nuclear weapons in a war theatre in his video address to the Hindustan Times Leadership Summit, broadcast live for the conclave in New Delhi on 22 November 2008, did not receive an affirmative response from the nuclear deterrence optimists in the country. President Zardari stated: "I don't feel

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threatened by India and India shouldn't feel threatened by us."[2] While maintaining that he did not believe in use of nuclear weapons, he stated: "We will most certainly not use it first. I don't agree...to nuclear weapons. I hope we never get to that position."[3] President Zardari's statement on "no first-use" of nuclear weapons marked a shift in the county's nuclear posture,[4] but it lost force due to New Delhi's mammoth investment in both conventional and nuclear weapons systems.

The "no-threat-from-India" and "no-first-use" statements had surprised the strategic community in Pakistan. It was a deviation from the existing Pakistani nuclear posture, which is premised on the "first-use" option. It has always been maintained that Pakistan's nuclear weapons are India-specific.[5] Hence, they would deter aggression, whether conventional or nuclear.[6] In simple terms, Islamabad rejected the "no first-use" idea because its defence policy is hinged on the prospect of use of nuclear weapons to deter New Delhi from exploiting its conventional superiority against Pakistan.[7]

The Mumbai terrorist attacks in November 2008, and the Indian ruling elite's bellicose reaction, though marked by pragmatic restraint, had once again restated the nuclear optimists' manifest rationale about the nuclear weapons capability of Pakistan. New Delhi's military build-up, coupled with its belligerent attitude towards Islamabad, sustains an alarming variable in the strategic calculation of Pakistan, which had deterministic impact on the security perceptions of both the ruling elites and the masses. Significantly, the public in Pakistan is very much India-cum-nuclear sensitive, and is convinced that without credible nuclear deterrence Pakistan will be vulnerable to Indian aggression.[8] It very closely monitors what is happening in the nuclear realm.[9] Therefore, neither the previous military regime nor the present elected government has ignored this sensitivity of the common man. The nuclear decision-makers in Islamabad have thus always remained conscious of this sensitivity, which pressurizes them to pursue policies that augment nuclear deterrence vis-à-vis India.

This study is divided into two major sections. The first deals with the conceptual framework. It highlights the influences and strategic thinking in Pakistan. It is followed by a discussion on the evolution of nuclear decision-making in Pakistan. This part is divided into numerous sub-sections, which reveals both individual and institutional predominance in nuclear decision-making during the different evolutionary phases of Pakistan's nuclear programme. The third section deals with the assessment regarding the role of political and military elite in the nuclear decision-making in Pakistan.

Conceptual framework

The events and issues which have a bearing on the subject of nuclear decision-making in Pakistan can only be interpreted and understood with reference to a conceptual framework. It is so because strategies and policies are formulated by human beings on the basis of how they understand the

implications of nuclear weapons; and different people can, and do, disagree as to the best strategy or policy that needs to be pursued.[10] Therefore, one has to explain and resolve the issue by using or mixing different theories and levels of decision-making, at least at the conceptual level. In this context, the writings of Western theorists such as Machiavelli, E. H. Carr, Hans J. Morgenthau, Reinhold Niebuhr, Kenneth Waltz, and the speeches/writings of a few Pakistani heads of state/government such as Zulfikar Ali Bhutto, Zia-ul-Haq, Nawaz Sharif, Pervez Musharraf, assist us in understanding the mindset of the decision-makers in Pakistan, while the writings of Bernard Brodie, Lawrence Freedman, Sir Michael Quinlan, Peter Lavoy, Scot D. Sagan, Rifaat Hussain, Zafar Iqbal Cheema, Feroz Hassan Khan, and Naeem A. Salik assist us in analyzing the officially stated 'minimum deterrence' policy of Pakistan.[11] In addition, this literature reveals that Pakistan's strategic elite is greatly influenced by the realist's theoretical tradition. The realist paradigm was a guiding principle for nuclear decision-makers in Pakistan due to their understanding of security in traditional military-political realm. In simple words, for the strategic enclave in Pakistan security was/is the survival of the state. It was when an issue was presented as posing an existential threat to a designated referent object — traditionally, though not necessarily, the state, incorporating government, territory, and society.[12] More precisely, the decision-makers in Pakistan have been preoccupied with military security, and for them the need to develop, procure, deploy, engage or withdraw military forces remains a primary objective for ensuring sovereign survival of the country. Barry Buzan has opined: "Generally speaking, the military security concerns the two-level interplay of the armed offensive and defensive capabilities of states, and states' perceptions of each other's intentions."[13] You may have splendid moral goals, argued Machiavelli, but without sufficient power and the willingness to use it, you will accomplish nothing.[14] Therefore, power, rather than morality, is the decisive factor. This understanding of security has been legitimized by the continuity of belligerent strategic relations between India and Pakistan.

The 1971 tragedy always reminds the decision-makers in Pakistan that the balance of power or terror, instead of international alliances or idealistic approach towards the regional security, is a guarantee of its sovereign defence. Zulfikar Ali Bhutto's pro-nuclear posture was motivated by hostility towards India and his belief in the deterrent value of nuclear weapons.[15] Pervez Musharraf argued: "Surely, any state whose chief rival has the bomb would want to do what we did. After all, we knew we could not count on Americans alone."[16] The India-Pakistan strategic relations in the last two decades have further helped strengthen Pakistanis' resolve to maintain their nuclear posture. They believe that the preservation of nuclear power is a natural drive, which could only be neglected at great peril.

The debate for the sake of making a nuclear strategy in Pakistan remained focused on deterring all-out war between India and Pakistan. Bernard Brodie has argued that one cannot fight a war with nuclear weapons, as their sole purpose must be to deter such a war from breaking out. Many Pakistani

strategic analysts share the same understanding about their country's possession of nuclear weapons. Zafar Cheema has pointed out: "Pakistan's security policy entails a posture of credible minimum deterrence which is incrementally in place since the country's overt nuclearization in May 1998."[17] A review of literature produced by most Pakistani strategic analysts on the subject of Pakistan's nuclear capability underscores that they were not arguing in favour of preparing to fight a nuclear war, or the possibility of using nuclear weapons for tactical purposes against India. The belief that nuclear weapons can never be used on the battlefield, and exist only for purpose of deterrence also reflects in the defence policy-making process in Islamabad. An overwhelming proportion of Pakistan's defence budget is consumed in refurbishing and procuring conventional military equipment. It is neither aimed at, nor has it completed, the full integration of nuclear weapons into its armed forces to date.[18] The Indian defence minister, George Fernandes, declared on 5 January 2000 at a seminar organized by the Delhi-based Institute for Defence Studies and Analysis (IDSA) on the "Challenges of Limited War" that Pakistan's possession of nuclear weapons did not rule out the possibility of a limited conventional war.[19] Moreover, the Cold Start Doctrine, announced on 28 April 2004 at the Indian Army Commanders Conference, had not compelled Islamabad to announce or declare the making and deployment of its nuclear weapons.[20]

Evolution of nuclear decision-making

Pakistan's nuclear programme has gradually evolved during the last six decades. Numerous actors played an important role in its theoretical and practical implementation. During the first two decades the scope of the programme was limited to the acquisition of scientific knowledge for peaceful purposes. The entire activity was under the strict monitoring of the International Atomic Energy Agency (IAEA). Nonetheless, the 1971 tragedy and the then president Zulfikar Ali Bhutto's strategic vision had broadened the horizon of Pakistan's nuclear programme. It encompassed military utilization of nuclear technology and initiated the process which culminated in development of credible nuclear deterrence capability of the country. The following discussion highlights, chronologically, the role of individual leaders, statutory bodies, scientific civil-military bureaucracies and the common man in the nuclear decision-making in Pakistan.

Statutory decision-making bodies: Defence Committees

There are three different Defence Committees — Defence Committee of the Cabinet, Defence Committee of the National Assembly, and Defence Committee of the Senate — in which the political elite has the privilege to critically examine the nuclear posture of the country. In theory, these Defence Committees are autonomous bodies where nuclear policy debate entailing formation process ought to take place. Previously, the proceedings of these committees were normally kept secret. Nevertheless, on certain occasions the

proceedings were reported in the press. For instance, responding to the pronouncement of the draft Indian nuclear doctrine in August 1999 and terming "offensive, and threatening the regional and global stability," the Defence Committee of the Cabinet, under prime minister Nawaz Sharif, stated that the future development of Pakistan's nuclear weapons programme would be "determined solely by the requirement of our minimum deterrent capability, which is now an indispensable part of our security doctrine."[21]

Significantly, the author has not come across any secondary source which avers that the nuclear weapons policy was debated in any of these defence committees. In February 2000 setting up of the National Command Authority (NCA) was publicly announced. And since then, it has been the primary nuclear decision-making body in Pakistan. The Strategic Plans Division, the Secretariat of the NCA, occasionally shares the NCA decisions with the press and also invites strategic analysts for briefings and discussions.[22] In addition, the ruling elite, especially during crisis, articulates a few aspects of Pakistan's nuclear policy.

Scientists' eagerness and ruling elite's apathy

The foundation of Pakistan's nuclear programme was laid in the mid-1950s. It was not a weapons-oriented programme in the beginning. Nuclear decision-making in the 1950s and 60s was a low-priority issue for the policymakers in Pakistan. And the armed forces were disinclined to pursue acquisition of nuclear weapons.[23] Consequently, the technical decision-making was left to the specialists or a team of scientists headed by Dr. Nazir Ahmed, a physicist. The then government established a 12-member Atomic Energy Committee, headed by Dr. Nazir Ahmad. The committee's objective was to prepare blueprints for peaceful uses of atomic energy in order to capitalize on the Atom for Peace Programme, announced by US president Eisenhower in October 1953. It was on the recommendation of the committee that an 'Atomic Energy Council' was set up in March 1956, with the task of planning and developing peaceful uses of nuclear technology.[24] Nevertheless, nuclear energy was not given high priority by the government and the Pakistan Atomic Energy Commission (PAEC) chairman reported to a relatively junior officer in the Ministry of Industries, and had no direct access to the chief executive.[25]

Atomic Energy Council

Two Branches	Governing Body	Atomic Energy Commission
Members	Two Central Ministers; two Central Secretaries, and Chairman of the Atomic Energy Commission.	Six Scientists

Responsibilities	Goals identification. Financial support. Supervision	Planning & developing peaceful uses of nuclear energy. Survey, procurement and disposal of radioactive material. Planning and establishment of atomic energy and nuclear research institute, installation of research and power reactors. Negotiations with international atomic energy bodies. Selection and training of personnel. Application of radio-isotopes to agriculture, health, industry, etc

Source: Hasan Askari Rizvi, Pakistan's Nuclear Programme (Karachi: Pakistan Association for Peace Research, 1991), pp. 7, 8. Naeem Ahmed Salik, "Pakistan's Nuclear Programme: Technological Dimension," in P. R. Chari, Pervez Iqbal Cheema, Iftekharuzzaman, ed., Nuclear Non-Proliferation in India and Pakistan (New Delhi: Manohar, 1996), p.87.

The above table shows that the decision to use nuclear energy for peaceful purposes was made by a governing body having chairman of the Atomic Energy Commission as its member. The entire details of the executing plan were worked out by the Commission. Hence, the scientific bureaucracy enjoyed complete autonomy. Moreover, the acceptance of Dr. Ahmed's recommendations had not only instituted the role of scientists in nuclear decision-making in Pakistan, but had also constituted an influential scientific-bureaucratic group in the country. This group stewarded the nuclear programme in the later years. Since the mid-1950s, the nuclear scientific bureaucracy has had a decisive role in nuclear decision-making. Gradually, this group realized that their relevance would be only acknowledged by the ruling elite if the government decided to use nuclear technology for defence purposes. Actually, the foreign qualified Pakistani scientists learnt that only those states had been greatly investing in the nuclear field which had a nuclear weapons programme. Hence, their significance in Pakistan was very much dependent on the objectives of the country's nuclear programme. Therefore, a few energetic scientists approached the political leadership for broadening the horizon of Pakistan's nuclear programme in the mid-1960s.[(26)] Munir Ahmed Khan, Chairman of Pakistan Atomic Energy Commission (1972-91), stated:

> In October 1965, Pakistan's foreign minister, a young man at that time, I call him a young man because he was two years younger than I was, Mr. Bhutto visited Vienna, where I was working at the IAEA, and I

> briefed him about what I knew of India's nuclear programme and the facilities that I had seen during a visit to Trombay in 1964, consisting of a plutonium production reactor, a reprocessing plant, and all the associated facilities, which added up to one thing: bomb-making capability. I told him that a nuclear India would further undermine and threaten our security, and for our survival, we needed a nuclear deterrent.[27]

Munir Ahmed Khan claimed that he met president Ayub on 11 December 1965 at the Dorchester Hotel, where he briefed him on all that he knew about India's nuclear programme and also informed him that there were no restrictions on nuclear technology, which was freely available.[28] Subsequent attempts to persuade him and his advisers were made by Dr. Abdus Salam, Dr. Usmani and others. These scientists also approached Ayub's successor, General Yahya Khan.[29] Though the scientists were using the security dilemma problem in international relations for convincing the ruling elite, yet the ministries of finance and defence opposed their proposal to purchase a plutonium separation plant that France was willing to sell.[30]

The scientific bureaucracy had failed to convince the ruling elite into changing and broadening the focus of Pakistan's nuclear programme. There were numerous reasons for limiting Pakistan's nuclear focus, and refraining from starting a nuclear weapons programme, with the major reason being the army background of president Field Marshal Ayub Khan and General Yahya Khan, and their lack of scientific orientation. Therefore, they failed to anticipate the transformation in the South Asian strategic environment due to the nuclearization of India and Pakistan. Secondly, at that time, Pakistan's SEATO and CENTO membership had given a (false) confidence to the Pakistani ruling elite that security alliances were reliable defensive fences against India's conventional superiority.[31] Thirdly, the 1962 Sino-Indian war and improvement in China-Pakistan relations were also the variables due to which Ayub Khan took the scientists' strategic apprehensions vaguely. Notably, he rejected Munir Ahmed Khan's proposal by claiming that Pakistan was too poor to spend that much money. Moreover, if we ever needed the bomb, we would buy it off the shelf.[32] Fourthly, the military leadership apparently believed that a strong conventional defence capability would suffice for deterrence.[33] Fifthly, the strategic culture of the state was very much ethnocentric and thereby the strategic policies remained influenced by a sense of superiority until the dismemberment of Pakistan in 1971. Sixthly, the civil bureaucracy (planning division and ministry of finance) lacked scientific vision and had apathetic attitude towards scientific bureaucracy.[34] Therefore, on numerous occasions in the 50s and the 60s, the PAEC's proposals for setting up nuclear projects like fuel fabrication facility, a heavy water plant and a reprocessing plant were rejected by the relevant government departments. Nevertheless, the scientific bureaucracy did not relinquish the concept and urge of military use of nuclear technology. Dr. Samar Mubarakmand stated:

> At this time [1960s], our chairman Dr. Usmani was a man of great vision, and he envisaged that the atomic programme had to be split into two branches, with one branch being devoted to peaceful use of atomic energy… Of course, nobody in the world expected PAEC just to do research in agriculture and medicine and industry; and therefore we had to think about the nuclear weapons programme in parallel with the peaceful programme.[35]

Bhutto's nuclear-leanings: Scientists' substantiation

The 1971 War with India made Pakistan realize the bitter reality how inadequate its reliance on American, Chinese, CENTO and SEATO support was in ensuring its territorial integrity. The dismemberment of the country multiplied the asymmetry between India and Pakistan that made it necessary for it to arm itself with the latest generation of weapons to compensate for its numerical inferiority as well as to solidify its defences against India. president Zulfikar Ali Bhutto was continuously in contact with the nuclear scientists since the early-1960s,[36] who convinced him to go for nuclear weapons technology to restore the strategic imbalance between India and Pakistan. President Bhutto stated on 28 November 1972: "Since 1965, I have been in close touch with you (Chairman PAEC) and we have had many occasions to discuss how atomic energy can help in the development of our country."[37] In 1965, as a foreign minister of Pakistan Z. A. Bhutto said: "If India makes an atomic bomb, then we will also do so, even if we have to eat grass… an atom bomb can only be answered by an atom bomb."[38] It indicates that Bhutto had taken seriously the Indians reaction to the Chinese nuclear weapon test in 1964.[39] He was convinced that soon India would acquire nuclear weapons technology, which would completely transform India-Pakistan strategic relationship to the former's advantage. In his book *The Myth of Independence*, Bhutto claimed: "If Pakistan restricts or suspends her nuclear programme, it would not only enable India to blackmail Pakistan with her nuclear advantage, but it would (also) impose a crippling limitation on the development of Pakistan's science and technology… our problem in its essence is how to obtain such a weapon in time before the crisis begins."[40] Therefore, he was an ardent supporter of the nuclear weapons programme of Pakistan.

President Zulfikar Ali Bhutto, therefore, soon after assuming charge as head of state, abolished all the inter-ministerial committees dealing with atomic energy and took charge of the programme so that the chairman of PAEC could report directly to him.[41] He convened a meeting of nuclear scientists at Multan on 20 January 1972. Prior to this meeting, he had recalled Munir Ahmed Khan from the International Atomic Energy Agency to prepare a report on the status of Pakistan's nuclear programme, which was submitted to the President before the Multan conference.[42] The participants in the Multan conference had included renowned nuclear physicist Professor Abdus Salam and Munir Ahmed Khan. Abdul Sattar argued: "Already convinced of the necessity of acquiring the

weapons option, Bhutto's main purpose was to discuss the expeditious acquisition of fuel cycle facilities. To pursue the plan, he appointed Munir Ahmed Khan as chairman of the PAEC on March 15, 1972, and allocated requisite funds for relevant projects."[43] Munir enjoyed the confidence of the president, which gave him a decisive power in the nuclear decision-making in 1972. Munir Ahmed claimed:

> Within the two months of that event, [Multan Conference] we submitted a detailed nuclear plan to the President, which envisaged complete control of the nuclear fuel cycle, and building of numerous plants and facilities for the generation and application of nuclear knowhow. And more importantly, that the plan was approved within two hours. I remember, the President turned to the Finance Minister Mubashir Hasan, and said, 'I hereby abolish all the several committees dealing with Atomic Energy in various Ministries. You give him money as he puts in a request.' And we, the PAEC, were supposed to report directly to the Chief Executive. If that thing had not happened, you [PAEC] would have been under a Joint Secretary in the Ministry of Industry or Science and Technology. So there were immediate measures taken to give us the freedom we needed to act and the access we needed to the decision-makers in Pakistan.[44]

In 1973 France and Pakistan signed a reprocessing plant agreement, under which the latter had to build with collaboration of the former a reprocessing plant under IAEA safeguards. The United States managed to get revoked that agreement in June 1978.[45] In fact, 18 May 1974, India's nuclear explosion changed the direction and speed of Pakistan's nuclear programme. The PAEC correctly anticipated future aid cut-off and sanctions from the nuclear supplier states of fuel cycle facilities, including the French reprocessing plant. Therefore, immediately following India's test, the PAEC initiated research and development studies for uranium enrichment at PINSTECH and by October-November 1974 had chosen the gas centrifuge method for uranium enrichment. Simultaneously, the PAEC also prepared for self-reliance in the front end of fuel cycle.[46] More precisely, the nuclear scientists anticipated the repercussions of Washington's opposition to Pakistan's nuclear programme; and therefore with the approval of the Prime Minister they embarked on an alternative route for production of fissile material — highly enriched uranium.[47] Additionally, on the basis of KANUPP knowledge, the PAEC broadened the programme and started building a heavy water plant, a 40-megawatt plutonium production reactor, and other plants for making tubes of different types, zirconium tubes, and other manufacturing facilities, which have contributed to the Chashma power reactor. While building nuclear fuel cycle, the scientists decided to start in parallel the design of a nuclear device, with its trigger mechanism, physics calculations, production of metal-making precision mechanical components, high-speed electronics, diagnostics, and testing facilities.[48]

Zulfikar Ali Bhutto's tenure had demonstrated great enthusiasm in the development of Pakistan's nuclear weapons programme from 1972 to 77, but the military had shown little interest in the nuclear weapons programme. The military, in those years, was more concentrating on overcoming both the psychological and physical hangover of the 1971 war trauma. Nevertheless, the military was assigned some auxiliary roles. The military's interest and role in Pakistan's nuclear weapons programme increased after Gen Zia-ul-Haq toppled prime minister Z.A. Bhutto in a military coup on 4-5 July 1977.[(49)]

Zia's continuity approach

The military coup and subsequent execution of Prime Minister Zulfikar Ali Bhutto did not affect the progress of Pakistan's nuclear programme. Zia's military junta continued the clandestine nuclear weapons project despite France's refusal to provide the nuclear reprocessing plant. Since 1972, the nuclear decision-making had evolved in a way that the government provided both direction and financial support to the programme. Technical decisions, however, were autonomously taken by the scientific bureaucracy. The trend in nuclear decision-making, which was set up by Prime Minister Bhutto, was continued during the military regime of Zia-ul-Haq. Notably, Prime Minister Z. A. Bhutto was very much autonomous in decision-making and his cabinet members never dared object to his decisions, particularly during his last three years of premiership. Similarly, Gen Zia was independent in his decision-making. He did not bring about any change in the nuclear decision-making process, except for allowing the emergence of two tiers in nuclear-scientific bureaucracy, i.e. the Pakistan Atomic Energy Agency and the Khan Research Laboratories (KRL). In addition, on certain issues General Zia took decisions alone, and did not share the information even with his kitchen cabinet. According to Shahid-ur-Rehman, in 1982 the KRL was commissioned in addition to uranium enrichment to design the bomb, develop trigger mechanism, convert enriched uranium into metal, work on the nitty gritty of the device, and assemble it. He added: "Dr. Khan claimed that he was instructed by President Zia not to mention his new responsibilities to anybody, not even to Finance Minister Ghulam Ishaq Khan, Foreign Minister Sahibzada Yaqub Ali Khan and his Chief of Staff Lt. General K.M. Arif. As regards funds, he was asked to make use of his own budget or write directly to Gen Zia."[(50)]

This testifies that president Zia unilaterally made nuclear decisions and doubled the efforts to invent a nuclear device. On 11 March 1983, the PAEC successfully conducted its first cold test of a working nuclear device. (A cold test is the actual detonation of a complete nuclear bomb except instead of enriched uranium, in the middle of the bomb, you put natural uranium. So it would not go into fission.) It did not acquire full power, but was a complete bomb in all respects. Munir Ahmed Khan stated, "That evening, I went to Gen Zia with the news that Pakistan was now ready to make a nuclear device.[(51)] Prior to the cold test, the nuclear weapon testing sites were selected by the PAEC in Chaghi and Kharan in 1976 and both the sites were complete, and the

shafts were all made in 1980-81."[52] The scientific bureaucracy was doing all this in a parallel effort in 1975 and 1976 because they were told that whenever they were ready, they would detonate the bomb. Dr. Samar Mubarakmand stated: "So we were all very enthusiastic. We were running day and night concentrating on our effort. But history has proved, it did not happen at that time. The mandate was withdrawn from us when we were ready."[53] This indicates that after 1983, the autonomy of scientific bureaucracy in nuclear decision-making was curtailed by General Zia-ul-Haq. He did not permit the PAEC to conduct a nuclear explosion or hot-test after the cold test. Dr. Samar Mubarakmand claimed: "We went to the Government and said we are ready and we want to do a hot test. The then President [General Zia-ul-Haq] said, "No, it is not the right time." and so we had to abide by that decision."[54] Nonetheless, despite not receiving permission to conduct hot-test, the PAEC continued its work on improving the device's design. The theoretical physicist at PAEC designed one sample after the other. After every 18 month or two years or so, (since March 1983 till May 1998) the PAEC had a new design and did a cold test on it.[55] This reveals the scientific bureaucracy's independence in the realm of design. Improvement was not curtailed by General Zia-ul-Haq.

Two tiers in nuclear scientific bureaucracy

In November 1974, the PAEC decided to initiate an indigenous uranium enrichment project. Sultan Bashiruddin Mahmood, former director-general (Nuclear Power) PAEC, founding project director, Uranium Enrichment Project, Khushab Nuclear Reactor, stated on 28 April 2007:

> In November 1974, he [Munir Ahmad Khan, Chairman of PAEC] called me to his office and asked me to prepare a detailed report on various technologies for uranium enrichment. He was so anxious to get this project started that he wanted the report next day. In this report I discussed laser, diffusion, jet nozzle and centrifuge methods for uranium enrichment. Finally we went for centrifuge technology for uranium enrichment. We were familiar with centrifuge technology since 1967 when a small group was formed by Dr. Naeem Ahmad Khan at Atomic Energy Centre, Lahore, which included Hafeez Qureshi, myself and Dr. Samar Mubarakmand.[56]

This reveals that scientific bureaucracy had decided to employ centrifuge method for uranium enrichment. In the formative years of Pakistan's nuclear weapons programme, Munir Ahmad Khan greatly influenced the decision-making. Farhatullah Babar pointed out: "If Bhutto [Prime Minister Zulfikar Ali Bhutto] was like Nehru in India in having a nuclear dream, Munir Khan was like Dr. Bhabha, who helped shape the political vision of Nehru for nearly two decades of his stewardship of the Indian Atomic Energy Commission."[57] In July 1976 Dr. Abdul Qadeer Khan took over the uranium enrichment project — Kahuta project — from Sultan Bashiruddin Mahmood,

who was the first head of the project. Dr. Khan renamed it Kahuta Research Laboratories (which was latter renamed Dr. A. Q. Khan Research Laboratories in 1981),[58] and the project was separated from the PAEC in the 1977.

The appointment of Dr. Khan constituted two tiers of decision-making within the nuclear bureaucracy. One was headed by Munir Ahmed Khan at the PAEC and other by Dr. A. Q. Khan at the Kahuta Research Laboratories. The latter was only dealing with the centrifuge-based uranium enrichment process, and it achieved the capability to enrich uranium to the level required for building an explosive device in 1982.[59] The PAEC was charged with the responsibility for pre- and post-enrichment phases of research. It manufactured the first atomic device in 1983.[60] Dr. Samar Mubarkmand, the then chairman of the strategic production complex claimed on 30 April 2003:

> Pakistan's nuclear capability was confirmed the day in 1983 when the PAEC carried out cold nuclear tests under the guidance and stewardship of late Munir Ahmed Khan. As many as nineteen steps were involved in the making of a nuclear weapon ranging from exploration of uranium to the finished device, and its trigger mechanism. The technological and manpower infrastructure for eighteen out of these nineteen steps were provided by the PAEC under the leadership of Munir Ahmed Khan who led it for nearly two decades, from 1972 to 1991.[61]

Controversial transparency

The 1986-87 Brasstacks crisis compelled Pakistan to increase the transparency of its nuclear weapon capability to introduce a nuclear deterrence factor in India-Pakistan strategic relations. Islamabad intensified nuclear signalling campaign to give its nuclear capabilities credibility in Indian eyes. On 24 March 1987 General Zia stated that "Pakistan has the capability of building the Bomb. You can write today that Pakistan can build a bomb whenever it wishes. Once you have acquired the technology, which Pakistan has, you can do whatever you like." Zia added, however, that Islamabad had no intention of building nuclear weapons: "What's the difficulty about building a bomb? We have never said we are incapable of doing this. We have said we have neither the intention nor the desire."[62] A few weeks before, on 1 March 1987 Kuldip Nayar published Dr. A. Q. Khan's interview in which the latter discussed Pakistan's nuclear programme.[63] This modification in Pakistan's strategic policy multiplied Dr. Khan's popularity. Gradually, Dr. Khan became a media-savvy figure due to his personal inclination towards media popularity, and tacit approval of the government. Consequently, he was mentioned as 'father of Pakistani nuclear weapons programme' within and outside the country. It is nearly impossible to say with any degree of certainty whether this media popularity increased Dr. Khan's influence in the nuclear decision-making process in the realm of scientific bureaucracy or it was merely a part of Pakistan's nuclear signalling strategy. President Pervez Musharraf pointed out:

"A.Q. Khan was not, in fact, the sole scientist in charge of the entire effort, yet he had a great talent for self-promotion and publicity, and led the public to believe that he was building the bomb almost single-handedly. Furthermore, our political leaders were intentionally ambiguous in public about our capabilities, for strategic reasons."(64) Nevertheless, Dr. Khan was the head of Khan Research Laboratories, which was a much smaller organization than PAEC. The PAEC, which had numerous nuclear projects, remained under the chairmanship of Munir Ahmed Khan until 1991 despite a malicious media campaign against him.(65) The press reports indicate that Dr. Khan desired to be the head of the PAEC,(66) but until his retirement he did not succeed in winning the prime post of PAEC chairmanship. Thus, the two-tiers of scientific bureaucracy operated autonomously within the broader framework constituted by the ruling elite in Islamabad.

Troika of leaders in 1990s

General Zia's plane crash on 17 August 1988 and the outcome of subsequent general elections introduced the famous troika of leaders — President, Prime Minister, and Chief of Army Staff (COAS) — a structure in the political system of Pakistan which remained intact until the passage of the 13th Amendment in the 1973 Constitution of Islamic Republic of Pakistan. The scientific maturity of Pakistan's nuclear weapons programme, and Troika of leaders made the armed forces of Pakistan an inevitable component of nuclear decision-making. Joseph Cirincione pointed out: "Three sets of actors play the dominant roles in nuclear decisions: the scientists, the soldiers, and the state leaders."(67) In the aftermath of the 1988 election, president Ghulam Ishaq Khan,(68) and Army chief General Mirza Aslam Beg emerged as the guarantors of continuity of the Zia era policies, and Prime Minster Benazir Bhutto was viewed as a force of change. President Pervez Musharraf pointed out: "After Zia's death in 1988, Ghulam Ishaq Khan took over as president. Since he was a civilian, he brought the army chief into the loop. From then on the chief of the army staff started managing our nuclear development on behalf of the president."(69) President Musharraf added: "This arrangement continued, but the chain lengthened. It ran from the prime minister to the army chief to a major general appointed as director general of combat development… No other government department was involved, nor was anyone else from the army."(70)

During her first tenure, Prime Minister Benazir Bhutto's role was limited in the federal government decision-making process. This premise is based on the following factors: the constitutional powers of the president by virtue of the Eighth amendment in the 1973 constitution, extensive experience of civil-bureaucrat turned politician Ghulam Ishaq Khan; nearly a decade of uninterrupted rule of Gen Zia-ul-Haq; and the fragile ruling coalition in the National Assembly.(71) Hence, many analysts concluded that Benazir Bhutto was bypassed by the civil-military establishment in the realm of nuclear decision-making.(72) Zafar Iqbal Cheema opined:

> On becoming prime minister in December 1988, Benazir Bhutto pledged her opposition to nuclear weapons but refused to sign the NPT. The crucial question, however, was not her willingness to stop pursuing a nuclear weapons programme but her ability to influence nuclear decision-making in Islamabad. She did not control the Nuclear Weapons Programme Coordination Committee, chaired by President Ghulam Ishaq Khan.[73]

In June 1989 during her state visit to Washington, Prime Minister Benazir Bhutto was given a detailed briefing on Pakistan's nuclear progress by CIA director William H. Webster. In the briefing the impression was given that the extent of the nuclear weapons programme was concealed from Prime Minister Bhutto. Devin T. Hagerty argued:

> After 1988, Pakistan was effectively ruled by a troika of leaders, of whom the inexperienced Bhutto was the weakest. The other two centres of power revolved around the president, Ghulam Ishaq Khan (a long-time civil servant and Zia's finance minister), and the chief of the army staff (COAS), General Mirza Aslam Beg. While they were content to let the charismatic Bhutto represent Pakistan on the world stage, she chafed under their continued dominance of vital national security issues like the nuclear programme and the relations with India."[74]

On the contrary, General Beg claimed that Prime Minister Bhutto had received detailed information of nuclear weapons programme within the first two months in office. Importantly, the Western writers also admitted in their writings that the prime minister had met Dr A. Q. Khan soon after taking office in December 1988, when he and Munir Ahmed Khan had given her a short briefing on the nuclear programme.[75] Nonetheless, later after her ouster from power, Benazir Bhutto maintained in an interview with the ABC television network that she was kept in the dark about the country's nuclear programme.[76] Moreover, during the 90s no elected government had completed its term of office. The elected leaders and governments political vulnerability had sustained the army's decisive influence over all sensitive areas of policymaking, ranging from Kashmir to the nuclear programme.[77] Nevertheless, Prime Minister Benazir Bhutto during her first tenure adopted a nuclear restraint policy. Pakistan capped its uranium enrichment programme in 1989.[78] According to Devin T. Hagerty:

> Bhutto also made two secret promises to Washington: first, that Pakistan would stop enriching uranium to weapons grade; and, second, that it would not convert its existing stock of weapons-grade uranium from gas to metal, which could then be machined into bomb cores. Thus, by 1989 Pakistan's

> nuclear weapon potential was essentially frozen, with all of the components in place, but as yet unassembled.[79]

Gen Aslam Beg pointed out that the capping decision was taken jointly by the ruling troika comprising the president, the prime minister, and the army chief.[80] The notable point here is that neither Prime Minister Bhutto nor General Beg spelled out contours of the policy of restraint. But it seems restraint was only theoretical in nature, and was for diplomatic consumption. It is because the policy did not hamper the scientific progress in the PAEC, as the commission continued cold tests of nuclear weapon designs until 1992. Moreover, in 1989, it concluded an agreement with China for the supply of a 300-MW nuclear power reactor at Chashma. Zahid Hussain has argued: "Despite the supposed cap, Pakistan is believed to have continued production of low-enriched uranium at its Kahuta plant. This low-enriched uranium could be transformed into weapons-grade uranium within a mater of months."[81]

The troika, instead of slowing down Pakistan's nuclear weapons programme, intensified the scientific progress at both PAEC and KRL. The scientific bureaucracy exploited the triangular arrangement of central power, secrecy of the nuclear projects, mounting tension with India in 1990, and, above all, Indian nuclear-missile progress to maximize their autonomy. The investigated accounts of Dr. Khan's network of illicit gas centrifuge trafficking reveal that during the governance of the troika of leaders, he was able to bypass the government of Pakistan and operated independently. He intelligently used the triangular arrangement against one another to maximize his independence.[82] Importantly, during these years the PAEC had similar opportunities, but it was not involved in any illegal export activities. The non-involvement of the PAEC in the illicit nuclear trafficking manifests that transfer of used centrifuges to Iran was not done by the prior approval of the government of Pakistan.[83] More precisely, Dr. A. Q. Khan acquired a stature in the nuclear bureaucracy that he was able to make decisions without the prior approval of political ruling elite. He clandestinely bypassed the government rules and regulations to do illicit nuclear trafficking. This would be discussed in detail later.

Nuclear weapon tests: Dynamics of domestic politics

As stated above Zia-ul-Haq, was not in favour of testing a nuclear device in 1983. The scientists had to wait for almost 15 years to demonstrate their achievement. The military dictator and his successor president Ghulam Ishaq Khan preferred ambiguity about Pakistan's nuclear-weapon capability, realizing perhaps that the cost-benefit ratio was adverse. In his first address to the National Assembly on 7 November 1990, prime minister Nawaz Sharif announced that Pakistan's nuclear programme was meant for peaceful purposes, but had a built-in security option.[84] Prime minister Benazir Bhutto reiterated similar stance during her second tenure that Pakistan's nuclear programme was intended for peaceful purposes, but could be converted to military use if the country's national security were threatened.[85]

The nuclear tests by India on 11 and 13 May 1998, and popular demand in Pakistan forced prime minister Nawaz Sharif to go ahead with testing on 28 and 30 May 1998. Before the test, he convened a meeting of the Defence Committee of the Cabinet (DCC) on 15 May 1998, to consider the situation resulting from the Indian tests. The meeting remained inconclusive.[86] On 18 May, however, Nawaz Sharif summoned Dr Ishfaq Ahmad and informed him of the government's decision to carry out the test. Shahid-ur-Rehman pointed out that "a shorter and exclusive DCC meeting convened during 15-18 May had decided to give a matching response to India and assign the task to the PAEC.[87] Dr. Samar Mubarakmand stated; "The PM had told me, 'Dr. Shahib, please do not fail, we cannot afford to fail. If we fail, we cannot survive. This is an hour of crisis for Pakistan'."[88] The prime minister stated later on 21 February 2009: "When we decided to conduct nuclear explosions in response to Indian atomic blasts in 1998, the legs of the top brass in a Defence Committee meeting were shivering with fear, but despite that we conducted the blasts."[89] This claim however lacked substantial evidential proof. Abdul Satar pointed out:

> Almost all political parties, political leaders and security analysts, newspaper editors and columnists, the security establishment and public and public opinion became vociferous in demanding a response to the Indian tests, and a demonstration to adventurists in India that Pakistan too possessed the bomb. The chief editor of a respected newspaper chain was said to have even warned the prime minister that an explosion was unavoidable: the choice was between a nuclear test and his government.[90]

Munir Ahmed Khan pointed out: "Meanwhile, the pressure of the public opinion, political parties and defence establishment was growing in direct response to India's increased nuclear belligerency."[91] Besides Abdul Sattar and Munir Ahmed Khan, many writers referred to the defence establishment or the security establishment's pressure on the Nawaz government for nuclear tests. Notably, according to these nuclear myth-makers, nuclear weapons could be used just exactly as one could use a bullet or anything else.[29] According to Samina Ahmad:

> ….the decision to abandon nuclear ambiguity for a declared nuclear weapons posture was ultimately determined by domestic factors, particularly the nature of Pakistan's decision-making apparatus. Policy-making in the realm of security, including the nuclear field, has been the preserve of the Pakistani military with the assistance and willing collaboration of civil bureaucracy, including the nuclear scientific estate.[93]

The preceding discussion shows that the armed forces of Pakistan were also on board in deciding to conduct nuclear tests in May 1998. Immediately after the May tests, the Nawaz government announced a moratorium on further tests. The prime minister, in his speech at the United Nations General Assembly

in September 1998, had expressed willingness to sign the Comprehensive Test Ban Treaty (CTBT) by September 1999, provided the sanctions were removed.

A.Q. Khan saga: An independent actor?

Dr. Abdul Qadeer Khan and a few of his associates from Pakistani nuclear bureaucracy became a part of underworld nuclear network. The network included suppliers from Switzerland, the United Kingdom, the United Arab Emirates, Turkey, South Africa, Malaysia and elsewhere.[94] These individuals including different countries' scientific bureaucracies were involved in illicit nuclear trade only for pecuniary benefit.[95] They managed it uninterrupted for the reason that many of the things they sought were of dual-use, so the real use could be disguised. In the words of Jeremy Bernstein, "In most cases, the sellers did not care."[96] In 1990, a member of the German parliament commented that the country's export controllers' motto was still "you never hear anything, you never see anything — and, in particular, you never block anything."[97] For instance, after the bombing of their reactor by Israel on 7 June 1981, the Iraqis decided to enrich their own uranium using Zippe-type centrifuges. They paid one million dollars to a German group for the design.[98] Degussa, one of the largest chemical companies in Germany which is involved in nuclear weapons material business, sold the Zippe centrifuges to Iran.[99] Jeremy Bernstein said that: "The Degussa representatives made it clear that they did not care if the Iranians were going to use the material to make weapons. That was fine with them, as long as they paid their bills."[100]

The A. Q. Khan network during the late 80s through the 90s transferred sensitive nuclear proliferation related technologies and information to Iran and Libya.[101] Moreover, on 20 February 2004, Malaysian police reported that the former head of the KRL, Dr Abdul Qadeer Khan, sent enriched uranium to Libya in 2001 and sold gas centrifuge parts to Iran in the mid-1990s.[102] After receiving authentic proofs about Khan's involvement in the illicit nuclear trafficking, he was arrested on 31 January 2004 under the Security Act of Pakistan 1952 for allegedly transferring nuclear technology to other countries.[103] On 7 February 2004, Gen Pervez Musharraf, president of Pakistan, at his press conference stated that one of the country's senior scientists, Dr. Abdul Qadeer Khan, and a few of his associates were guilty of illicit nuclear trade. Dr Khan was convicted and punished.[104] Musharraf claimed in the news conference that the Pakistani civil and military bureaucracy was not a part of this illicit nuclear trafficking. Abdul Sattar pointed out:

> However, the Pakistan government itself obtained the relevant information through the interrogation of accused individuals. Investigation confirmed that he and some of his subordinates had indulged in the sale of nuclear technology. The inquiry also concluded that the government had not authorized any transfer, and that the sale was on account of the personal greed of a few persons.[105]

It needs to be noted that numerous Western analysts had critically examined Dr Khan's nuclear export and a few of them had disputed the government of Pakistan's claim that it was Dr. Khan's personal decision to transfer gas centrifuge technology to Iran, Libya and North Korea. But it seems that the decision to transfer nuclear technology clandestinely was a personal venture of Dr. Khan. In fact, once his prestige grew exponentially, he began to run the export of gas centrifuge technology as a business. Bruno Tertrais pointed out: "Most knowledgeable observers of the Pakistani scene agree that A.Q. Khan had an important degree of autonomy. If nuclear exports had been a consistent State policy, then it would have been logical that PAEC had a role in it too, which does not seem to have been the case."[106] Jeremy Bernstein's findings also support the assertion that Pakistani nuclear exports were probably, to a significant extent, an individual initiative. He concluded:

> He opened an office in Dubai operated by his nephew. They soon produced a kind of menu from which you could order, complete with prices. The Iranians bought centrifuge designs and parts of actual centrifuge for several million dollars, which they should have declared to the International Atomic Energy Agency. The centrifuge that the Iranians claim to have used to enrich is called the P-1, where 'P' stands for 'Pakistan'.[107]

NCA: Institutionalizing decision-making

After the nuclear tests in May 1998, Islamabad adopted a transparent nuclear decision-making policy by constituting a powerful and coherent National Command Authority (NCA) to chalk out the nuclear strategy, manage nuclear infrastructure and strategic assets.[108] The then army chief Gen Pervez Musharraf submitted a written plan for NCA, a new secretariat within the government that would take charge of operational, financial, and security controls.[109] Consequently, the NCA became operative in March 1999,[110] though the formal announcement in this regard came on 2 February 2000.[111] Gen Musharraf, who became president ousting prime minister Nawaz Sharif in a military coup, stated:

> When I took the helm of the ship of state on October 12, 1999, I was solely in charge of all our strategic programmes. I soon realized that I could not devote as much time to them as they required. I decided to implement the system that I had proposed earlier. In February 2000, our strategic weapons programme came under formalized institutional control and thorough oversight, duly approved by my government.[112]

The NCA was a three-tier institutional structure dealing with the country's nuclear weapons. The Employment Control Committee and Development Control Committee, constituted one tier; the Strategic Plans Division (SPD) the second tier; and the three services' strategic forces command

the third tier. The Chairman and Vice Chairman of the NCA were the head of the state (President) and the Head of the Government (Prime Minister), respectively. The Strategic Plans Division was the Secretariat of NCA.

NCA Ordinance, 2007

President Pervez Musharraf promulgated the NCA Ordinance on 13 December 2007.[113] The Ordinance No. LXX of 2007, which came into force at once and extended to the whole of Pakistan, provided de jure status to the constitution and establishment of the National Command Authority. A careful reading of the ordinance shows that it did not contradict or reverse the previous NCA system. It stated: "The National Command Authority already established by the competent authority shall deem to be the Authority established under this Ordinance."[114] The ordinance designated the President of Pakistan as the Chairman of the Authority and the Prime Minister as Vice-Chairman. It listed the following as the other ex-officio members of the NCA: the Minister for Foreign Affairs; Minister for Defence; Minister for Finance; Minister for Interior; Chairman, Joint Chiefs of Staff Committee; Chief of Army Staff; Chief of Naval Staff; Chief of Air Staff; and Director General, Strategic Plans Division. The SPD DG was also named the Secretary of the Authority. An important aspect of the ordinance was that it provided a legal document on the NCA containing details regarding the command and control over research, development, production and use of nuclear and space technologies of Pakistan. It also provided information about the safety and security mechanism that ensured safety and security of all personnel (employees serving and retired), facilities, information, installations or strategic organizations.[115]

Three Tiers of NCA

First Tier – NCA		**Second Tier**	**Third Tier**
Employment Control Committee	Development Control Committee	Strategic Plans Division	Three Services: strategic forces command
Chairman: President Vice-Chairman: Prime Minister Deputy Chairman Foreign Minister Members Minister for Defence Minister for Interior Minister for Finance CJCSC COAS/ VCOAS CNS CAS Secretary Director General SPD By invitation as Required	Chairman: President Vice-Chairman: Prime Minister Deputy Chairman CJCSC Members COAS/VCOAS CNS CAS Heads of strategic organizations concerned Secretary Director General SPD	Head: Director General Four main Directorates: 1. Operations and planning directorate, 2. CCCCIISR directorate, 3. Strategic Weapons Development directorate, 4. The Arms Control and Disarmament Affairs directorate.	• Army strategic force command, • Air Force strategic force command, • Naval strategic force command

*CCCCIISR (Computerized Command, Control, Communications, Information, Intelligence and Surveillance)

The Head of State, the President of Pakistan, chaired the apex Employment Control Committee. As the names suggest the Employment

Control Committee was to deal with what could be defined broadly as "nuclear strategy" including targeting policy and the conduct of nuclear operations. It provided policy directions in peacetime and had the authority to order, control and direct use/employment of tri-services strategic forces during war. On 6 January 2003, the NCA headed by the president, Pervez Musharraf, announced that a "unanimous decision" would be taken for using nuclear weapons. It was made clear that no individual, including the President of Pakistan, was authorized to use nuclear weapons. This arrangement precluded the possibility of any irrational decision by an individual. Hence, the decision-making process was based on the concept of consensus. Secondly, the list of the members of the committee showed overwhelming civilian representation in the Employment Control Committee. Besides the Chairman (head of the state) and vice-chairman (head of the government), the other members of this committee included: Minister of Foreign Affairs (Deputy Chairman), Minister of Defence, Minister of Interior, Chairman of Joint Chiefs of Staff Committee, Services chiefs, Director-General of Strategic Plans Division and, technical advisers and others, as required by the chairman. Presently, the NCA Employment Committee was the real decision-making body Pakistan's nuclear programme.

The Development Control Committee dealt with the planning and development of nuclear forces. It exercised day-to-day technical, financial and administrative control over the strategic organizations and also oversees the systematic development of strategic weapons programme. Its Chairman was the Head of the State, Vice-Chairman Head of the Government and Deputy Chairman is CJCSC. Other members were: Services chiefs — Army, Air Force and Navy; heads of strategic organizations concerned, i.e. scientists, while the SPD the Director General serves is secretary. The Development Control Committee institutionalized the role of the armed forces in addition to that of the scientific bureaucracy. This arrangement was very important because the scientific bureaucracy needs to be familiar with the detailed texture of the current military requirements.

The Strategic Plans Division was secretariat to the NCA and was entrusted with the task of developing and managing Pakistan's nuclear capability in all dimensions — operational, planning, weapons development, arms control and disarmament affairs, command and control, storage, safety, budget, etc. Put simply, the SPD, headed by a director general, works on behalf of the NCA, which increased its role in nuclear decision-making. In addition to the SPD, separate strategic forces commands had been raised in all the three services. The services retained training, technical and administrative control over their strategic forces. Though the operational planning and control rested entirely with the NCA, yet the role of the SPD was very decisive in nuclear decision-making.

NCA Act, 2010

The process of strengthening the parliamentary system of government has also an impact on the process of nuclear decision-making in the country. The

18th Amendment to the 1973 Constitution of Pakistan, passed by the National Assembly on 8 April 2010 and by the Senate seven days later, reduced the president's constitutional powers and made the parliament sovereign in real terms. President Zardari relinquished chairmanship of the NCA in favour of the Prime Minister. After Parliament's approval and President's assent, the National Command Authority Act, 2010, came into force on 11 March 2010.[116] Article 2, Clause b. of the Act states: "Chairman means the Prime Minister of the Islamic Republic of Pakistan."[117] Other members of the Authority shall be the Minister for Foreign Affairs; Minister for Defence; Minister for Finance; Minister for Interior; Chairman, Joint Chiefs of Staff Committee; Chief of Army Staff; Chief of Naval Staff; and Chief of Air Staff. The Director General of the Strategic Plans Division, shall act as the Secretary of the Authority.[118]

Article 4 of the Act states "All the powers and functions shall rest with the National Command Authority on whose behalf the Chairman will exercise these powers and functions who may in consultation with National Command Authority and subject to such limitations as he may specify, delegate any of these powers and functions to Chairman Joint Chiefs of Staff Committee and Director General Strategic Plans Division, who may further sub-delegate the same to any employee."[119] The Strategic Plans Division shall function as the Secretariat of the Authority and shall be headed by a Director-General. The Authority may, if required, invite any head of the Strategic Organization, or any person or an expert etc., to participate in its meetings.[120] In addition to other functions the Authority is responsible for ensuring security and safety of nuclear establishments, nuclear materials and to safeguard all information and technology relating to the said matters. It also ensures security and safety of establishment and facilities, etc. of the Strategic Organizations and renders security and ensures safety of serving or retired employees.[121] The Strategic Organization means such a body as notified by the Authority to be a Strategic Organization and includes the Pakistan Atomic Energy Commission, Dr. A. Q. Khan Research Laboratories and Space and Upper Atmosphere Research Commission. Since the entry into force of the NCA Act, 2010, Prime Minister Yusuf Raza Gilani has been chairing the NCA meetings.

Conclusion

The preceding discussion seeks to prove that during the evolution of Pakistan's nuclear programme different institutions of the country were involved in the nuclear decision-making. But the national Parliament, even during the era of parliamentary governments in Pakistan, was not involved in the nuclear decision-making. Instead of a Parliamentary Act, for example, the Ordinance provided legal basis to the NCA until the present parliament endorsed it. In 2004, however, for the first time the national parliament was involved in the nuclear decision-making a law passed — Export Control on Goods, Technologies, Material and Equipment related to Nuclear and Biological Weapons and their Delivery Systems Act, 2004 — in September 2004.[122] The purpose of this Act was to further strengthen controls on export of sensitive

technologies, particularly those related to nuclear and biological weapons and their means of delivery. Historical trends indicate that the parliament was bypassed on sensitive nuclear decision-making, especially regarding nuclear weapons' quantitative and qualitative improvement, mating the devices with delivery systems, deployment of nuclear weapons, etc.

Secondly, the western literature depicts that Pakistani politicians lack adequate awareness of the country's nuclear capability. Therefore, the military enjoys autonomy in the nuclear decision-making. In reality, however, most politicians do have a high level of awareness of the basic facts and Pakistan's armed forces' role is limited to input at the technical level of strategy, and would obviously be active during the conduct of war. In reality, however, since the retirement, and later resignation, of president Musharraf the armed forces' representation on the employment committee of the NCA is limited to Joint Chiefs of Staffs Committee chairman. All the remaining members are civilians. This composition of the committee reflects overwhelming representation of civilians in the nuclear decision-making process.

Thirdly, the recent and distant military interventions in the political realm minimize the significance of civilians in nuclear decision-making. The history of civil-military relations has generated two competing notions about nuclear decision-making in Pakistan. One school of thought believes that both the formulation and execution of nuclear strategy is in the domain of the Armed Forces of Pakistan, particularly the Army, which has complete control over nuclear decision-making. The second school of thought opines that civil political leadership has the decisive role in nuclear decision-making. Indeed, Pakistan's nuclear weapons programme was started by a civilian prime minister — Zulifkar Ali Bhutto — and the decision to conduct the nuclear weapon tests in May 1998 was made by Nawaz Sharif, another elected civilian head of the government. Moreover, during the second tenure of prime minister Benazir Bhutto, Pakistan's ballistic missiles inventory received a boost. Zia-ul-Haq had only upheld Zulfikar Ali Bhutto government's nuclear policy. Again, Gen Musharraf did not disrupt the evolutionary process of Pakistan's nuclear programme, except for institutionalizing the National Command Authority in February 2000, and introducing the system of nuclear scientists' debriefing, and promulgation of the abovementioned control law in September 2004 passed by the parliament of Pakistan. The rhetorical shift in the realm of nuclear posture, i.e. 'No-First-Use' came after the re-establishment of civilian political setup. Nevertheless, after the maiden attempt to present Pakistan's nuclear posture differently, President Zardari did not comment on this issue. Further, in the 1970s, Zulfikar Ali Bhutto had not only laid the foundation, but also provided real impetus to Pakistan's nuclear weapons programme. Since then, it had gained such a momentum that even after his departure no political or military leader could stop it because it had won overwhelming public support. This public support would remain a decisive factor in nuclear decision-making in Pakistan.

To conclude, political stability ensuring continuity and prosperity of the democratic system in Pakistan is a pre-requisite to end the ambiguities regarding

nuclear decision-making in the country. If the current political situation continues, and the democratic institutions gradually mature, the nuclear decision-making would be more transparent and evident in the domain of the elected civilian government. The military's role would be limited to tactical, operational and theatrical levels of nuclear strategy. The defence committees, those of the Federal Cabinet, Senate and National Assembly, would become more vibrant and efficient in their functions. Consequently, the country's political culture would be transformed, and the people of Pakistan start accepting that the armed forces do not take initiatives in nuclear decision-making and always await authorization from political masters through the National Command Authority.

Notes and References

1. Article 245 of the Constitution of the Islamic Republic of Pakistan spells out the functions of the Armed Forces. Clause 1 of this article (245) states: "The Armed Forces shall, under the directions of the Federal Government, defend Pakistan against external aggression or threat of war, and, subject to law, act in aid of civil power when called upon to do so."

2. Jawed Naqvi, "Zardari suggests accord to avoid nuclear conflict in S. Asia," *Dawn,* 23 November 2008. <http://archives.dawn.com/2008/11/23/top1.htm>; accessed on 19 February 2012.

3. Ibid.

4. "No first use (NFU)" refers to a pledge or a policy by a nuclear power not to use nuclear weapons as a means of warfare unless first attacked by an adversary with nuclear weapons. Pakistan maintains its "first-use" option, partly because it has no confidence in India's "no-first-use" declaration and partly because it is perceived by Pakistan as undermining its nuclear deterrence. Islamabad also viewed its nuclear weapons as a conventional force multiplier, or to address the increasing conventional asymmetry between the two neighbours.

5. "Pakistani Nuclear Deterrence And Foreign Policy", An interview with Pakistani foreign minister on 4 November 2003, <http://www.pakistanidefence.com/news/Articles&Analysis/InterviewFM,NuclearDetence.html>.

6. Shamshad Ahmed, foreign secretary of Pakistan, stated in a press conference in Islamabad on 30 May 1998.

7. India brandishes its declaration on no-first-use of nuclear weapons, but reserves for itself the right to use conventional force.

8. The perception that without nuclear deterrence, Pakistan will be vulnerable to Indian aggression is based on historical realities. The inequality in military balance of power, and non-functional security alliances were among a few important factors that resulted in the dismemberment of Pakistan in 1971.

9. Numerous facts unveil India's aggressive tendencies. For instance, on 4 January 2003 its Cabinet Committee on Security reviewed the operationalization of its nuclear doctrine — "nuclear weapons will only be used in retaliation against a nuclear attack on Indian territory, or on Indian forces anywhere." The "Indian forces anywhere" indicates that Indian forces would be happened to be on another state's territory as an occupation force, or even if in an aggressive mode. Dr. Zafar Iqbal Cheema, "Pakistan's Posture of Credible Minimum Deterrence: Current Challenges and Future Efficacy," *Margalla Papers,* Special Edition — Nuclear Pakistan: Ten Years On, 2008, pp.50-51.

10. The ideas one develops about correct strategy and policy can be termed inferential learning because they involve drawing inferences from the underlying facts. Jeffrey W. Knopf, "The Concept of Nuclear Learning," paper prepared for the "Decade of Nuclear Learning in South Asia" Conference, Honolulu, Hawaii, 12-13 February 2009.

11. E. H. Carr, *The Twenty-Year Crisis, 1919-1939* (New York: Harper and Row, 1964). Hans J. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace,* (New York: Alfred A Knopf, 1973, Fifth Edition); Kenneth N. Waltz, *Theory of International Politics*, (California: Addison-Wesley Publishing Company, 1979); Zulfikar Ali Bhutto, *If I am Assassinated* (Lahore: Classic, 1989); Pervez Musharraf, *In the Line of Fire: A Memoir* (New York: Simon & Schuster, 2006).

12. Bernard Brodie, *The Absolute Weapon: Atomic Power and World Order* (New York: Harcount Brace & CO., 1946); Lawrence Friedman, *Deterrence* (Cambridge: Polity Press, 2004); Lawrence Friedman, *The Evolution of Nuclear Strategy,* Third Edition (New York: Palgrave, 2003); Scott D. Sagan, Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate Renewed* (New York: W.W. Norton, 2003); Peter R. Lavoy, Scott D. Sagan, and James J. Waltz, *Planning the Unthinkable: How New Powers Will Use Nuclear, Biological, and Chemical Weapons,* (London: Cornell University Press, 2000); Sir Michael Quinlan, "India-Pakistan Deterrence Revisited," *Survival*, Vol. 47, No. 3, Autumn, 2005; Rifaat Hussain, "Nuclear Command/Control and Deterrence Stability," *Strategic Issues,* No. 3, March 2000; Rifaat Hussain, "Nuclear Doctrines in South Asia." *SASUU Research Report*, No 4, December 2005; Dr. Zafar Iqbal Cheema, "The Role of Nuclear Weapons in Pakistan Defence Strategy" *IPRI Journal,* Islamabad, Summer 2004; Dr. Zafar Iqbal Cheema, "Pakistan's Posture…" op.cit.,

(ref 9); Feroz Hassan Khan, "Nuclear Proliferation Motivations: Lessons from Pakistan," *Nonproliferation Review,* Vol.13, No.3, November 2006; Naeem Ahmad Salik, "Pakistan's Ballistic Missile Development Programme — Security Imperatives, Rationale and Objectives," *Strategic Studies,* Vol. XXI, No.1, Spring 2001.

13. Barry Buzan, Ole Waever, Jaap de Wilde, *Security: A New Framework For Analysis* (London: Lynne Rienner Publishers, 1998), p.21.

14. Ibid, pp.7-8.

15. Michael G. Roskin. "National Interest: From Abstraction to Strategy," http://dde.carlisle.army.mil/ce-slrc/roskin.doc , accessed on 30 December 2004.

16. Samina Ahmed and David Cortright, "Pakistani Public Opinion and Nuclear Weapons Policy," in Samina Ahmed and David Cortright, ed. *Pakistan and the Bomb: Public Opinion and Nuclear Options* (Karachi: Oxford University Press, 2001), pp. 9, 10.

17. Pervez Musharraf, op.cit., (ref.11), pp.283-284.

18. Dr. Z. I. Cheema, "Pakistan's Posture…", op.cit., (ref.9), p.43.

19. Ibid, p.43.

20. Indian defence minister George Fernandes seconded Gen V.P. Malik's argument in the inaugural address, "The Challenges of Limited War: Parameters and Options", New Delhi, January 5, 2000. For more, see General V. P. Malik, *Kargil: From Surprise to Victory* (New Delhi: HarperCollins Publishers, 2006), pp. 363-366.

21. According to the "Cold Start Doctrine," in any future conflict scenario where a "blitzkrieg"-type strategy is going to be followed, joint operations involving the Indian army, Indian air force and Indian navy would be an imperative. Intended to allow India to mobilize quickly and undertake limited retaliatory attacks on its neighbour, without crossing Pakistan's nuclear threshold. The doctrine marks a break with the fundamentally defensive military doctrines that India has employed since gaining independence in 1947. It primarily aims at capturing strategic places of Pakistan through speedy surprise combatant forces offensive operation that minimize Pakistan's reaction time to position its own forces at the front appropriately to confront Indian strike forces. In addition, the rapid military operation also avoids the possibility of third party — the United States and Britain — diplomatic intervention and pressure on India's leadership not to attack Pakistan. Walter C. Ladwig III, "A Cold Start for Hot Wars? The Indian Army's New Limited War Doctrine," *International Security*, Vol.32, No.3, Winter 2007-08. Dr Subhash Kapila, "India's new Cold Start war doctrine strategically reviewed," *South Asia Analysis Group,* Paper No. 991, 4

May 2004, http://www.southasiaanalysis.org/papers10/paper991.html, accessed on 15 July 2008.

22. Quoted in Dr. Z.I. Cheema, "Pakistan's Posture…", op.cit, (ref.9), p.59; "Pakistan says Indian nuclear plan threatening global stability," *The News,* 26 August 1999.

23. At present reports on the NCA meetings and decisions are posted on the ISPR website. This transparency approach of the SPD contributed constructively to understanding and analyzing the nuclear posture of Pakistan. Besides, the author along with other security observers, was invited by the SPD for occasional short background briefings at headquarter in Rawalpindi, Pakistan.

24. "Siding with the West during the peak of the Cold War, military officials had become the beneficiaries of large-scale Western military and economic assistance, resulting in a constant expansion of the military establishment and consolidation of its political standing vis-à-vis political rivals in the state." Samina Ahmed and Cortright, "Pakistani Public Opinion and Nuclear Weapons Policy," op.cit, (ref.16), p.9.

25. Dr. Nazir Ahmed's tenure as chairman of Pakistan Atomic Energy Commission was 1955-1960. He was succeeded by Dr. I. H. Usmani who remained chairman until 1972. Munir Ahmed Khan replaced Dr. Usmani and worked from 1972-91. S. N Burney, "Munir Ahmed Khan and I," *The News,* Rawalpindi/Islamabad 3 June 1999.

26. Munir Ahmad Khan, "Nuclearisation of South Asia and its Regional and Global Implications," *Regional Studies,* Vol. XVI, No. 4, Autumn 1998, p. 11.

27. Farhatullah Babar, "Bhutto's footprints on nuclear Pakistan," *The News,* 4 April 2006.

28. Speech delivered by Munir Ahmed Khan, on 20 March 1999: Chaghai Medal Award Ceremony, Pinstech, Nilore, Islamabad.

29. Ibid. Munir Ahmad Khan's elder brother Khurshid Ahmad was minister for law in the Ayub cabinet. In addition, Zulfikar Ali Bhutto had an inclination towards nuclear knowhow. These two connections might have facilitated the meeting between the scientist and the president of Pakistan in London.

30. Ibid.

31. Ayub Khan, too, did not favour the idea. Abdul Sattar, *Pakistan's Foreign Policy, 1947-2005: A Concise History* (Karachi: Oxford University Press, 2007), p.145.

32. Feroz Hassan Khan, "Nuclear Proliferation Motivations: …," op.cit., (ref.12), p.505.

33. Munir Ahmed Khan, op.cit., (ref.28).

34. Abdul Sattar, *Pakistan's Foreign Policy…*, op.cit., (ref.31), p.145.

35. Dr Salam once asked the deputy chairman, Planning Commission, to consult scientists in the formulation of policies for science-based industries. The deputy chairman arrogantly replied:" Why should I consult the scientists; I do not consult my cook to show me how to run my household? Dr Nazir informed the PAEC Board meeting on 9 March 1959 of his failed attempts to persuade the financial bureaucrats to get a decision in favour of the CP-5 reactor. Shahid-ur-Rehman, *Long Road To Chagai* (Islamabad: Print Wise Publications, September 1999), pp.21-23.

36. "A Science Odyssey: Pakistan's Nuclear Emergence," speech delivered by Dr. Samar Mubarakmand on 30 November 1998 at Khwarzimic Science Society, Government College, Lahore.

37. As minister of minerals and Natural Resources, Zulfikar Ali Bhutto laid the foundation-stone of Pinstech in 1963. Munir Ahmad Khan, "Bhutto and nuclear programme of Pakistan," *The Muslim,* Islamabad, 4 April 1995.

38. *Morning News*, Karachi*,* 29 November 1972.

39. Abdul Sattar, op.cit., (ref.31),p.144.

40. Soon after the Chinese nuclear test, Dr Homi Bhabba, the head of India's Atomic Energy Commission, lobbied for the development of nuclear weapons capability, claiming that India could develop a bomb in 18 months. Scott D. Sagan, "Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb," *International Security,* Vol. 21, No. 3, Winter 1996-97, p. 66.

41. Quoted in Farhatullah Babar, "Bhutto's footprints…," op.cit., (ref.27).

42. *Morning News* op.cit., (ref.38). Munir Ahmad Khan, "Bhutto and…," op.cit., (ref.37).

43. Shahid-ur-Rehman, op.cit., (ref.35), p.16.

44. Abdul Sattar, *Pakistan's Foreign Policy…,* op.cit., (ref.31), pp.145-146.

45. Munir Ahmad Khan, op.cit., (ref.28).

46. Zahid Malik, *Dr. A. Q. Khan and The Islamic Bomb* (Islamabad: Hurmat Publications, 1992), p. 201.

47. On 15 February 1975 Munir Ahmad Khan obtained approval for $ 450 million nuclear weapons programme from prime minister Bhutto. This plan included: uranium refining and conversion, (UF6), production complex at BC-IR at Dera Ghazi Khan; a centrifuge plant at Kahuta; a

nuclear weapon design programme in PAEC. M. H Chaudhry, "Pakistan's Nuclear History: Separating Myth from Reality," *Defence Journal* (Karachi: May 2006).

48. Sultan Bashiruddin Mahmood, "Obituary: A Great Loss for the Nation," *The Nation,* Islamabad, 25 April 1999.

49. Munir Ahmed Khan, op.cit., (ref.28).

50. Zafar Iqbal Cheema, "Pakistan's Nuclear Use Doctrine and Command and Control," in Peter R. Lavoy, Scott D. Sagan , and James J. Waltz, ed. *Planning the Unthinkable: How New Powers Will Use Nuclear, Biological, And Chemical Weapons* (London: Cornell University Press, 2000), p. 162.

51. Shahid-ur-Rehman, op.cit., (ref.35), p.6.

52. The team that conducted the 1983 cold test was the same that carried out the Chaghai tests in May 1998. Ibid.

53. Dr. Samar Mubarakmand, op.cit., (ref.36).

54. Ibid.

55. Ibid.

56. Ibid.

57. Speeches delivered at the memorial reference held on 28 April 2007 in Islamabad at the eighth death anniversary of Munir Ahmed Khan. See also *Nawa-i-Waqt,* (Urdu newspaper) Islamabad, 29 April 2007.

58. Farhatullah Babar, "The nuclear sage of Pakistan," *The News,* 22 April 2005. Farhatullah Babar belongs to the Pakistan People's Party, was a member of the Defence Committee of the Senate of Pakistan.

59. Zahid Malik, *Dr. A. Q. Khan…,* op.cit., (ref.46), p.255.

60. Abdul Sattar, *Pakistan's Foreign Policy…,* op.cit., (ref.31), p.147.

61. Ibid., p.148.

62. "Pakistan became a nuclear state in 1983: Dr. Samar," *The Nation,* Islamabad, 2 May 2003.

63. Quoted in Devin T. Hagerty, *The Consequences of Nuclear Proliferation: Lessons From South Asia* (London, The MIT Press, 1998), p.123. Ross H. Munro, "Knocking at the Nuclear Door," *Time Magazine*, 30 March 1987, p.42.

64. Hagerty, Ibid, pp.118-121.

65. Musharraf, op.cit, (ref.11), p.285.

66. Dr. M. S Jilani, "Man of Honor," *The News,* 3 June 1999. Farhatullah Babar, "The nuclear sage…", op.cit., (ref.58).

67. "Khan got to the point, asking Bhutto [Benazir Bhutto, in 1990] to dismiss Munir Ahmad Khan, and give him control of the country's entire nuclear programme. Munir, he argued, was delaying nuclear progress because he was not a good enough scientist or administrator to handle the job." Douglas Frantz and Catherine Collins, *The Nuclear Jihadist* (New York: Hachette Book Group, 2007), pp. 181, 182.

68. Joseph Cirincione, *Bomb Scare: The History and Future of Nuclear Weapons,* (New York: Columbia University Press, 2007), p. 64.

69. Ghulam Ishaq Khan was a long-time civil servant and Zia's finance minister and latter chairman of the Senate. After Zia's fatal plane accident, he became acting president of Pakistan and after the general elections of 1988 was elected the president of Pakistan.

70. Musharraf, op.cit., (ref.11), p.285.

71. Ibid. Musharraf writes: "I say this about the army with full authority because I became the director general of military operations (DGMO) in 1992, an appointment that involved dealing with all sensitive military planning and operational matters, but I was kept totally out of the nuclear circuit."

72. After the failure of no-confidence motion in the National Assembly against prime minister Benazir Bhutto's government, president Ghulam Ishaq deposed the government and dissolved the National Assembly by exercising his constitutional power, i.e. Article 58, Clause 2b, in August 1990

73. This impression received legitimacy when the US deputy national security chief, Robert Gates, as an envoy of president Bush in summer 1999 met Gen Beg instead of prime minister Bhutto, and president Ishaq Khan to defuse the India-Pakistan 1990 crisis.

74. Z.I. Cheema, op.cit., (ref.50), p.163.

75. Hagerty, op.cit., (ref.63), pp.135-136.

76. Frantz and Collins, op.cit., (ref.67), p.181.

77. Zahid Hussain, "Deliberate Nuclear Ambiguity," in Samina Ahmed and Cortright, ed. *Pakistan and the Bomb* op.cit., p.39.

78. Samina Ahmed and Cortright, op.cit., (ref.16), p.13.

79. Independent verification of the enrichment capping was not possible because the nuclear facility involved was not subject to international nonproliferation safeguards. Zahid Hussain, "Deliberate Nuclear Ambiguity," op.cit., (ref.77), p.30.

80. Hagerty, op.cit., (ref.36), pp.128-129. In her speech before a joint session of Congress in June 1989, prime minister Benazir Bhutto said: "Speaking for Pakistan, I can declare that we do not possess nor do we

intend to make a nuclear device. That is our policy." Benazir Bhutto, "The Policies of Pakistan Nuclear Problems and Afghanistan," *Vital Speeches of the Day*, 7 June 1989, p.553.

81. Zahid Hussain, op.cit., (ref.77), p.39. Z.I. Cheema, "Pakistan's Nuclear Use Doctrine…," in Lavoy, Sagan and Waltz, op.cit., (ref.50), p.163.

82. Ibid., p.30.

83. "As the two men sat in Beg's office in Rawalpindi, Khan complained bitterly that Bhutto was hindering the advance of the nuclear programme, explaining that she had restricted his travel and kept an incompetent, Munir Khan, at the top of the PAEC to stall the final push to a weapon… Beg agreed that Bhutto was an obstruction and confided to Khan that he, too, wanted to get rid of her, but it was difficult because she remained popular with the public. Nonetheless, a new alliance had been forged." Frantz and Collins, *The Nuclear Jihadist*, op.cit., (ref.67).p.182.

84. Importantly, the Iranians received centrifuges from A Q Khan in early 1990s. But they were not able to enrich uranium because of the failure of centrifuges until 2004.

85. Z.I. Cheema, "Pakistan's Nuclear Use Doctrine…," op.cit., (ref.50), p.164.

86. Ibid, p. 164.

87. Participant of the DCC meeting held at Prime Minister Secretariat in Islamabad were foreign minister Gohar Ayub Khan, foreign secretary Shamshad Ahmad, finance minister Sartaj Aziz, the three services chiefs, Dr. Abdul Qadeer Khan and Dr Samar Mubarakmand. Shahid-ur-Rehman, *Long Road…,* op.cit., (ref.35).pp.9-10.

88. Shahid-ur-Rehman, ibid., p.11.

89. Dr. Samar Mubarakmand, op.cit., (ref.36).

90. Babar Dogar, "Nawaz takes the plunge at last," *The News,* 22 February 2009.

91. Abdul Sattar, op.cit., (ref.31), p.202.

92. Munir Ahmad Khan, "Nuclearisation of South Asia…" op.cit., (ref.26), p.29.

93. President Dwight-Eisenhower declared at a press conference on 16 March 1955, that nuclear weapons should be "used just exactly as you would use a bullet or anything else." Quoted in Nina Tannenwald, *The United States and the Non-Use of Nuclear Weapons since 1945* (New York: Cambridge University Press, 2007), p.9.

94. Samina Ahmed, "Security Dilemmas of Nuclear-Armed Pakistan," *Third World Quarterly,* Vol. 21, No.5, October 2000, p.783.

95. William D. Hartung and Frida Berriganp, "Arms and Terrorism: Tracing the Links," in Sean S. Costigan, & David Gold, ed. *Terrornomics,* (England: Ashgate Publishing Limited, 2007), p.95.

96. The global underworld nuclear bazaar has been working since 1940s. In spite of tightened control regimes, it has prospered far beyond anything anyone had predicted, with buyers and sellers from countries around the globe.

97. Jeremy Bernstein, *Nuclear Weapons: What you need to know,* (New York: Cambridge University Press, 2008), p.266.

98. Quoted in Bruno Tertrais, "Not a 'Wal-Mart', but an 'Imports-Exports Enterprise': Understanding the Nature of the A.Q. Khan Network," *Strategic Insights,* Volume VI, Issue 5, August 2007. Accessed on 3 May 2009.

99. Bernstein, op.cit., (ref.97), p.269.

100. The Zipp centrifuge can produce as many as 90,000 revolutions per minute. One of the innovations was to heat the bottom so as to produce countercurrents. The heavier Uranium-238 is collected in a downward-moving current at the outside while the lighter Uranium-235 moves on an upward current on the inside, where it can be collected. The original centrifuges used aluminum rotors, but aluminum has now been replaced by specialized steels. Bernstein, op.cit., (ref.97), p.263.

101. Bernstein, op.cit., (ref.97), p.263.

102. In November 2003, president Moammar Gadhafi decided to renounce Libya's weapons of mass destruction programme and opened his country's weapons laboratories to international inspection. The Libyan government gave a package of documents to the US officials. Experts from the United States, Britain and the International Atomic Energy Agency analyzed the documents. They concluded that bomb designs and other papers turned over by Libya had yielded evidence of Pakistani-led trading network in transferring nuclear know-how to Libya.

103. "Malaysian police report implicates Dr. A. Q. Khan," *Dawn,* 21 February 2004.

104. "Nuclear Black Markets: Pakistan, A. Q. Khan and the rise of proliferation networks: A net assessment," *On ISS Strategic dossier* (London: The International Institute for Strategic Studies, 2007), pp.96-100.

105. Zafar Nawaz Jaspal, "Pakistan and the Issue of Nuclear Proliferation," *Margalla Papers,* Special Edition, Nuclear Pakistan: Ten Years On, 2008, pp.82, 83. Abdul Satar, op.cit., (ref.31), p.218.

106. Abdul Sattar, (ref.31), p.218.

107. Tertrais, op.cit., (ref.98).

108. Bernstein, op.cit., (ref.97), p.267.

109. The succeeding paragraphs on the National Command Authority have been adopted from the author's recently published article the Issue of Nuclear Proliferation," *Margalla Papers,* Special Edition, Nuclear Pakistan: Ten Years On, 2008, pp.92-94.

110. Musharraf, op.cit., (ref.11), p.286.

111. Kenneth N. Luongo and Brig. Gen. (Ret.) Naeem Salik, "Building Confidence in Pakistani Nuclear Security," *Arms Control Today.* December 2007, accessed on 28 March 2012.

112. "National Command Authority formed", *Dawn,* 3 February 2000.

113. Musharraf, op.cit, p.287.

114. *Dawn*, 14 December 2007.

115. The text of Ordinance LXX—2007.

116. *The Gazette of Pakistan Extraordinary,* Published by Authority, Registered No. M-302/L-7646, Islamabad, 11 March 2010.

117. Ibid. p.75.

118. Ibid. p.76.

119. Ibid. pp.76-77.

120. Ibid. p.77.

121. Ibid. p.78.

122. The control list for the act encompasses the lists and scope of export controls maintained by the Nuclear Suppliers Group, the Missile Technology Control Regime, and the Australia Group (for biological agents).