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Evolution of Pakistan's Nuclear Weapon Programme

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Tahir Mahmood Azad* | Hina Shahid †

Abstract *The purpose of this paper is to discuss the development of Pakistan's nuclear progarmme before and after 1998. Pakistan started its nuclear programme solely for peaceful purpose, and it had no intention to develop nuclear weapons. However, India's objective to acquire nuclear weapons compelled Pakistan to make its own weapon to deter India. After the 1971 war and India's so-called Peaceful Nuclear Explosion (P.N.E.) in 1974, there was no option left for Pakistan but to build its bomb to deter Indian aggression. This paper comprehensively discusses the evolution of Pakistan's nuclear programme, the role of civil-military leadership and furthermore, the development of the command and control system. This paper further elaborates the development of missile technology and the nuclear policy of the country.*

Key Words: Nuclear Weapons, Nuclear History, Civil Programme, Pakistan's Policy

Introduction

This paper broadly debates the development of Pakistan's nuclear programme and lead the discussion to why, how and when Pakistan developed its nuclear weapons. The development of Pakistan's nuclear programme has been divided into two phases, such as pre-1998 and post-1998. Phase one discusses Pakistan's nuclear programme before its nuclear tests in 1998. It fundamentally discusses the manufacturing period of Pakistan's nuclear programme. Phase two basically elaborates on Pakistan's nuclear developments after its nuclear tests in 1998. The post-1998 phase is the era of development of nuclear planning and strategy, command and control system and enhancing nuclear safety and security mechanisms.

The journey of Pakistan's nuclear weapons programme is not very long. It mainly started after 1970. The evolution of Pakistan's nuclear programme is divided into two sections. The first provides a comprehensive historical account of Pakistan's nuclear programme. It further discusses the role of various political and decision-making elites in the national nuclear programme. The second section deals with Pakistan's post-1998 nuclear development.

- Pre-1998 era: The Evolution of Nuclear Weapon Programme.
- Post-1998 era: Institutional and Doctrinal Development.

Initially, Pakistan's nuclear programme was primarily for peaceful purposes. The principal objective was to pursue nuclear technology only for civilian purposes. Pakistan had no intentions of making a nuclear bomb. After the partition of the Subcontinent in 1947, Pakistan was conventionally weak in comparison to traditional rival India. Asymmetry in conventional forces did not push Pakistan to acquire unconventional weapons at that time. Surprisingly, Pakistan was

* Visiting Research Fellow, Centre for Science & Security Studies (CSSS), War Studies Department, King's College London. Email: tahir_mahmood.azad@kcl.ac.uk

† Assistant Professor, Department of Arts & Media, Foundation University, Islamabad, Pakistan.

successful in the 1948 and 1965 wars to curtail the mighty Indian conventional force. Even until the late 1960s, there was no scientific or political move for the acquisition of nuclear weapons. It was only Zulfiqar Ali Bhutto, during the 1960s when he served in the cabinet of President Ayub Khan, was keen for Pakistan to acquire nuclear technology for both civil energy and security purposes (Nizamani, 2000, p.55). Bhutto, as Foreign Minister, urged President Ayub Khan to acquire a nuclear bomb, but the then Chairman of the Pakistan Atomic Energy Commission (PAEC), I.H. Usmani, advised Ayub Khan to resist the nuclear option (Cheema, 2000, p.161). Ayub Khan was never interested in the nuclear weapon programme.

Pakistan initiated its pursuit for nuclear technology for the purpose of civil nuclear energy under U.S. President D. Eisenhower's 1953 "Atoms for Peace Plan" (Fischer, 1997, p.9; Hagerty, Miller, Lynn-Jones, & Motley, 1998, p.73). In 1955, under the Chairmanship of Dr Nazir Ahmad, Pakistan established a 12-member Atomic Energy Committee to work out a strategy for the development of nuclear energy for peaceful purposes in Pakistan (Bhola, 1993, p.22). The prime objective was to find out the opportunities in the nuclear field. After the recommendations of this committee in 1956, Pakistan established the Council of Atomic Energy (C.A.E.), consisting of a Governing Body and the Atomic Energy Commission (Qureshi, 2020, p.7). Nazir Ahmad became the first Chairman of the newly established PAEC (Qureshi, 2020). In 1957, Pakistan became a member of the IAEA. Later on, several developments occurred in the civilian nuclear program. Those included the establishment of the Atomic Energy Centre, Lahore in 1961, the foundation stone laying of the Pakistan Institute of Nuclear Science and Technology (PINSTECH) in 1963, establishing a number of research facilities in various disciplines of nuclear science and technology, sending scientists and engineers to the U.S.A. for various trainings and courses. Many young nuclear scientists and engineers were also recruited and offered attractive packages and facilities under the close surveillance of Intelligence agencies. The whole exercise was to achieve better results in civil nuclear technology. According to Qureshi (2020), "Pak Atom" started in 1969, but remained irregular for some years. Furthermore, PAEC also published a list of its scientists and engineers in 1967 and also in 1970. But later on, its publication was suspended for security reasons" (p.10).

Z.A. Bhutto failed to convince President Ayub Khan in the 1960s to start a nuclear programme. He, however, kept his ambitions alive until he became the President of Pakistan in 1972. The embargo on military supply imposed by the U.S.A. right after the 1965 Pakistan-India war further provoked Pakistani authority to pursue a policy of self-reliance and self-defence strategy. The loss of East Pakistan in 1971 and the Indian nuclear test in 1974 (F. Khan, 2012, p.6) were the major factors apprising Pakistan's decision to acquire nuclear weapons for security purposes (Z. Khan, 2014, p.33). In 1972, Bhutto finally decided to start Pakistan's nuclear weapon programme. "Bhutto apparently held a meeting of top officials and scientists on January 20, 1972, in Multan, where they decided on a crash programme [nuclear weapon programme], through reprocessing of Plutonium" (Paul & Paul, 2000, p.133). In the early 1970s, political and military elites were totally convinced that Pakistan had to build its own nuclear bomb to deter Indian aggression. But, Pakistan's nuclear industry was not mature and advanced at that time. There was a will, but the technology was insufficient to build a bomb (Chakma, 2004, p.19).

A new shift was witnessed in Pakistan's nuclear weapon program in 1974. In September 1974, a young Pakistani scientist, A.Q. Khan, who had been associated with the Netherlands for a subcontract of the European Enrichment Consortium (URENCO), wrote a letter to Prime Minister Z.A. Bhutto offering to assist Pakistan to build a nuclear bomb (Fuhrmann, 2012, p.194). A.Q. Khan got full support from the Prime Minister (IBP USA, 2009, p.116). In 1976, the Engineering Research Laboratory (E.R.L.) was established under A.Q. Khan's control (which later came to be known as Kahuta Research Laboratory (K.R.L.), which became central to Pakistan's nuclear weapon programme (Perkovich, 1999, p.196).

During the late 1970s, Pakistan got sufficient achievements in the nuclear weapon programme. K.R.L. and PEAC did their best in the national security interest of Pakistan. In 1982, A.Q. Khan was successful in producing enough highly-enriched uranium (HEU-235) to build a bomb (Jones, 2003, p.201). The next step was to work on the nuclear device. Munir Khan, the then Chairman of the

PAEC, claimed that PAEC had conducted a cold test for a nuclear device on March 11, 1983 (Ahmed, 2012, p.72). Subsequently, there was a series of developments in the nuclear weapon programme. The first time Pakistan tested its nuclear deterrence strategy successfully against possible Indian aggression was in 1986-87. In response to the Indian Brasstacks Exercise in Northern Rajasthan, on January 28, 1987, A.Q Khan stated categorically that Pakistan had enough weapons-grade enriched uranium, and he further confirmed that "a nuclear device could be tested by simulation techniques" (Chari, 2003, pp.14-15). During the 1990 crisis over the Kashmir issue (Chari, 2003, pp.16-17), the nuclear factor was apparent in controlling the situation between Pakistan and India.

After acquiring weapons-grade enriched uranium, Pakistan concentrated on developing the delivery system. In the mid-1980s, Pakistan began its ballistic missile programme (Izuyama & Ogawa, 2003, p.78). There was a substantial development in the ballistic missile programme. On May 28, 1998, Pakistan successfully conducted its nuclear tests in response to the Indian nuclear tests earlier the same month. In the following figure, various nuclear facilities of Pakistan have been highlighted:

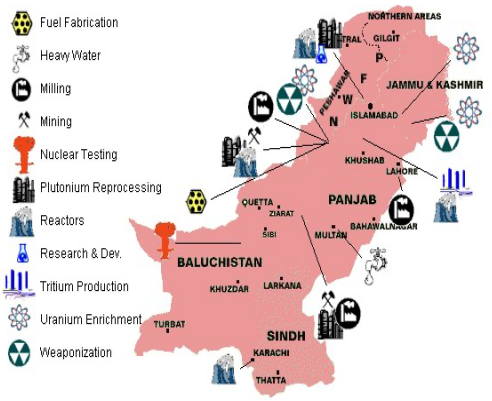

Figure 1: Pakistan's Nuclear Facilities Until 1998 (Hayes, 1999, pp.28-30)

Source: Hayes, Bradd. "International Game '99: Crisis in South Asia", Sponsored by the United States Naval War College, January 28-30, 1999, http://www.fas.org/nuke/guide/pakistan/docs/sapp_rpt.htm, Accessed on September 16, 2020.

Pakistan's civil nuclear programme in under IAEA safeguards. The following tables show various nuclear sites which are under IAEA safeguards agreements.

Table 1. Summary of Various Safeguards Agreements with the Agency (S. Khan & Mulla, 2015, p.2)

S. No.	Facility	Agency Publication	Date of Signing
1.	Pakistan Research Reactor-1 (PARR-1)	INFCIRC/34	March 05, 1962
2.	Karachi Nuclear Power Plant (KANUPP)	INFCIRC/116	Jun 17, 1968
3.	Karachi Nuclear Power Plant (KANUPP)	INFCIRC/135	October 17, 1969
4.	Fuel Reprocessing Plant	INFCIRC/239	March 18, 1976
5.	Hawks Bay Depot	INFCIRC/248	Mar 02, 1977

6.	Pakistan Research Reactor-2 (PARR-2)	INFCIRC/393	September 10, 1991
7.	Chashma Nuclear Power Plant-1 (C-1)	INFCIRC/418	February 24, 1993
8.	Chashma Nuclear Power Plant-2 (C-2)	INFCIRC/705	February 22, 2007
9.	Chashma Nuclear Power Plant-3 & 4 (C-3/C-4)	INFCIRC/816	April 15, 2011
10.	Karachi Units 2 & 3	INFCIRC/920	May 3, 2017

Source: Salim Khan and Muhammad Saeed Mulla, "Safeguards in Pakistan-State-Agency Cooperation," IAEA, Paper No. IAEA-CN-220-xx, 2014, p.2.

Pakistan also adheres to international efforts for nuclear safety, and it has become part of various international efforts in this regard. Pakistan is part of the following international nuclear-related engagements:

Table 2. International Engagements

S. No.	International Nuclear Engagements
1	Convention on the Physical Protection of Nuclear Material, 1980 (CPPNM), including an amendment adopted in 2005. The Physical Protection of Nuclear Material and Nuclear Facilities INFCIRC/225/Rev.4 (INFCIRC/ 225).
2	Convention on Early Notification of a Nuclear Accident, 1986 (CENNA).
3	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, 1986 (CACNARE).
4	Convention on Nuclear Safety.
5	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management 2001.
6	Convention on Suppression of Acts of Nuclear Terrorism, 2005.
7	Code of Conduct on the Safety of Research Reactors on 8 March 2004.
8	Guidance on the Import and Export of Radioactive Sources.
9	United Nations Security Council resolution 1540.
10	The Global Initiative to Combat Nuclear Terrorism (GICNT).
11	IAEA Illicit Trafficking Database (ITDB).
12	Nuclear Security Summit, 2010, 2012 and 2014.

Command and Control System

Developments of strategic organizations have occurred during recent years in the domain of nuclear command and control system. Mutual cooperation and harmony between civil and military leadership have been considered a very important factor for a robust nuclear command and control system. Technological advancement has further enhanced the capabilities of this system. Nuclear weapon modernization, weapons' coding, and locking mechanism have further tightened the security system. After Zulfiqar Ali Bhutto, Pakistan's military took complete control over the country's nuclear weapon programme. In the post-nuclearization environment (1998), Pakistan was in dire need of a system that could oversee and regulate policies about nuclear weapons. In the absence of a formal functional organization to manage the techno-political matters of nuclear weapons' security, nuclear weapon development and strategies were not under a single command. The Combat Development Directorate (CD Directorate) was the centre of the nuclear programme from 1993 to 1998 (F. Khan, 2012, p.325). The creation of robust nuclear command and control system was not only "to establish a harmonized command and control mechanism, operational policy, and development strategy, but also to provide credibility to strategic deterrence" (Durrani, 2004, p.49). To fill this vacuum, Pakistan took many steps. After taking power in October 1999, the National

Security Council (N.S.C.), a committee of 13 members, was instituted by former President General Parvez Musharaf (Chakma, 2004, p.75). To establish a more effective and highly centralized hierarchy, Pakistan took affirmative decisions in the best national interest. In this regard, Lt. General Khalid Kidwai, the first Director-General of S.P.D., has played a vital role in setting the constitution of nuclear command and control in the late 1990s (F. Khan, 2012).

After conducting nuclear tests, Pakistan focused on the development of a command and control system and doctrinal development. The 1999 Kargil crisis provided an opportunity to fill the missing links in nuclear strategy and to further strengthen the deterrence strategy. The military standoff in 2002-2003 was a test case for nuclear deterrence in South Asia. Most importantly, Pakistan enhanced its nuclear missile delivery system and also introduced tactical nuclear weapons (T.N.W.) to counter any kind of Indian aggression.

Pakistan considerably enhanced the institutional framework for controlling its nuclear weapons. The National Command Authority (N.C.A.) was created on February 2, 2000 (Lavoy, 2009, p.12). The Prime Minister heads the N.C.A. The National Command Authority exclusively manages the activities and supervision of all such organizations engaged in nuclear weapons research, development, and employment, as well as the military services that operate the strategic forces (Medalia et al., 2009, pp.8-9). The Strategic Plans Division (S.P.D.) is the secretariat of the N.C.A., which is located at the Joint Services Headquarters. The other very effective body is the Pakistan Nuclear Regulatory Authority (PNRA). "Under the Pakistan Nuclear Regulatory Authority Ordinance, 2001, the Pakistan Nuclear Regulatory Authority (PNRA) was established in 2001 as an independent regulatory body to regulate and supervise all matters related to the safety of nuclear and radiation facilities in the country" (Pakistan Nuclear Regulatory Authority, 2011, p.1). PNRA's function is primarily regarding the civil nuclear programme. Pakistan has developed a nuclear management system in all civil and military domains. The country has also achieved an important development and outcome in nuclear-related activities. It has also ensured the safety and security of all nuclear-related technology and weapons.

Pakistan has advanced its nuclear warhead delivery system and introduced the ballistic and cruise missiles system. The following table shows the design characteristics of Pakistan's missile technology.

Table 3. Design Characteristics of Pakistan's Ballistic Missiles (Kristensen & Norris, 2011, p.93; Nuclear Threat Initiative, 2011)

Name	Other Names	Type	Length (m)	Diameter (m)	Payload (kg)	Range (km)	Circular Error Probable-CEP (m)	Propellant	Status
Hatf-1		SRBM	6.0	0.56	500	60-70	Unknown	Solid	Operational
Hatf1A		SRBM	6.0	0.56	500	100	Unknown	Solid	Operational
Hatf-1B		SRBM	6.0	0.56	500	100	Unknown	Solid	Operational
Hatf-2	Abdali-Shadoz	SRBM	6.5	0.56	500	180-200	150	Solid	Operational
Hatf-2A*	Abdali	SRBM	6.5	0.56	500	180-200	30	Solid	Operational
Hatf-3	Ghaznvi	SRBM	8.5	0.80	700	290-400	50-250	Solid	Operational
Hatf-4	Shaheen-1	SRBM	12.0	1.00	700	750	200	Solid	Operational
Hatf-4	Shaheen-1A**	SRBM	12.0	1.00	Unknown	900	Unknown	Solid	Unknown
Hatf-5	Ghauri, Mark III	MRBM	15.9	1.35	700-1200	1,500-1,800	2500	Liquid	Operational
Hatf-6	Shaheen-2	MRBM	17.2	1.40	700	2,500	350	Solid	Operational

Hatf-7	Babur-I	Land-based Cruise Missile	6.2	0.52	450-500	700	20-50	Turbojet/ Solid	Operational
	Babur-II		6.2	0.5	450-500	750		Solid/ Fuel	Unknown
	Babur-III	SLCM	6.2	0.5	450-500	450		Solid/ Fuel	Unknown
Hatf-8	Ra'ad-I	Air-Launched Cruise Missile (ALCM)	4.85	0.53	1100	350	20-50	Turbojet	Operational
	Ra'ad-II	ALCM	4.85	0.5		600			Operational
Hatf-9	Nasr	SRBM	6.0	0.40	400	60	Unknown	Solid	Operational
Hatf-10	Shaheen 3	MRBM	19.3	1.4		2,750		Solid	Testing
	Ababeel	MIRVs				2200			Underdevelopment
	Taimur	ICBM				7000			Underdevelopment

Source: Nuclear Threat Initiative (N.T.I.), "Design Characteristics of Pakistan's Ballistic Missiles," September 2014.

Nuclear Policy of Pakistan

Pakistan has sustained its ambiguity in its nuclear doctrine. This policy of uncertainty or ambiguity has become a dynamic segment of its nuclear deterrence strategy. Pakistan has maintained its nuclear weapons under firm confidentiality since its early development in the early 1970s (Grossman, 2013). International apprehensions about Pakistan's nuclear transparency policy have no rational sense. Every nuclear weapon states have retained their nuclear weapons and materials under extreme secrecy. Although, U.S.A, U.K and France have revealed some information publically, Russia and China have a strong secrecy policy. According to SIPRI Year Book 2013:

> France, the U.K. and the U.S.A. have recently disclosed important information about their nuclear capabilities. In contrast, transparency in Russia has decreased as a result of its decision not to publicly release detailed data about its strategic nuclear forces under New START, even though it shares the information with the U.S.A. China remains highly non-transparent as part of its long-standing deterrence strategy, and little information is publicly available about its nuclear forces and weapon production complex (Kile, Fedchenko, Gopalaswamy, & Kristensen, 2011, p.283).

All these P-5 nuclear weapon states even do not share nuclear data and information with each other. According to many nuclear experts in the West, all P-5 NWS do not trust each other in terms of sharing information about nuclear weapons and materials because of security reasons. In the same way, Pakistan does not disclose information about its nuclear weapon programme and has maintained its secrecy. "The most important reason why states might prefer to keep information on nuclear warhead deployments and arsenals secret is the fear that its revelation would weaken the security of a state and its allies because it would encourage the first strike and therefore undermine deterrence" (Schaper, 2004, p.11), says Annette Schaper. In sync with the nuclear culture maintained by the nuclear-weapon states, Pakistan would also like to keep its nuclear policy a secret to exercise its right of maintaining minimum credible deterrence. Pakistan is compelled to maintain its strategy of ambiguity to keep its nuclear weapons and materials safe and secure. Pakistan's deterrence strategy is more to counter conventional asymmetry vis a vis India on the one hand, and on the other, ensure peace in the region. In Annette Schaper's views, "smaller nuclear powers might additionally favour a policy of quantitative ambiguity as a way of protecting nuclear deterrence until they have built a survivable nuclear retaliatory force" (Schaper, 2004, p.11).

It is also in the interest of Pakistan to keep ambiguity in its nuclear policy intact to strengthen its national interest and keep its command and control system fairly transparent. Pakistan has displayed transparency in its nuclear safety and security architectures at some level. In comparison to the other nuclear-weapon states like China and India, Pakistan is more transparent.

Pakistan's nuclear complex is small as compared to other nuclear-weapon states. Approximately 70,000 people work in Pakistan's nuclear complex, which also includes 7,000 to 8,000 scientists, and about 2,000 have "critical knowledge" (Clary, 2010, p.14). The military is usually involved in providing security, command and control system and organizational matters. It is also a fact that in all nuclear-weapon states, it is the military that manages nuclear security matters and plays an effective role in nuclear command and control. In Pakistan, the military performs similar duties. It is a reality that civil-military relation in Pakistan has had a very tumultuous history. Although the historical balance of civil-military relationship in Pakistan has been oscillating, nonetheless, during the last decade, the situation has improved significantly and "healthy civil-military relations are witnessed" (ul Haq, 2012, p.110). National command authority (N.C.A.) is comprised of both top civil and military elites. It reflects a very positive image of the nuclear decision-making structure in Pakistan.

Pakistan has a firm belief that the international community has completely misperceived its nuclear weapons and underestimated its safety and security mechanisms. In addition, a media campaign has been launched to create insensitivity in the common public. International worries are based on secondary sources or assumptions based scenarios.

There are two major reasons which have made Pakistan's nuclear weapons programme so questionable:

(a) Baseless world perceptions on its security and safety, mainly due to Pakistan's ambiguous nuclear policy. This perception has largely been reinforced by Western and Indian propaganda.
(b) Pakistan's inefficiency in defending its programme despite having reasonable transparency accessible for inquiry.

Pakistan has significantly improved its nuclear safety and security architecture, and it has established an effective command and control system. It is a reality that there is no single incident of nuclear theft, attack on a nuclear facility, insider-outsider threat or any unauthorized use of a nuclear weapon. Every nuclear weapon state has some bad episodes in its nuclear history, but all nuclear-weapon states understand the dangers of these weapons. A.Q Khan incident was a test case for Pakistan, and it has learnt from this episode. Currently, Pakistan's nuclear complex is stronger, more effective, mature and reliable. Pakistan has taken various safety and security measures to increase global confidence in the security of its nuclear weapons. Pakistan has stored its nuclear weapons in components form (Lewis, 2010, p.4). This is also a fact that "the United States has provided substantial assistance to improve the security of Pakistan's arsenal, such that today it is largely safe and secure during peacetime" (Lewis, 2010, p.1). According to Matthew Bunn, the United States has cooperated with Pakistan in improving its nuclear security. According to Jeffrey Lewis, "The United States has provided approximately $100 million to Pakistan in the form of training and equipment" (Lewis, 2010, p.3). Pakistan's civil-military authorities have shown full confidence over its nuclear weapons' safety and security arrangements. Pakistan believes that only a credible, safe and secure nuclear weapon system can guarantee its national security and survival against its traditional rival. Pakistan has complete understanding that nuclear weapons are a very important component of its deterrence policy, and Pakistan has to keep these weapons safe, secure and under reliable command and control system.

Conclusion

Pakistan's nuclear programme has evolved and progressed in difficult phases. During the pre and post-1998 era, Pakistan has successfully operated its nuclear programme. Both civil and military leaderships have shown true dedication and commitment to the country's nuclear programme.

From nuclear weapon development to nuclear use policy, ambiguity has been maintained as a party of nuclear strategy. Its both civil and military nuclear programme is under effective command and control system. Advancement in missile technology is also an important feature in Pakistan's strategic policy. In the meantime, Pakistan has sustained positive collaboration with the global community for safe and secure nuclear technology.

Reference

Ahmed, M. (2012). Pakistan's Nuclear Odyssey: An Organizational and Bureaucratic Politics Perspective. In K. Sasikumar (Ed.), Organizational Cultures and the Management of Nuclear Technology: Political and Military Sociology. New Jersey: *Transaction Publishers*.

Bhola, P. L. (1993). Pakistan's Nuclear Policy: *Sterling Publishers*.

Chakma, B. (2004). Strategic dynamics and nuclear weapons proliferation in South Asia: a historical analysis (Vol. 489): *Peter Lang*.

Chari, P. (2003). Nuclear crisis, escalation control, and deterrence in South Asia.

Cheema, Z. I. (2000). Pakistan's Nuclear Use Doctrine and Command and Control. In P. R. Lavoy, S. D. Sagan, & J. J. Wirtz (Eds.), Planning the unthinkable : how new powers will use nuclear, biological, and chemical weapons. New York: *Cornell University Press*.

Clary, C. (2010). Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War: *Institute for Defence Studies and Analyses (IDSA)*.

Durrani, M. A. (2004). Pakistan's Strategic Thinking and the Role of Nuclear Weapons. Cooperative Monitoring Center Occasional Paper 37. In: Sandia National Laboratories Albuquerque, NM.

Fischer, D. (1997). History of the International Atomic Energy Agency. The First Forty Years.

Fuhrmann, M. (2012). Atomic assistance: How "Atoms for Peace" programs cause nuclear insecurity: *Cornell University Press*.

Grossman, E. M. (2013). Why Almost Nobody Likes News About Pakistani Nuclear Security. http://www.nti.org/gsn/article/why-almost-nobody-likes-news-about-pakistani-nuclear-security

Hagerty, D. T., Miller, S. E., Lynn-Jones, S. M., & Motley, K. (1998). The consequences of nuclear proliferation: Lessons from South Asia: M.I.T. *Press*.

Hayes, B. C. (1999). International Game'99: Crisis in South Asia: Naval War College, Center for Naval *Warfare Studies, Strategic Research* ....

IBP USA. (2009). Pakistan Intelligence, Security Activities and Operations Handbook: *International Business Publications U.S.A*.

Izuyama, M., & Ogawa, S. (2003). The Nuclear Policy of India and Pakistan: *National Institute for Defence Studies*.

Jones, O. B. (2003). Pakistan: Eye of the Storm: *Yale University Press*.

Khan, F. (2012). Eating grass: The making of the Pakistani bomb: *Stanford University Press*.

Khan, S., & Mulla, M. S. (2015). Safeguards in Pakistan: State-Agency Cooperation.

Khan, Z. (2014). Pakistan's Nuclear Policy: A Minimum Credible Deterrence: *Routledge*.

Kile, S. N., Fedchenko, V., Gopalaswamy, B., & Kristensen, H. M. (2011). *World nuclear forces. SIPRI Yearbook 2011*, 351-352.

Kristensen, H. M., & Norris, R. S. (2011). Pakistan's nuclear forces, 2011. *Bulletin of the Atomic Scientists, 67*(4), 91-99.

Lavoy, P. R. (2009). Pakistan's Nuclear Posture: Security and Survivability; Strategic Insights: February 2009. *Strategic Insights February 2009*.

Lewis, J. (2010). Managing the Danger from Pakistan's Nuclear Stockpile: *New America Foundation*.

Medalia, J., Kan, S. A., Kerr, P. K., Migdalovitz, C., Mix, D. E., Nikitin, M. B., & Niksch, L. A. (2009). *Nuclear Weapons R&D Organiziations in Nine Nations*.

Nizamani, H. K. (2000). The Roots of Rhetoric: Politics of Nuclear Weapons in India and Pakistan. West Port: *Praeger*.

Nuclear Threat Initiative. (2011). India-Pakistan agreement on chemical weapons. https://www.nti.org/learn/treaties-and-regimes/india-pakistan-agreement-on-chemical-weapons/#:~:text=India%20signed%20the%20CWC%20on,not%20possess%20chemical%20weapons'%20stockpiles.

Pakistan Nuclear Regulatory Authority. (2011). Pakistan Nuclear Regulatory Authority Annual Report 2011.

Paul, T. V., & Paul, T. V. (2000). Power versus prudence: Why nations forgo nuclear weapons: *McGill-Queen's Press-MQUP*.

Perkovich, G. (1999). India's nuclear bomb : the impact on global proliferation: *University of California Press*.

Qureshi, I. (2020). Recollections From The Early Days Of The PAEC. *The Nucleus, 42*(1-4), 7-11.

Schaper, A. (2004). Looking for a demarcation between nuclear transparency and nuclear secrecy.

ul Haq, N. (2012). Civil-Military Relations in Pakistan. *IPRI JOURNAL, 12*(2), 110-116.