

# DRIVERS OF NUCLEAR PROLIFERATION: SOUTH AFRICA'S INCENTIVES AND CONSTRAINTS

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## *Abstract*

*Many factors are identified as causes of nuclear proliferation, but three stands out among them. These comprise the international and domestic political environment, technical capabilities and motivation. This article explores, on the one hand, the conditions that are conducive for the proliferation of nuclear weapons, whilst also suggesting strategies that can effectively address the problem. The authors use the South African episode as a case study. They identify the role of technology and motivations in the development of South Africa's nuclear weapons programme and claim that the possession of technological capability is not a sufficient cause of nuclear proliferation. Rather, the presence of strong motivations in conjunction with sufficient technical capability leads to nuclear proliferation.*

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**Keywords:** Nuclear proliferation; South Africa; technology; capability; motivation; incentives and disincentives; constraints; uranium; Nuclear Proliferation Treaty.

**Slutelwoorde:** Proliferasie van kernwapens; Suid-Afrika; tegnologie; vermoëns; motivering; aansporings en ontmoedigings; beperkings; uraan; Kernspervetdrag.

## 1. INTRODUCTION

Until now, large segments of the academic and policy communities have shared the consensus on technological capabilities as a cause of nuclear proliferation. Unfortunately, many seem to perceive nuclear weapons proliferation as almost entirely a technological problem. One of the main problems with the technical approach is the “technicist fallacy”; that is, its concept of proliferation primarily in terms of technological ability and solutions, rather than political incentives and disincentives.<sup>3</sup> Stated somewhat differently, a technicist perspective regards the technological capability to manufacture nuclear weapons as a sufficient condition for proliferation. Technical capability can, in fact, be a necessary condition

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3 R Betts, “Paranooids, pygmies, pariahs, and non-proliferation”, *Foreign Policy* 26, Spring 1977, pp. 162-164.

for nuclear proliferation but not a sufficient condition, since the decision to “go nuclear” is a complex military, economic and political question involving domestic as well as international considerations.

While increasing numbers of states have advanced to nuclearization, there are a number of countries that have instead refrained from proliferation, despite their possession of the requisite technical and industrial capability (e.g., Canada, Sweden, Switzerland, Germany, Japan and Italy). For these countries, “the absence of operational nuclear weapons is (in fact, recognized as) more a function of political will than of technical knowhow”.<sup>4</sup> An alternative perspective rooted in a consideration of the motivational aspects of nuclear proliferation can better answer the question of why states “go nuclear”.

In pursuing this argument, we discuss the drivers of South Africa’s nuclear weapons programme from being purely motivated by technological advancement rather than other motivations. After 1974, the apartheid government in South Africa decided to develop nuclear weapons as a deterrent, influenced by the *coup* in Portugal, and followed by the installation of pro-communist governments in Mozambique and Angola.<sup>5</sup> Prior to 1974, the government only considered obtaining a nuclear capability as a matter of prestige for a strong Afrikaner nationalism<sup>6</sup> – with its almost adequate technological “know how”<sup>7</sup>. This outlook soon changed when the contagious “Cold War flu” and raging hostilities between the two world power blocs led by the United States of America (USA) and the Union of Soviet Socialist Republics (USSR) found its way to the shores of Southern Africa, triggering a strategic need by the South African government to buffer her geo-political entity. The apartheid government concluded that the attainment of significant security, as well as the possession of bargaining power in international politics, could only

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4 WC Potter, *Nuclear power and proliferation* (Cambridge, Mass: Oeleschlager, 1982), p. 135.

5 W Stumpf, “Birth and death of the South African nuclear weapons programme”. Paper presented at the 50 years after Hiroshima Conference, Castiglioncello, Italy, 28 September to 2 October 1995, <<http://www.fas.org/nuke/guide/rsa/nuke/stumpf.htm>>, accessed 31 January 2014; FW de Klerk, “Matters relating to nuclear non-proliferation treaty, violence, negotiation and the death penalty. Statement by the State President to a Joint Sitting of Parliament”, *Hansard*, 24 March 1993, columns 3465-3478; JEC Hymans, “Taking the plunge: Emotion and identity in the decision to build nuclear weapons”. Paper presented to the annual meeting of the American Political Science Association, Washington, D.C., September 1-3 2000.

6 SM van Wyk, “Sunset over atomic apartheid: United States-South African nuclear relations, 1981-1993”, *Cold War History* 1(1-29), 2009; JEC Hymans, “Pride, prejudice, and plutonium: Explaining decisions to acquire nuclear weapons”, Ph.D.-dissertation, Harvard University, 2001; J Resende-Santos, “Anarchy and the emulation of military systems”, *Security Studies* 5(3), 1979, pp. 190-245.

7 Indeed, South Africa depended on possible collaboration from any and all of the Western States for the development of its nuclear capability. Such technological capability is a requisite for the development of nuclear weapons.

be achieved through the acceleration of her nuclear weapons programme, with assistance from western allies.<sup>8</sup>

Using the South African case study, the aim in this article is to re-examine the potency inherent in the possession of nuclear weapons as a source of international political power; the role of the state and the domestic decision-making process in the areas of development and usage of technology in global politics; and, importantly, the extent to which motivations serve as a driving force towards nuclear proliferation beyond the traditional brief of the mere possession of technological capability.

## 2. ANALYTICAL FRAMEWORK

In pursuing the question of why nations go nuclear, the motivational aspects of proliferation is useful as an analytical construct. Countries will consider the nuclear option for the following reasons – firstly, among other reasons is *political power and prestige* - to advance to the status of a global or regional power; to acquire positions within international forums; to enhance bargaining positions within an alliance, and to assert political and military independence. The earlier stages of the South African case study are suggestive of this rationale, but in the later stages deterrence became a key motivation for the development of nuclear armaments. The second reason why states go nuclear is *military security* - to deter attack from a nuclear-armed adversary and to redress conventional military asymmetry. This position highlights the relevance of deterrence theory. Thirdly, states develop nuclear weapons because of *economic considerations* - to reduce the economic defense burden and to stimulate commerce through the growth of the nuclear industry, particularly the export of uranium yellowcake (U3O8), and *others*: to increase a country's bargaining position in disarmament negotiations.<sup>9</sup> This is also important in the South African case. Since it would not discontinue its apartheid policy, South Africa developed nuclear weapons as a diplomatic bargaining tool in its relations with both foes and allies on the international platform.<sup>10</sup> The Office of Technology Assessment's (OTA) 1977 lists of nuclear proliferation summarizes a variety of political incentives and disincentives for "going nuclear":

8 D Albright, "South Africa and the affordable bomb", *Bulletin of the Atomic Scientists* 50(4), July-August 1994, pp. 37-47; J Siracusa, "Averting Armageddon: In search of nuclear governance", *Globalisation and Development Center* 22, 2008.

9 R Betts, "A diplomatic bomb for South Africa?" *International Security* 4(2), 1979, pp. 97-101.

10 *Ibid.*; L Beaton and J Maddox, *The spread of nuclear weapons*, (New York: Praeger, 1962); RN Rosecrance (ed.), *The dispersion of nuclear weapons: Strategy and politics* (New York: Columbia University Press, 1964); CF Barnaby (ed.), *Preventing the spread of nuclear weapons* (London: Souvenir, 1969).

“The general political incentives encompasses deterrence - The primary incentive for many states to acquire nuclear weapons would be to deter external efforts to undermine or destroy the existing regime or governmental system; Increased international status - Nuclear weapons can give self-confidence, and respect of neighbors and superpowers; Domestic political requirements - International status can serve to bolster a government’s domestic political standing; Economic considerations - Nuclear weapons programmes might provide technological spinoffs and expand internal economic interests; Increased strategic autonomy; Strategic hedge against military and political uncertainty; A weapon of last resort; As an instrument of the Third World, nuclear weapons might be equalizers; Peaceful nuclear explosives.

The general political disincentives include Diversion of resources; Adverse public opinion; Disruption of assured security guarantees; Nuclear weapons might remove the proliferator from under the protective umbrella of a superpower; Infeasibility of a desired nuclear strategy - a modest nuclear force might not be sufficient to deter a nuclear enemy, and hence might invite a preemptive attack; Adverse international reaction; Adverse reactions by adversaries - This reaction could be diplomatic in the form of an arms race, or a preemptive attack; Advocacy of neutrality aims: Some neutralist leaders see the possession of nuclear weapons as eroding their credibility on arms control issues.”<sup>11</sup>

It is on this basis that one can both explain and use the South African case study as a point of analysis.

### 3. A HISTORY OF SOUTH AFRICA’S TECHNOLOGICAL CAPABILITY

The nuclear research programme in South Africa began in the late 1940s, established on the basis of the country’s abundant uranium reserves. With a focus upon the extraction of uranium ore for export, the Atomic Energy Board (AEB) was established in 1949. According to early predictions, South Africa has “as much as 25 percent of the noncommunist world’s total reserves”.<sup>12</sup> In order to secure reliable sources of uranium, Britain and the USA invested in uranium-processing facilities in South Africa, which opened its first processing plant at Krugersdorp in 1952.<sup>13</sup> A research and development programme began in 1957 at the Nuclear Physics Research Unit of the University of Witwatersrand. Both the USA and Britain contributed to South Africa’s early nuclear development. During the 1950s, Britain provided South Africa with the necessary information for the design and

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11 D Schroerer, *Science, technology, and nuclear arms race* (New York: John Wiley & Sons, 1984), p. 339; USA Congress, Office of Technology Assessment. *Nuclear proliferation and safeguards* (Washington, D.C.: Office of Technology Assessment, 1977), pp. 94-98.

12 Betts, “A diplomatic bomb”.

13 DB Sole, “The South African nuclear case in the light of recent revelations”. Paper presented at the “New Horizons in Arms Control and Verification Conference”, John G Tower Center for Policy Studies, Southern Methodist University, Dallas, Texas, 15 October 1993.

development of research reactors and arranged visits of South African scientists and engineers to observe unclassified atomic energy work.<sup>14</sup>

In 1957 South Africa and the United States signed a 20-year agreement under the “Atoms for Peace” programme. According to its terms, the USA agreed to supply South Africa with a light-water research reactor. The country’s first research reactor was called the South African Fundamental Atomic Research Installation 1 (SAFARI-I), which began operating at Pelindaba in 1965 with a capacity of 20 megawatts.<sup>15</sup> The SAFARI-I reactor was placed under international safeguards based on a 1965 agreement with the International Atomic Energy Agency (IAEA). A full-scale nuclear programme seems to have begun in 1965, when Prime Minister Hendrik F Verwoerd implied that, “the South African government had a duty to consider the military uses of nuclear technology”.<sup>16</sup> In 1967 South Africa began to indigenously design and construct a zero-energy research reactor, called Pelunduna Zero, located at the Atomic Energy Board (AEB) nuclear research center at Pelindaba. Because of financial constraints, however, its construction was cancelled in 1971. However, the early developments that occurred during the late 1950s and 1960s - the processing of indigenous uranium ore, access to Western (British and American) nuclear technology, and the acquisition of a research reactor - enabled South Africa to progress toward achieving independent nuclear capability including the development of an indigenous enrichment capability.<sup>17</sup>

South Africa had meanwhile decided in 1974 to build two light-water power reactors with a combined output of 1 850 megawatts, at Koeberg, near Cape Town.<sup>18</sup> In 1976 a French-based company, GDF Suez, signed a contract to build the Koeberg facility. The two reactors were placed under IAEA safeguards and became operational in 1984-1985. According to reports, South Africa has had a “small working model plant to reprocess the spent fuel from the Koeberg plants and the SAFARI reactor”.<sup>19</sup>

14 M Reiss, *Without the bomb: The politics of nuclear nonproliferation* 1991 (New York: Columbia University Press, 1988).

15 SM van Wyk, “Ally or critic? The United States’ response to South African nuclear development, 1949-1980”, *Cold War History* 7(2), 2007, pp. 195-225; M Reiss, *Without the bomb* (South African Foreign Affairs Archives: SAFAA, 1981). Nuclear Energy, Top Secret, 1 January 1981-6 May 1981, Memorandum, “South African-United States’ nuclear relations”, 20 March 1981; National Security Agency (NSA). CIAOSI, Scientific Intelligence Research Aid, Volume IV: Asia and Africa, “Nuclear activities of foreign nations,” 30 September 1956.

16 Betts, “South Africa”; JA Yaeger (ed.), *Nonproliferation and U.S foreign policy* (Washington, D. C: Brookings Institution, 1980), pp. 290-292.

17 RS Jaster, “South Africa”, in JC Snyder and SF Wells (eds), *Limiting nuclear proliferation* (Cambridge, Mass.: Ballinger Publication Co., 1985), pp. 149-150.

18 G Jones, *South African proliferation prognosis and USA options* (Los Angeles: Pan Heuristics, 1977), pp. 8-10.

19 J Goldblat (ed.), *Non-proliferation: The why and the wherefore* (Philadelphia: Taylor and Francis, 1985); IAEA Report, Board of Governors and the Director General to the General Conference,

In sum, through cooperation in the nuclear field in this early period with anti-communist states, and through its own efforts to achieve indigenous nuclear capability over many years, South Africa developed uranium mining facilities (which produce more than ten per cent of the world's total uranium production), a uranium enrichment plant at Valindaba, a light-water research reactor (SAFARI I), a research center at Pelindaba and two light-water power reactors (KOEBERG I and II) near Cape Town. While most of these facilities lack a direct impact on nuclear weapons in terms of specific components of production, it was assumed that the country could launch an independent nuclear weapons programme on the basis of having a pool of nuclear technicians with the know-how and experience as well as these nuclear facilities. In addition, by refusing to sign the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and to open its Valindaba enrichment facility to the IAEA, South Africa kept its nuclear options open.

The concern over proliferation was heightened in August 1977, when both the Soviet and the US Intelligence satellites detected an apparent nuclear weapons test site in the Kalahari Desert.<sup>20</sup> Right after the Kalahari test site, Vastrap, was discovered, it was assumed that, "South Africa had obtained weapons-usable highly enriched uranium from a pilot-scale uranium enrichment plant at Valindaba, which began operating in 1975".<sup>21</sup> This information spurred widespread fears of an imminent South African nuclear weapons test. After a strong diplomatic intervention by the USA, France, West Germany and Britain, however, the South African government pledged to dismantle the test site and not to build nuclear arms.<sup>22</sup> International anxiety and suspicion over South Africa's nuclear capability and intentions were further aroused with a second testing controversy in September 1979, when a US satellite, Vela, had sighted two bright pulses of light in the South Atlantic, the sequence and timing of which closely resembled the signature of a nuclear weapons detonation.<sup>23</sup> After an intense search by the United States and several other countries, no other relatively acceptable evidence of a nuclear test was uncovered<sup>24</sup> despite the fact that the Arecibo radio telescope detected an ionospheric electromagnetic impulse; US acoustic detectors picked up the shock wave from the blast and radioactive fallout blown by the hemispheric winds was detected in New Zealand sheep thyroids.

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South Africa's Nuclear Capabilities, GC 28(724), 24 September 1984, Annex 1, Attachment 3.

20 M Marder and D Oberdorfer, "How West, Soviets moved to head off S. Africa A-test", *Washington Post*, 28 August 1977.

21 LS Spector, *Nuclear proliferation today* (New York: Vintage Books, 1984), p. 221.

22 Marder and Oberdorfer.

23 *New York Times*, 26 October 1979.

24 LA Dunn, *Controlling the bomb: Nuclear proliferation in the 1980s* (New Haven and London: Yale University Press, 1982), p. 54.

In a 1976 interview concerning South Africa's defence posture, Prime Minister John Vorster mentioned, "we are only interested in the peaceful applications of nuclear power. But we can enrich uranium, and we have the capability. And we did not sign the nuclear nonproliferation treaty."<sup>25</sup> Dr Louw Alberts, Vice President of AEB, stated in 1974 that, "our technology and science have advanced sufficiently for us to produce (a nuclear bomb) if we have to".<sup>26</sup>

Renfrew Christie's study of electricity consumption by the uranium enrichment plants proves that South Africa had not enriched sufficient uranium to make any A-bombs before the 1980s. The 1979 A-bomb test could only have been an Israeli A-bomb (probably of the neutron bomb variety intended for anti-tank battlefields), tested by, or in cooperation with, the South African navy. This would also imply that the 1977 A-bomb test site was either intended for an Israeli bomb test, or was a dummy site put up as a bargaining chip – though it is not clear that P W Botha's government gained any concessions in exchange.<sup>27</sup>

Definitive evidence of South Africa's weapons capability was provided by an official announcement in April 1981. South Africa had produced 45 per cent enriched uranium to fuel the SAFARI-I research reactor. Since, "it is relatively easy to improve 45 per cent enriched uranium to the 90 percent level needed for weapons",<sup>28</sup> many have agreed that South Africa has had the capability to produce nuclear weapons since 1981. South Africa completed its first bomber-deliverable weapon in 1982. However, further refinements in terms of reliability, safety, as well as delivery designs delayed the completion of the next nuclear weapon for another five years (August 1987). Production then accelerated afterwards to the extent that its nuclear bomb stockpile finally stood at six and a half in 1989.<sup>29</sup>

In any event, it is clear today that there was no significant technological obstacle to South Africa's production of a nuclear bomb, apart from UN sanctions and embargoes. All the technical and circumstantial evidence, taken together, suggests that South Africa undoubtedly has the capability to design, produce and test a small nuclear weapon. Thus, the risk of proliferation in South Africa was not heightened because of technological capability alone.

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25 *Newsweek*, 17 May 1976.

26 *Rand Daily Mail*, 11 July 1974.

27 C Renfrew, *Electricity, industry and class in South Africa* (London and Basingstoke: Macmillan, 1984).

28 Spector, p. 222.

29 D Albright, *South Africa's secret nuclear weapons*. Institute for Science and International Security (ISIS) Report, May 1994; FW de Klerk, "Matters relating to nuclear non-proliferation treaty"; JW De Villiers, R Jardine & M Reiss, "Why South Africa gave up the bomb", *Foreign Affairs* 72(6), 1993, pp. 98-109.

#### 4. SOUTH AFRICA'S MOTIVATIONS: INCENTIVES AND CONSTRAINTS

The nuclear weapons programme in South Africa progressed with various motivations, reflecting a changing military and political situation both domestically and internationally.<sup>30</sup> An economic justification for advancing a nuclear energy programme is considerable but it does not seem entirely consistent.<sup>31</sup> Although the country lacks oil resources it has massive coal and solar resources. The combination of uranium and coal resources can supply a sufficient amount of energy to meet the country's energy needs. Accordingly, their reason for maintaining a nuclear power programme is political and not economic in this regard.<sup>32</sup>

In fact, the economic rationale for the peaceful application of nuclear energy has been intertwined with military weapons options since the early 1960s. The military security incentive appears to be one of the major factors to control South Africa's decision to build the nuclear bomb. Since the early 1960s South Africa has experienced a series of setbacks in world affairs.<sup>33</sup> In June 1963, the Organization of African Unity (OAU) was formed with one of its expressed goals to achieve independence for those countries still under minority rule. During the same year, in condemning South Africa's apartheid policy, the United Nations (UN) decided to impose a voluntary arms embargo on South Africa. Meanwhile, South African officials first began to discuss nuclear weaponry. In 1965 Prime Minister Hendrik Verwoerd stated that, "the South African government had a 'duty' to consider the military uses of nuclear technology".<sup>34</sup> In 1968, General HJ Martin, Chief of Staff of the South African army, also noted that, "South Africa was prepared to manufacture nuclear weapons".<sup>35</sup> Although South Africa considered manufacturing nuclear weapons in the 1960s, the country did not yet initiate a full-scale nuclear weapons programme.

During the 1970s, a number of developments both inside and outside South Africa stimulated the development of a nuclear weapons capability. During this period the Portuguese colonies of Angola and Mozambique gained their

30 WJ Long and SR Grillot, "Ideas, beliefs, and nuclear policies: The cases of South Africa and Ukraine", *Nonproliferation Review* 7(1), 2000, pp. 24–40; TV Paul, *Power versus prudence: Why nations forgo nuclear weapons* (Montreal: McGill-Queen's University Press, 2000); BA Thayer, "The causes of nuclear proliferation and the utility of the nuclear nonproliferation regime", *Security Studies* 4(3), 1995, pp. 494–495.

31 P Liberman, "The rise and fall of the South African bomb", *International Security* 26(2), 2001, pp. 45–86.

32 Atomic Energy Board (AEB). Report on the investigation into the possible introduction of nuclear power in the Republic of South Africa (Pelindaba: AEB, 1968).

33 Liberman, "The rise and fall of the South African bomb", pp. 45–86.

34 Betts, "South Africa", pp. 290–292.

35 *Ibid.*

independence and joined the African frontline states. Cuban troops and Soviet military advisers were injected into the region. In 1974 there was a move to expel South Africa from the UN, a move blocked only by the vetoes of the USA, Britain and France. The Security Council passed a resolution in 1976 to exercise a mandatory arms embargo against South Africa. The erosion of support from the Western allies with the growing international condemnation of apartheid, and the fear of possible aggression from neighbouring states, contributed to South Africa's growing isolation in international affairs and its deteriorating security situation. Moreover, anti-government protest within the country seriously intensified, following the Soweto Massacre. All these factors presumably contributed to prompt South Africa to pursue a nuclear weapons option. It was during the 1970s that the South African government initiated a number of efforts especially aimed at acquiring a nuclear capability.

In the 1980s, the military and political situation both inside and outside South Africa deteriorated further. Domestically, anti-apartheid resistance and government repression intensified from the mid-1980s. The creation of the United Democratic Front (UDF) and the National Forum – umbrella organisations for a multiplicity of ideologies and organisations united in their opposition to apartheid – saw the intensification of protest towards the apartheid state. In addition, sabotage attacks waged against the South African government by the African National Congress (ANC) became bolder. International opposition to apartheid also became more widespread and more effective. The creation of the Southern African Development Co-ordination Conference (SADCC) as resistance by the Frontline States, and the calling for international sanctions by the Non-Aligned Movement and OAU had an impact. Since 1985, more than 100 foreign companies withdrew from South Africa, and all governments within the Organisation for Economic Co-operation and Development (OECD) imposed sanctions.<sup>36</sup> Besides economic isolation, South Africa experienced growing political isolation and a loss of diplomatic relations with several states.<sup>37</sup> President PW Botha stated: “South Africa is now facing a challenge from the capitalist West as much as from the communist East.”<sup>38</sup> The combination of this “total onslaught” appeared to affect South Africa's nuclear weapons option.<sup>39</sup>

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36 *Ibid.*

37 *Ibid.*

38 *Ibid.*

39 At the end of the 1980s however, there were dramatic political changes in South Africa. In 1990 the new President Frederik W de Klerk made a firm commitment to remove a number of apartheid measures. The new administration undertook a number of anti-apartheid actions - to release political prisoners, assist with the return of exiles, indemnify political activists for past crimes and review security legislation. With all these political changes there were growing optimism that sanctions against the country may soon be lifted. Particularly, President De

With growing violence internally and towards the region of Southern Africa, the gradual decline of South Africa's regional hegemony, and increasing international isolation, South African leaders considered themselves to be "under a state of siege".<sup>40</sup> For years, South African leaders increasingly felt a sense of threat to their survival, and they adopted the concept of the "total onslaught" allegedly being waged against South Africa.<sup>41</sup> In 1981 South African defense minister, General Magnus Malan, described the situation of a "total onslaught" as follows:

"An ideologically motivated struggle and the aim is the implacable and unconditional imposition of the aggressor's will on the target state. South Africa is today involved in total war. The war is not only an area for the soldier. Everyone is involved and has a role to play."<sup>42</sup>

From the sense of an all-out threat to its survival, South African leaders may well have considered all possible means, including the nuclear weapons option, to compensate for its own vulnerabilities and to counter the strengths of its adversaries.<sup>43</sup> In fact, South Africa perceived a serious threat to its security, due to possible conventional attack from neighbouring black African states and the presence of the Soviet and Cuban military in Angola. In preparing for this security threat, the South African leadership would anticipate deterrent effects from the possession of nuclear weapons.<sup>44</sup> For South African leaders, the overt deployment of nuclear weapons also might be thought "to provide added insurance against the South African government's fears of a large-scale, externally supported conventional attack".<sup>45</sup> To sum up, military security considerations due to the sense of all-out threat to the survival of the apartheid state appeared to be one of the important factors to motivate the South African efforts to acquire a nuclear weapons capability.

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Klerk's initiatives to revoke apartheid legislation - the statutes mandating where people may live according to racial classification, restricting black ownership of land and classifying citizens by race at birth - encouraged the European community, the United States and the IMF to consider easing economic and financial sanctions. All these political developments appear to considerably reduce South Africa's isolation; *Time*, 11 February 1991; F Slabbert, "South Africa and the world in the nineties", *South Africa International* 21(1), July 1990, pp. 20-26; PH Baker, "South Africa on the move", *Current History* 89(547), 1990, pp. 197-200.

40 WC Potter & G Mukhatzhanova (eds), *Forecasting nuclear proliferation in the 21st Century. A comparative perspective*, Volume 2 (Stanford: Stanford Security Studies, 2010); Jaster, "South Africa", p. 157.

41 Jaster, p. 157.

42 S Geldenhuys, *Some foreign policy implications of South Africa's "Total National Strategy"* (Braamfontein: South African Institute of International Affairs, 1981), p. 3.

43 To combat the perceived "total onslaught", the apartheid state devised a "total strategy" that may include nuclear weapons.

44 LA Dunn and WH Overholt, "The next phase in nuclear proliferation research", *Orbis* 20(2), 1976, pp. 497-524.

45 *Ibid.*

While military security considerations constituted an important incentive, many have suggested that the primary motive of South Africa's nuclear weapons option was political.<sup>46</sup> The thinking of South African leaders was to use a nuclear arsenal for non-military purposes such as improving its bargaining position *vis-à-vis* other African states, and increasing its diplomatic leverage *vis-à-vis* Western countries.<sup>47</sup> In demonstrating their nuclear weapons capability, South Africa would remind neighbouring African states of their own scientific and technical underdevelopment and their inability to counter it, thus enabling South Africa to have a favourable bargaining position in any future political negotiations with its neighbouring black states. South Africa's nuclear weapons option could be used to extract nuclear concessions from the West, particularly Britain and the USA. For example, it has been observed that the objective of the Kalahari nuclear test preparations served as a bargaining chip to win important concessions from the proliferation-sensitive Carter administration.<sup>48</sup> By threatening to employ nuclear weapons or by promising to refrain from their use, South Africa attempted to secure her various political, economic, or security interests in political bargaining with the West. In sum, the South African leadership hoped that the open acquisition of nuclear weapons would enhance South Africa's position in the world and open the way for future negotiations with the West and with its neighbouring countries on issues of mutual interest.

While there were various incentives to develop nuclear weapons, South Africa would refrain from the open demonstration of its nuclear capability due to a number of constraints.<sup>49</sup> At first, as many nuclear strategists suggested, the military utility of nuclear weapons has in fact been doubtful, either as a deterrent or as a defense.<sup>50</sup> Although its margin of military superiority has somewhat declined in the region, South Africa maintained its conventional superiority over any political opponents in Africa. Compared to the combined military power of all the nearby states, South Africa's conventional military power was continuously overwhelming. Mainly because of South Africa's geographic position, and the economic and military weakness of black African states, "there was realistically no conventional threat that South Africa could not handle easily".<sup>51</sup> In short, as long as South Africa

46 Some, for example Flournoy and Campbell, have emphasized the military intention of South Africa's nuclear option, but many have generally suggested that South African attempts to possess nuclear weapons is for non-military purposes such as enhancing the country's status or increasing its diplomatic leverage.

47 Betts, "A diplomatic bomb".

48 Jaster, "South Africa".

49 N Tannenwald, "Stigmatizing the bomb. Origins of the nuclear taboo", *International Security* 29(4), 1995, pp. 5-49; N Tannenwald, *The nuclear taboo. The United States and the non-use of nuclear weapons since 1945* (Cambridge: Cambridge University Press, 2007).

50 JS Spence, "South Africa: The nuclear option", *African Affairs* 80(321), 1980, pp. 445-446.

51 Betts, "Paranoids, pygmies, piriahs", pp. 162-164.

maintained overwhelmingly strong conventional capabilities in the region, nuclear weapons would be unnecessary for either deterrence or for defense. In effect, doubt about South Africa's military utility would downplay the incentive of her leaders to openly demonstrate her weapons capability.

South Africa experienced strong international pressures against the two attempts to conduct underground and atmospheric nuclear weapons tests in 1977 and 1979.<sup>52</sup> The South African leadership might have realized that any use (or threatened use) of nuclear weapons by South Africa against an African state could well provoke a collective international reaction. In addition to diplomatic sanctions it might, more importantly, provoke strong economic retaliation from the Western countries, particularly from the USA. In political terms, nuclear weapons might be counterproductive to South Africa's foreign policies and interests in Africa by further alienating other African states and by jeopardizing military, political and economic relations with the West. In the South African case at the time, it appears that the incentives were negligible and the constraints substantial.

Broadly speaking therefore, a country's incentives are divided into military security considerations, political objectives, economic spillover and domestic politics. In general, deterrence, strategic autonomy, and considerations over political bargaining appear as the most important incentive factors of nuclear proliferation in South Africa. Depending on a country's particular domestic and international situation, however, the focus, priorities, and emphasis concerning nuclear weapons options vary. For instance, for South Africa political bargaining considerations appear to be the primary motive for nuclear proliferation.

Both FW de Klerk and PW Botha have been quoted several times as claiming that the A-bombs were never integrated with army strategy, nor ever deployed, nor were there any military exercises practicing their use. PW Botha's sole strategy was, in the event of a conventional military invasion of South Africa or Namibia, to warn the NATO powers that South Africa had A-bombs. If that did not ensure that the NATO powers intervened to prevent an invasion, he would then detonate

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52 Recent research suggest inconclusively that the 1979 incident is not related to South Africa. When Gen. Constand Viljoen (an Afrikaner pillar of the apartheid regime who commanded South Africa's ground forces from 1976 to 1980 and then was chief of general staff for five years) was asked about this, he said: "We wanted to get nuclear know-how from anywhere we could and from Israel, too." Viljoen said: "That is what was decided, and that is how we acted." Viljoen evaded a question about the 1979 test; Cf. Y Melman 2009, "Did Israel play a role in 1979: South Africa nuclear test? South Africa turned to Israel after West froze nuclear ties in 1976 over development of military program", HAARETZ 2 August 2009 [online], <<http://www.haaretz.com/print-edition/features/did-israel-play-a-role-in-1979-south-africa-nuclear-test-1.281226>>, accessed 3 February 2014.

one A-bomb in an above-ground test to prove South Africa's possession of nuclear weapons. But that was all that was strategized.<sup>53</sup>

Military security considerations did not seem to be the primary incentive of South Africa's nuclear program. Over time South Africa changed her incentives to acquire nuclear technology. While military security considerations constitute an important incentive, the primary motive of South Africa's nuclear weapons option seems to be political considerations, such as improving its bargaining position *vis-à-vis* other African states, increasing its diplomatic leverage *vis-à-vis* the Western countries, and enhancing the country's political status in the world. In short, South African foreign policy considerations appear the primary incentive for achieving nuclear weapons status, rather than military security considerations.

As countries have different proliferation incentives, so they show varying degrees of problems and constraints in pursuing nuclear weapons options. A country's constraints are broadly divided into military security, international political constraints, and domestic politics. In terms of constraints, possible military reaction by other states appeared to be one of the most important constraints for South Africa. With a conventional military strength superior to that of neighbouring states, military reactions by other states appear to be only modest constraints in pursuing her nuclear weapons options. Another important constraint would be the strategic credibility gap which comprises scepticism about the strategic utility of nuclear weapons. For example, the overt possession of nuclear bombs would cancel security guarantees from her supporting countries. As a result, the country's security would be more in danger with a nuclear bomb than without one.

## 5. CONCLUSION

Indeed, some weaknesses in the South African security situation may have led some observers to conclude that domestic politics drove South African nuclear weapons policies. The "general domestic explanation for nuclear proliferation, derived from organizational politics theory, is that influential science, energy, and armament complexes spur nuclear acquisition".<sup>54</sup> Technology is, of course, one of two necessary conditions for the nuclear proliferation process. However, the fundamental conditions of nuclear proliferation appear to be motivational factors. A lesson from the South African case buttresses the tremendous growth and spread of civil nuclear technology, because once countries have a relative level of nuclear capability, technical constraints will continue to decline as an obstacle to making a nuclear bomb and, in turn, various motivations propel such states to cross the

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53 AJ Venter and NP Badenhorst, *How South Africa built six atom bombs and then abandoned its nuclear weapons program* (Michigan: Ashanti, 2008).

54 Liberman. "The rise and fall".

nuclear threshold. Once a country has decided to develop nuclear weapons because of certain motivational situations, it will have devoted all its scarce resources to that objective.

In fact General Constand Viljoen, when head of the South African Defence Force (SADF), strongly argued in vain that A-bombs were both militarily useless, and would consume a huge proportion of the military budget that was, instead, urgently needed to begin the manufacturing of jet engines for fighter aircraft, and other weapons. Viljoen, who visited Israel and conferred with senior officers, said:

“Instead of the billions we spent on nuclear weapons, we could have bought tanks and needed military equipment. Ambitious politicians and the heads of the Armscor arms corporation [where the nuclear weapons were developed] pushed for the program. As a good soldier I was compelled to obey them.”<sup>55</sup>

Deducing from this, the authors conclude that if a country has strong motivations (taken in conjunction with adequate technical ability), it can produce a nuclear capability and bombs. In short, “going nuclear” is not a matter of technological capability alone, but also of ideological motivation.