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CHAPTER 2 ENVIRONMENTAL ANALYSIS

2.1 OVERVIEW OF THE ENVIRONMENTAL ANALYSIS PROCESS

Any strategy should take cognisance of the situation in the environmental situation intended for use. The analysis employed in this study includes an assessment of environmental dynamics, a PEST analysis, a market growth analysis, a key success factors analysis and a competitive industry environment analysis. The volatility and the novelty of situations in which the organisation finds itself, are a measure of the dynamics of the environment.

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2.2 ASSESSMENT OF ENVIRONMENTAL DYNAMICS

2.2.1 CHANGEABILITY

Changeability is a measurement of the extent to which the environment may change. This section assesses changeability in relation to complexity and novelty.

A. COMPLEXITY

Definition: This is the extent of the number of factors in the environment and the extent to which they interact, influence the environment.

National security concerns political, economic, social and environmental factors (White Paper of Defence 1996: Chapter 2, paragraph 1). Political decisions are the basis for military actions. In terms of security, a broad spectrum of factors influences these political considerations. Economic instability or collapse could, for example trigger a chain of events that could lead to conflict. These factors and their interaction are complex.

Co-ordinating activities related to anything as sensitive as security between several sovereign independent states adds to the complexity.

Since the end of the cold war, alliances and associations have changed making their future direction more difficult to predict.

The White Paper on Defence of 1996 outlines the most predominant international trends since the cold war. These trends include the tendency for conflicts to occur within, rather than between, states, the increased interdependence of states, the discrepancy between the developed northern and the developing southern states and the willingness of the United Nations to actively contribute towards improving peace and security.

The defence industry has also undergone significant transformation. Owing to the reduction in spending on armaments, the industry has had to rationalise by means of alliances and acquisitions in line with the trend towards globalisation. Nations have had to prioritise the development of their domestic capabilities strategically. Some defence companies in the RSA now have a responsibility and loyalty to their shareholders in foreign corporations instead of ARMSCOR and the SANDF as in the past.

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B. NOVELTY OR UNFAMILIARITY

Definition: This is the extent to which the environment tends to present the organisation with unfamiliar situations.

The fall of the Berlin wall and the fall of communism could hardly have been predicted to have taken place as soon as they did. Many other political and other manifestations have also defied prediction since then.

In the information and communications technology industries, the growth of innovation, capabilities and markets has exceeded all expectations. It has had an effect on all but the most remote communities.

The RSA is now a member of the Non-Aligned Movement. This, presents to investors, potential investors and nations dealing with or planning to deal with the RSA, with a new perspective.

2.2.2 PREDICTABILITY

Definition: Predictability is a measure of the probability that the changes in the environment can be accurately predicted. Predictability in this context is defined as a combination of environmental change and the visibility of future conditions within the environment.

A. RATE OF CHANGE

Definition: This parameter may be defined as the speed at which the change in the environment occurs.

Since the end of the cold war, many alliances and associations have changed rapidly, this often resulting in post-Cold War conflicts such as those in Bosnia and the Democratic Republic of the Congo (DRC).

The quantum leap that the world has experienced in the merging of communication and computers appears to have accelerated the pace of change. In addition to this, announcing occurrences through the news media, for example, can rapidly and strongly influence public opinion. Thus, for example images from Yugoslavia galvanised the world against the abuses of civilians in the conflict.

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In 1975, the RSA public was denied knowledge of the first incursion by the SADF into Angola. With the current coverage of world news, an operation of such import would be difficult to hide. National and international reaction would be proportionately quicker and more severe. It is debatable whether the RSA government would have risked attracting the adverse publicity of the Angolan incursion under today's circumstances, given the visibility accorded to such actions by the international news media since the early 1990s.

The situations in Lesotho and Zimbabwe, which have both degraded more rapidly than was expected, are just two examples of the accelerating pace of change.

In the area of technology, items such as personal computers, enjoy a life of only two to four years before becoming obsolete.

Knowledge and information are more freely available than ever before, but the challenge is to harness them fully before one's competitors do.

B. VISIBILITY OF FUTURE

Definition: This concept relates to the availability of information, that is useful for estimating future trends within the environment.

Today knowledge and information are more freely available than ever before, allowing anyone interested to extrapolate data to possible future situations. In spite of this, important events such as the collapse of the economies of the Far Eastern countries in the late 1990s were unexpected.

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2.3 POLITICAL, ECONOMIC, SOCIO-CULTURAL AND TECHNOLOGICAL (PEST) ANALYSIS

2.3.1 OVERVIEW OF THE PEST ANALYSIS

The PEST analysis scrutinises and assesses the political, economic, socio-cultural and technological (PEST) environments for their influence on the environment as a whole, and vice-versa. This analysis supports strategic thinking about the organisation.

2.3.2 THE POLITICAL ENVIRONMENT

National defence is also an international matter because the prime function of the SANDF is to protect the RSA against any external military aggression (Defence White Paper 1996: Ch 5, paragraph 1.1). International political opinion can also be influenced by the manner in which a defence force is employed domestically or in support of international forces. This also applies to the SANDF when it acts in terms of its secondary roles as defined in the Defence White Paper (1996: Ch 5, paragraphs 1.2 to 1.6).

There are two main factors influencing this role: the RSA national political arena and the politics of foreign national or international role-players.

Two further subsets of these aspects are concerned with the employment and the support of forces. The support of forces includes the acquisition and support of Products Systems. The employment of forces concerns those military operations conducted domestically, against external military aggression and with operations supporting the United Nations.

A. THE NATIONAL POLITICAL ARENA OF THE RSA

The RSA has a multiparty democratic political system that is based on a democratic constitution.

Political Parties: The government of the RSA is controlled by the African National Congress (ANC) alliance, which at the time of this study, holds the majority of seats in parliament of 66%. The ANC alliance consists of a broad spectrum of political groupings, that range from the SA Communist Party (SACP) and the Congress of South African Trade Unions (COSATU), on the left, to groupings that support free enterprise. The support base of the ANC alliance appears to consist almost totally of blacks. The next most significant parties in parliament include the Democratic Party and the New National Party, which have recently

merged to form the Democratic Alliance. The Democratic Alliance is a centrist group that supports free enterprise.

Legislation: Since its ascent to power in 1994, the ANC alliance has enacted a plethora of laws, some of which have been surrounded by controversy. Labour legislation has been seen to be detrimental to job creation and changes are being considered amid strong objections by COSATU and the SACP. Other forms of legislation have exacerbated the shortage of skills and entrepreneurs in the RSA by placing hindrances in the path, eg. of immigrants. The SANDF on the other hand, has been legislated into existence in the Constitution of the Republic of South Africa (1996: Chapter 11, paragraph 198 to 204).

The military personnel of the SANDF are subject to the Defence Act of 1957. This act is in the process of being rewritten to comply with the constitution, but it is not expected that it will change the way in which the SANDF operates or have any significant effect on the personnel. The Labour Relations Act of 1995 does not apply to military personnel.

The Public Service Act personnel are however subject to the Labour Relations Act of 1995. Both the Public Service Act and Defence Act personnel are required to remain apolitical.

Relations between Government and Organisation: The SANDF is intended to be an apolitical state organ. The constitution and the Defence Act of 1957 define the nature of this relationship.

Retention of the SANDF's skilled members remains a serious problem on account of poor remuneration. Responsibility for remuneration, which was previously centrally regulated by the Public Service Commission, has been delegated to the Public Service departments in terms of the Code of Remuneration (CORE). The DoD uses the Personnel Management Code (PMC) for uniform members. In spite of this change, skilled members have seen little incentive to remain in the Services. Members who once studied engineering through the SAAF have been inclined to leave within two years of graduating. For similar reasons few engineers are attracted to employment in the SANDF. The organisation's ability to retain a core body of expertise as required by the Defence Review (1998: Chapter 3, paragraph 9.2), has, as may be expected been severely weakened.

Recruitment is also fraught with difficulties. The Equity in Employment Act as applied by the DoD requires that the recruits be appointed in the following ratios: 64% black persons, 11% coloured persons, 1% persons of an Asian ancestry and 20% whites persons (Fullard 2001:1).

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In 2000, only 3 000 black school-leavers have passed higher-grade maths and 5 000 passed higher-grade science each year (Bisseker 2001: 1). These subjects are prerequisites for engineering degree studies. Few black candidates are consequently eligible for enrolling as students as engineers or pilots.

The SANDF must, furthermore, compete with the generous bursaries offered by corporations such as Anglo-American and Vodacom for their portion of an annual national pool of about 3000 eligible black matriculants. Very few black candidates accept the offer to study through the SANDF. The result is that a smaller number of non-blacks than that needed to maintain the proportions between the races are then recruited.

B. The International Political Arena

All hope for development, good governance, and the alleviation of human suffering is dependent on a secure and stable environment. Peace is therefore the foundation for Africa's future. Sub-Saharan Africa is trapped in a vicious cycle consisting of poverty which gives rise to criminal and political violence which in turn, investment and weakens economic development. When a state is no longer able to offer its citizens safety and security, its primary reason for existing is lost. Thanks to the visibility that the news media give to wealthier developed economies, risk-takers, in their abject poverty, are becoming increasingly more willing to take up arms to claim their piece of the depleted economic pie in their regions (Thom 2000: 3).

Africa has enjoyed little growth since colonial times. A large proportion of African countries suffer from chronic infrastructural underdevelopment, poverty, unemployment, disease, debt and instability. The outcome of this situation is the displacement of people, the proliferation of weapons, illegal immigration, trafficking in contraband and the propagation of disease. Some countries such as Angola and the Democratic Republic of the Congo (DRC) are currently engulfed in civil wars.

Zimbabwe has recently deteriorated to the point where the rule of law has been eroded to virtual non-existence. The flight of skills has further weakened the country's ability to grow its economy to maintain the well-being of its population.

African states do not have the coercive capacity, individually or collectively, to enforce stability on the continent in more than the most localised spots. At present an arc of crisis

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stretches from Eritrea, through Sudan, Rwanda and the Democratic Republic of the Congo to Angola, affecting almost a score of states. (Cilliers 2000: 1)

There is a strong link between regional and domestic security. Arguably the greater, more important challenge, considering the extent of state collapse in much of Africa, is that basic stability, law and order to be maintained in each state. The more secure states will then be in a position to assist those collapsed states. Encouraging undemocratic weak states to assist other undemocratic weak states in the provision of security without the unequivocal and significant involvement of the international community may, over time, have unintended consequences. One such consequence could be to further strengthen external involvement in the affairs of others, while continuing to allow poor countries to expend significant scarce resources on the maintenance of military forces with an essentially non-domestic security orientation (Cilliers 2000: 1).

The Drug Enforcement Agency (DEA) of the United States of America (USA) considers drug trafficking to be a global threat to stability. Today's major international drug syndicates are far more powerful and violent than any organised criminal groups ever encountered by American law enforcement agencies (Ledwith 2000: 1).

> *"Members of international groups headquartered in Colombia and Mexico today have at their disposal the most sophisticated communications technology as well as faxes, internet, and other communications equipment. Additionally, they have in their arsenal: aircraft, radar-equipped aircraft, weapons, and an army of workers who oversee the drug business from its raw beginnings in South American jungles to the urban areas and core city locations within the United States. All of this modern technology and these vast resources enable the leaders of international criminal groups to build organizations which – together with their surrogates operating within the United States – reach into the heartland of America. The leaders in Colombia and Mexico, by creating organizations that carry out the work of transporting drugs into the United States and franchising others to distribute drugs, themselves try to remain beyond the reach of American justice. The traffickers also have the financial resources necessary to corrupt law enforcement, military, and political officials in order to create a relatively safe haven for themselves in the countries in which they make their headquarters (Ledwith 2000: 1)."*

According to Ledwith (2000: 1), non-statutory paramilitary groups are also used by the drug traffickers:

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> *"Since the 1970s, drug traffickers based in Colombia have made temporary alliances of convenience with leftist guerrillas, or with right wing groups. In each case, this has been done to secure protection for the drug interests. At other times, the drug traffickers have financed their own private armies to provide security services. Some insurgent and paramilitary groups have, in fact, become little more than bands of well-armed thugs selling their services to drug traffickers."*

Internationally, countries have tended to downsize their military forces since the end of the cold war.

Border Responsibilities: The RSA has a coastline of 2 798 km and land borders measuring 4 750 km. Along our maritime borders lie a 24 nautical mile contiguous zone and an exclusive economic zone of 200 nautical miles. The prospect of a border of such extent poses a considerable challenge to any defence force. The size of the RSA's borders makes them suitable as a transit route for illegal immigrants and criminal syndicates with contraband such as drugs or arms.

C. REGIONAL STABILITY

Botswana has a stable political environment, although nearly half of the electorate have not registered as voters because of disenchantment with opposition parties. The country sharply increased its defence spending during the latter part of the 1990s. Its neighbours are also upgrading their forces. Botswana sent 200 troops alongside the RSA contingent to restore order in Lesotho in 1999. The Tuli block in Zimbabwe is a potential source of conflict as Botswana locals feel that the area belongs to them. This matter has however not been raised with Zimbabwe. The satisfactory growth in Botswana has failed to generate adequate employment for young well-educated school-leavers and has resulted in riots. The electorate has become cynical of the political elite whose corruption has recently surfaced (Synge 2000: 59). Botswana has been inclined to be wary of its regional neighbours, preparing for a worst case scenario by maintaining relatively large military forces. Violent crime in that country is also a cause for concern (Synge 2000: 60).

The mountain kingdom of Lesotho, long marked by political turmoil and economic struggle suffered rejection of the results of the 1998 election by parties opposed to the Lesotho Congress of Democracy (LCD). The police and military were divided along political lines. The resulting violence led to intervention by a SADC/-RSA force. Further violence and arson ensued, destroying many businesses. Political tensions were reduced when the government

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announced that new elections were to be held in the second quarter of 2001 (Synge 2000: 107).

In Zimbabwe President Robert Mugabe suffered an unexpected defeat in a referendum to change the constitution. Perceiving the influence for this defeat to originate from the small group of Productive and influential farmers, the so-called "war veterans" terrorised the farmers, occupying white-owned farms and killing 20 people while injuring many others. Many farmers were forced to leave their farms. Further violence and intimidation marked the run up to the election in June 2000, which the ruling ZANU (PF) won albeit with a lower majority than before. Zimbabwe has been racked by a growing lack of respect for the law and dictatorial tendencies by President Robert Mugabe. His government amended the constitution to provide for the expropriation of farms without compensation. International confidence and the aid traditionally provided by the international community have dropped. The fuel shortage, which is due to non-payment of their accounts, has plunged the country into a crisis. Owing to involvement in the war in the DRC, conditions for the Zimbabwean military have been less than satisfactory (Synge 2000: 487).

For many years a peaceful kingdom, Swaziland is the only country in the Southern African region without a constitution or full democracy. Groups demanding the establishment of democracy are subjecting the monarchy to increasing pressure. A pro-democracy strike caused tremendous damage while enabling the population to gain a few concessions from King Mswati II. A political group called the "Black Tigers" emerged after the 1998 elections. This led to a government crackdown on opposition politicians. The Black Tigers claimed responsibility for a series of bomb blasts subsequent to the crackdown. Recent support of the people and intervention by South African unions in Swaziland's internal affairs have the potential to cause increased instability in the workplace. The influx of crime syndicates and criminals from the RSA is distorting Swaziland's economy. The understaffed police force is unable to control access through their borders, this resulting in the Southern and Eastern regions of Swaziland becoming transit points for criminals and contraband. Swaziland is also an area where dissidents from the RSA could easily take refuge from South African security forces (Synge 2000: 397).

Moçambique was afflicted by a civil war for many years under the FRELIMO government until the RENAMO movement was persuaded to join the democratic process. FRELIMO won the election in 1999 with an overall majority that was less than that of the previous election in

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1994. Despite differences between the two opposing groups, it appears unlikely that RENAMO will revert to a campaign of violence. This group has threatened to form its own government in the central and Northern provinces, sparking fears of a possible secessionist war by its leader especially since the group has been excluded from provincial government. Lawlessness is the order of the day in large parts of the rural areas where the government has little presence. Crime networks controlled from other countries exploit this situation. Arms and ammunition are easily accessible, posing a threat to maintenance of law in the region. Moçambique suffered greatly under the devastation wreaked by major floods in the first quarter of 2000. Support from neighbouring countries was essential for survival and recovery. Unions have threatened a general strike if the government fails to increase the minimum wages for workers. The flood that ravaged Moçambique also devastated parts of Botswana, Zimbabwe, Swaziland and the RSA (Synge 2000: 185).

In spite of a lack of resources, some African states have shown a surprising and sobering ability to finance military operations (Thom 2000: 10).

In some African regions, generations have grown up knowing only war. It will be difficult stopping the conflicts in these areas (Thom 2000: 11).

By 2010, it is likely that Africa will consist of islands of stability around relatively strong, prosperous states such as the RSA, Kenya and possibly, Nigeria. Other states that are unstable will probably develop into secure city-states surrounded by local powers pursuing their own interests (Thom 2000: 11).

The predictive index of civil war has been determined to be greater in Sub-Saharan Africa than other regions. The probability of war in Sub-Saharan Africa, excluding the RSA, is also growing whereas in other regions it is on the decline. (Collier *et al* 2000: 15).

2.3.3 THE ECONOMIC ENVIRONMENT

A. THE DOMESTIC ECONOMIC ENVIRONMENT

The RSA's world competitiveness rating has increased to 25 and its growth competitiveness ranking is 33 (World Economic Forum 2000: 196).

A degree of friction and discomfort is being felt by the Southern African Development Community (SADC) countries on account of the RSA's economic dominance in the region.

Zambia and Zimbabwe have found it difficult to compete with imports from the RSA (Synge 2000: 287).

The issue of water security has led to tensions between Namibia, Botswana and Angola. In the future this may become a greater issue in the region (Synge 2000: xv).

GDP: The GDP for 1998 was US$ 116,730 million, which was the highest in Sub-Saharan Africa. Table 2 suggests that the RSA's economy has shifted towards a service economy with a decreased contribution from the agricultural sector (International Bank for Reconstruction and Development 2000: 253).

		Value added as percentage of GDP			
Year	**GDP [$M]**	**Agriculture**	**Industry**	**Manufacture**	**Services**
1998	116 730	4	38	24	57
1980	78 744	7	50	23	43

Table 2: Economic Sector Contribution to GDP (International Bank for Reconstruction and Development 2000: 253).

The RSA has shifted towards becoming a service-based economy.

The RSA has achieved a smaller growth in its Gross Domestic Product than was expected after 1994 when the then Government of National Unity was formed.

Currency Fluctuation and Exchange Rates: The value of the currency of the RSA has deteriorated since 1994 as shown in Figure 5. Since 1996 the RSA Rand has lost considerable value against other currencies. This holds advantages for the export trade, but weakens the RSA's ability to acquire resources required from foreign countries, to develop local industries for competition in the global market.

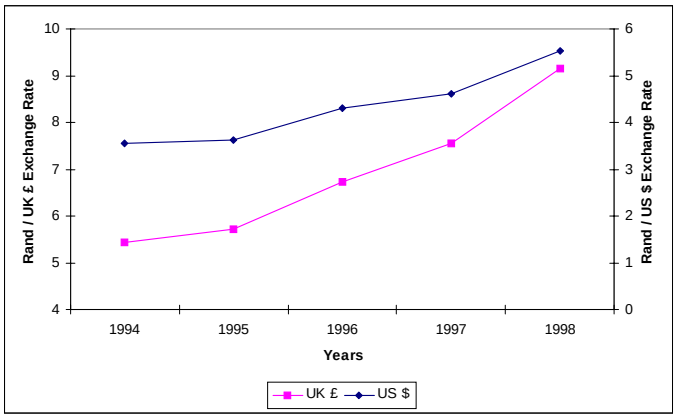

Figure 5: Currency Exchange Rates since 1994 (SARB 2000: x).

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Industries: The RSA has an extensive mining industry and is the world's largest producer of platinum, gold and chromium. Other industries include the assembly of automobiles, metal-working, and the production of machinery, textiles, iron, steel, chemicals, fertiliser and foodstuffs.

Investment

- By the State: The State's capital expenditure for 1998 was 1,3% of GDP (International Bank for Reconstruction and Development 2000: 256).
- By the Private Sector: Investment by the private sector in 1998 was 72,9% of gross domestic fixed investment (International Bank for Reconstruction and Development 2000: 260).
- Foreign Investors: Foreign direct investment (FDI) was US$ 993 million and US$ 550 million in 1995 and 1998 respectively (World Bank South Africa Data Profile 2000: 1). This decline in FDI appears to be the result of an increase in conflicts and corruption in southern Africa.

Unemployment: The RSA's official unemployment level at the time of the 1996 census was 33,9 % of the 23,986 million people of the population aged between 15 and 65 years of age. The Global Competitiveness Report for 2000 (World Economic Forum 2001: 197), rated the RSA's unemployment very badly at 55 out of 59.

Globalisation: Globalisation has had a significant influence on the previously isolated RSA economy. Many firms closed when faced with competitively priced imported Products. Other firms that were well-managed found that new markets sought their services and goods.

Stability in monetary and fiscal issues: The RSA government has maintained fiscal discipline by resisting unrealistic public service wage demands and reducing the budget deficit. The Reserve Bank has generally adhered to strict monetary policies (Synge 2000: 291).

Labour movements: Between 1989 and 1997 the RSA lost more than a quarter of a million of people to emigration, a figure that is shocking compared with Statistics SA's count of 82 811. Since 1994, 56% more professionals have been emigrating annually than in 1989. Home Affairs on the other hand has not been able to cope with the processing of applications from skilled immigrants, but has been seen to improve recently. The inefficient processing of immigrants' applications serves as a discouraging signal to businesses entering the RSA (Berkowitz 2001: 1).

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B. THE INTERNATIONAL ECONOMIC ENVIRONMENT

Depending on its individual situations, each country has its own spending priorities. Generally expenditure on defence has dropped quite drastically throughout the world. Those opposed to funding of the military or in favour of disarmament, argue that a greater peace dividend would be earned if governments spent their money on social services rather than weapons. In the Sub-Saharan Africa some countries have spent a larger part of their Gross National Product (GNP) than have others. In some cases the larger spenders have poor national wealth as indicated by their GNP per capita. Figure 6 graphically shows the relationship between the GNP per capita and the degree of military spending by the countries listed in Table 3. The same parameters for the world are shown to place the sending of the various countries spending in context.

The average national military expenditure in the rest of the world is about 2,8 % of GNP (International Bank for Reconstruction and Development2000: 262).

Table 3 shows that the sub-Saharan African economies are relatively poor, each having a low GNP/capita.

Slowing economies in several countries have led to civil disorder as the populations protest particularly against urban unemployment (Synge 2000: xv).

Country	**Military Spending [%GDP]**	**GNP per Capita [US$]**
RSA	1.5	3400
Botswana	6.5	3260
Namibia	2.74	2200
Swaziland	2.5	1440
Zimbabwe	5.5	750
Lesotho	3.4	670
Zambia	1.76	380
Angola	6.9	340
Malawi	1.47	243
Moçambique	1.02	90

Table 3: The Correlation of Southern African Countries' GNP per Capita with their Military Spending during 1999/2000 (Synge 2000: xvii).

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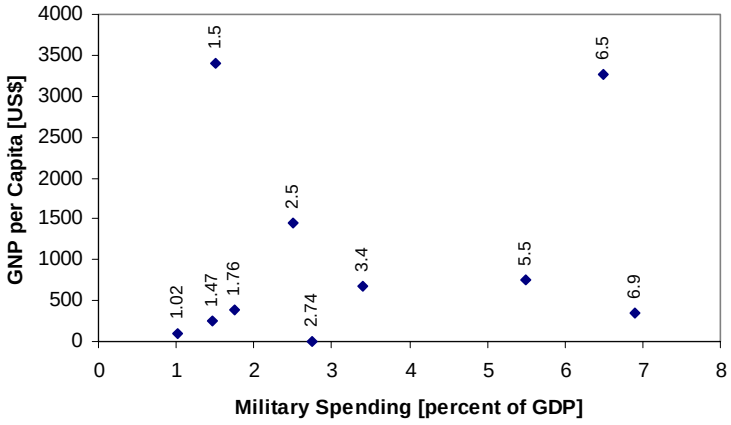

Figure 6: The Military Spending of Southern African Countries Listed in Table 3 during 1999/2000 (Synge 2000: xvii)

2.3.4 THE SOCIO-CULTURAL ENVIRONMENT

A. SHIFTS IN VALUES AND CULTURE

In South Africa there has been a shift away from the former authoritarian, hierarchical approach, which was the hallmark of the National Party's period of government. The ANC government generally tends to seek consultation during the development of new laws. They have however not hesitated to employ their majority in passing laws, sometimes to revisit certain legislation as in the case of the Labour Relations Act of 1995. Globally, the trend towards consensus-seeking is growing. However a few states, for example Zimbabwe under Mugabe and the DRC under Kabila have been less than accommodating towards those who disagree with them.

The youth in very poor communities are susceptible to active involvement in conflicts, wars and even banditry.

B. ATTITUDES TO WORK AND LEISURE

In terms of the competence of government officials, the RSA's competitiveness is very poor as it is ranked at 55 out of 59 countries (World Economic Forum 2000: 197).

Several incidents involving black members of the SANDF murdering their white counterparts have occurred. These include the incidents that have occurred at Tempe military base, Simon's Town and at 7 SA Infantry at Phalaborwa. The murder of two black SANDF

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members during the robbery of firearms by white members has also raised concern. The Tempe incident has been under investigation by the Setai committee.

Doctors employed at SAMHS are demilitarising to avoid serving in the DRC or in rural areas (JSCD 2001: 1).

The Chief of the SANDF (C SANDF) has stated that certain members of the SANDF have had a tendency to be absent without leave (AWOL). These cases are dealt with by the deduction of amounts from the salaries of the members concerned for the period absent. Because of the investment in them, these members are not being discharged (JSCD 2001: 1).

While the above cases are examples of offences caused by factors ranging from poor discipline to plain criminality, there are many members in the SANDF who are well-motivated and disciplined and who serve with distinction.

C. Natural Environment

Just as Africa comprises many countries, cultures, races and languages, it has many different ecological environments. These environments range from vast deserts, semi-deserts, dense forests, and savannah grasslands to swamps and lake areas. These environments each have their own unique ecologies and diseases. These diseases which include Malaria, Congo Fever and Sleeping Sickness pose a serious threat to any military force operating in these regions.

Moçambique and the Northern border areas of the RSA suffered floods during the first quarters of 2000 and 2001. Local and foreign military and civil organisations were required to assist with search and rescue operations in these areas and the SANDF played the leading role in the operation.

The SANDF is expected to conduct operations in any of these environments. Suitability and fitness for purpose in the environmental conditions encountered in these areas are important aspect of the design of the equipment used for these operations. The question has arisen whether the RSA's military equipment is suitable for deployment in these regions. If it is not, the efficacy of deploying the SANDF in these unsuitable regions, is questionable.

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D. EDUCATION AND HEALTH

Education: The RSA's illiteracy rate declined from 15.8% to 14.3% in the case of male adults and 17.5% to 15.8% in the case of female adults between 1995 and 1999 (World Bank South Africa Data Profile 2000: 1).

Assessments have rated the quality of tertiary education in the RSA as poor, at 46 out of 59 economies. Maths and science education was rated as 58, the second worst of those 59 countries assessed. The difference in the quality of schools in the RSA also fared very poorly, being placed at 54 out of 59 countries. The quality of public-funded schools was rated as poor at 44 out of 59 countries (World Economic Forum 2000: 197).

Health: In 1995 the average life expectancy of South Africans was 62 for males and 68 for females (International Bank for Reconstruction and Development 2000: 232).

The RSA has a very large range in the quality of healthcare, is therefore considered to have an inadequate healthcare system nationally, being rated at 50 out of 59 countries (World Economic Forum 2000: 197).

Over the last six years, Zimbabwe has lost a million people to AIDS. It has been estimated that 25% of Zimbabweans are infected with HIV (Synge 2000: 488).

E. DEMOGRAPHIC CHANGES

Urbanisation: The ratio of the size of the urban population to that of the rural population increased from 49.3%, 52.1% to 51.7% in 1995, 1998 and 1999 (World Bank South Africa Data Profile 2000: 1).

Population growth rate: The population growth rate has been 2.2%, 1.8% and 1.7% for 1995, 1998 and 1999 respectively. There has been a steady net increase in the loss of people through emigration. In 1998 and 1999 the country lost 4843 and 5540 people, respectively. This reflects the difference between the number of immigrants to the South Africa from foreign countries and the number of emigrants leaving the RSA. The emigrant category comprises only those persons who have formally declared their intention to permanently leave the country. The emigrants category generally includes skilled professionals or businessmen or women. Of the 8 276 people that emigrated in 1998, 1 796 were from professional

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occupations, 736 were from managerial and administrative occupations and 306 were from artisan or related occupations (Lindeque 2000: 1.16).

Crime rate: The level of crime in the RSA is unacceptably high. In the second half of 2000, the Ministry of Safety and Security announced a moratorium on the publication of crime statistics. During the first sitting of parliament in 2001, the opposition parties strongly objected to this decision, exerting pressure on government to resume the release of crime statistics.

Police protection and organised crime in the RSA both score very badly, South Africa being placed 56th out of the 59 countries assessed (World Economic Forum 2000: 197).

As crime places a burden on the State, businesses and private individuals, it presents a risk to investors and hinders the development and growth of the economy.

F. INCOME DISTRIBUTION

The Gini coefficient is a measure of the income distribution in an economy. It is derived from statistics indicating the scales of income of different levels of population of the country. Figure 7 shows the income distribution profiles of the RSA compared with those of Zimbabwe, Egypt and Australia (International Bank for Reconstruction and Development 2000: 238). This graph shows the extent to which the RSA and Zimbabwe share the characteristics of a more uneven income distribution compared with Egypt and Australia.

If the wealth of a country were divided perfectly equally among all the citizens in the country, the Gini coefficient would be zero. If only one person out of the entire population were to hold a nation's wealth, the Gini coefficient will be unity. During the years of apartheid, the RSA registered one of the highest Gini coefficients in the world ranging from the high 0,50s to the low 0,60s. Countries such as Columbia, Chile, Brazil, Kenya and Jamaica where large degrees of inequality were prevalent had similar Gini coefficients. Studies by Statistics SA in 1995, 1996, 1997 and 1998 demonstrated how the Gini coefficient rose steadily from 0,73 in 1995 to 0,80 in 1998. Statistics SA has, however, always measured the Gini coefficient along racial lines each year. The trend is upwards for whites, coloureds, and blacks, but most dramatically among blacks, rising from 0,70 to a staggering 0,81 in three years. If the Gini coefficient is correct, this suggests that there has been a strong tendency in the RSA for wealth to concentrate in small groups within each racial group (Jack 2000: 1).

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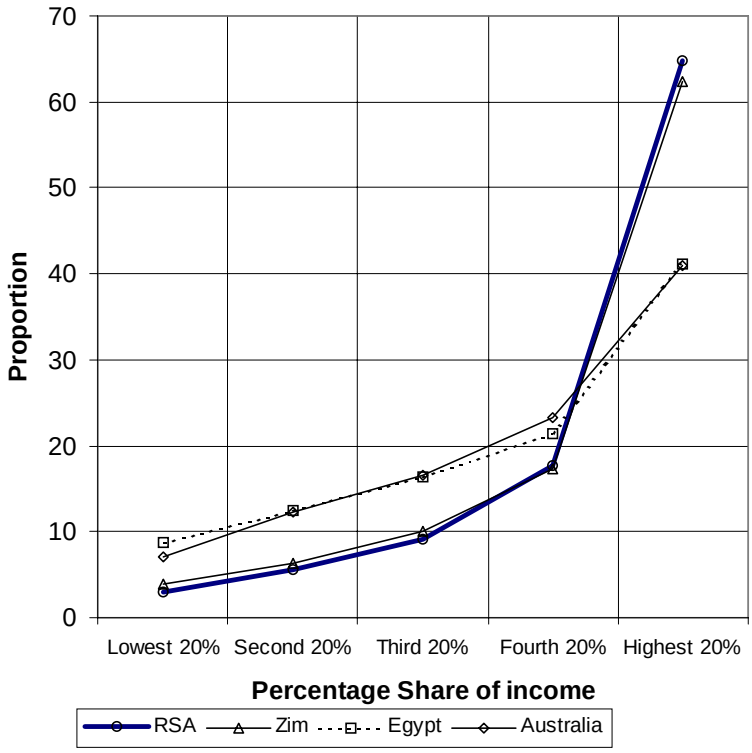

Figure 7: Profiles of the Income Distribution of several Economies (International Bank for Reconstruction and Development 2000: 238).

This is a cause for concern as great inequalities in wealth present a threat to the state's ability to maintain stability. Symptoms of popular discontent include corruption, high crime levels and even insurgency.

2.3.5 THE TECHNOLOGICAL ENVIRONMENT

A. GOVERNMENT POLICY

In 1996 the RSA government presented its approach to technology in the White Paper on Science and Technology. This appears to have been a deliberate attempt to approach and direct technology strategically.

It is crucial for government departments to retain A capability and capacity for intelligent buying of research and development and SET services (DACST 1996: Chapter 3, paragraph 3).

The approach for a national system of innovation is envisaged in the White Paper on Science and Technology of the Department of Arts, Culture, Science and Technology (DACST)

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(1996: Chapter 3, paragraph 1) as an interacting system of functioning institutions, organisations and policies with a common set of social and economic goals.

The RSA government believes that the functions of DACST should include the following (DACST 1996: Chapter 5, paragraph 1):

- Promoting coherence and consistency in Government's approach to stimulating the national innovation system in general and in its effort to support the development of science, engineering and technology in particular.
- Promoting and co-ordinating interdepartmental and government-wide initiatives relating to the support of innovation and technology diffusion.
- Making available and controlling a government-wide science budget to enable ministers to assess and determine the multi-year spending priorities, thereby enhancing innovation effectiveness.

The defence sector is the repository of an extensive set of engineering and technological skills and holds potential for exploitation in civil applications (DACST 1996: Chapter 8 paragraph 5).

The DACST is carrying out a comprehensive audit of research and technology to identify and assess existing government interventions in science, engineering and technology (SET) and develop an inventory of research and technology projects in the economy (DACST 1996: Chapter 5, paragraph 2).

Defence Technology Policy: It is envisaged that a small, sophisticated force, by leveraging its technological advantage to increase its flexibility and responsiveness, could mobilise more rapidly. Investment in defence research is considered important for this reason (DACST 1996: Chapter 8, paragraph 5). The Directorate of Technology Development of the SANDF is one of the sources of expertise to be used to manage the innovation fund envisaged by Government (DACST 1996: Chapter 7, paragraph 2). A strong technology base for the SANDF is essential for the following purposes (DACST 1996: Chapter 7 paragraph 2):

- Maintaining the ability to detect threats.
- Creating an awareness of military technological trends and the implications thereof for the SANDF.
- Providing expert advice in the area of procurement.

- The provision of test and evaluation services.
- Supporting upgrading and maintenance efforts

Government Investment Policy: Government plans to support research and innovation by the co-ordinated funding of:

- Higher education institutions (DACST 1996: Chapter 7, paragraph 3).
- Science, engineering and technology institutes (SETIs) (DACST 1996: Chapter 8, paragraph 1).
- Patents: The RSA government plans to develop legislation and policy that will be in keeping with international norms, thereby affording protection to the innovator and encouraging economy-growing innovation (DACST 1996: Chapter 6, paragraph 1).

B. PRODUCTS

During the arms sanctions against the RSA, many indigenous Products of superior quality were developed, manufactured and employed in South Africa. Since the end of the Cold War, military spending has declined dramatically world-wide, making it difficult for South African weapons to be marketed in spite of the removal of sanctions. Several negotiations to obtain major sales of the Rooivalk combat helicopter system to the UK and Australia have been unsuccessful. Deals involving other defence Products such as the communications systems and the Health and Usage Monitoring Systems (HUMS) for the British Aerospace Hawk export contract to Australia have, on the other hand, been successful.

C. NEW TECHNOLOGIES

The RSA has initiated the acquisition of a set of new weapons systems to replace the existing inventory and to keep abreast of the current trends in arms technology.

In relation to other economies, the RSA has been rated 12th out of 59 for the licensing of technology, 19th for e-commerce and 12th for Internet use for general information (World Economic Forum 2000: 197).

The SANDF maintains research and development institutes to address those core areas that are strategically significant for ensuring a credible deterrent. The output of these R&D processes is used in defence Products. The lower level of investment in technology has, however, reduced the output of research.

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D. TECHNOLOGICAL COMPETITIVENESS

The number of scientists and engineers per million people in the RSA compares favourably with that of other African countries, as shown in Figure 8. This is, however, not the case if we are compared with a first world country such as Canada.

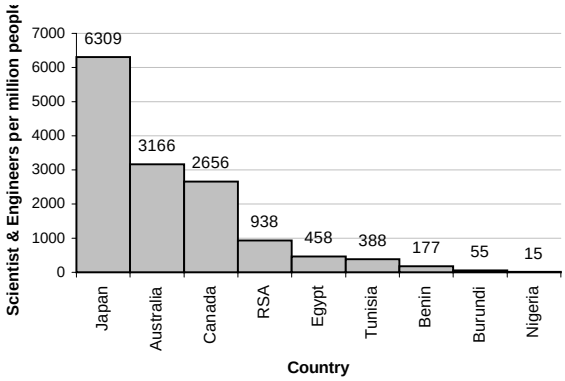

Figure 8: The Scientists and Engineers Population per Million People per Country (International Bank for Reconstruction and Development 2000: 266).

There are no records of scientists and engineers in Botswana, the DRC, Kenya, Lesotho, Malawi, Moçambique, Namibia, Tanzania, Zambia or Zimbabwe (International Bank for Reconstruction and Development 2000: 266). This suggests that the numbers of these resources in these countries are either insignificantly low or else the survey failed in these countries. These latter countries suffer from a distinct disadvantage in the areas of technological competitiveness or innovation. They are also dependent on foreign support and advice for technological acquisitions and support throughout their economy.

This apparent potential for technological advancement has two main requirements, namely a technologically more capable defence force and an economic engine to drive the creation of wealth by the development and production of commodities for the markets.

Most African countries need foreign assistance, as they are unable to maintain their weapons inventories effectively (Thom 2000: 3).

While the RSA may appear competitive compared with its neighbours, its technological also a source of concern, as wealth derived from technological innovations will not be distributed evenly in the sub-Saharan region. This may contribute to the potential for conflicts.

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The brain drain or rate at which the RSA loses people with high levels of skills is the third worst in the world ranked 57th out of 59 countries, with the USA performing the best (World Economic Forum 2000: 197).

E. Developments in Unrelated Industries

Information warfare is an example of an area of the defence industry that has attracted attention from users of information technology (IT) such as banks. The civil use of IT is a defensive one focussed on avoiding and surviving the danger of threats from hackers and viruses.

Conversely, the military have begun adopting the cryptographic and communications technologies that have migrated to the civilian sector as effective, affordable Commercial off the Shelf Systems (COTS).

F. Trends

Global Trends in the Technological Environment: The distinction between communications and computers have become blurred beyond all expectations. The Internet, which operates on telecommunications networks, is challenging traditional telephone systems. Mobile telephony has more in common with a digital computer database than a radio communications system.

The role of the soldier has changed from one of being concerned only with all-out war to one of peacekeeping and police support. The conventional service or assault rifle has come under debate. The development and adoption of less-than-lethal and electronically controlled weapons is being proposed for the new roles of the soldier (Gander 2001: 1).

In general, many new Products have the following characteristics:

- They contain significant numbers of software components.
- They have a significant degree of embedded intelligence.
- They are physically compact.
- They are considerably more robust and reliable than older Products.
- They often have embedded functional redundancy to enhance dependability.

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Because of these characteristics, the functions and performance capabilities of Products are tractable or adaptable. Often, the client or user can implement his changes to suit their range of applications. Modern Products are therefore flexible to the point where they can be considered to have deferred or virtual configurations.

Open systems have become an important and attractive trend. Hanratty *et al* (1999: 50) define open systems as systems that can be supported by the entire marketplace, rather than supportable by a single or small group of suppliers on account of the unique aspects of the design chosen. Open systems reduce risks and costs associated with developing new interfaces.

Communications: The RSA, rated 45th out of 59 countries, is one of the poorer performers internationally as regard its telephone density (World Economic Forum 2000: 197). The RSA had an average of 107 telephone main lines per 1000 people in 1997 compared with the world average of 144 and the lower middle income country average of 108 (International Bank for Reconstruction and Development 2000: 267).

Scenarios: In a peaceful environment, technological innovation capabilities can contribute to wealth creation for a country by means of exports and licensing agreements. When a country prospers while its neighbours experience poverty, a situation with a potential for instability develops. Unemployed people tend to migrate to the country where they can derive incomes but where the local populations resists the possible dilution of its employment opportunities and labour bargaining ability.

In an environment experiencing conflict, technological capabilities provide the military forces with innovation opportunities that leverage their capabilities and therefore their influences.

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2.4 MARKET GROWTH ANALYSIS

A. THE MILITARY

The military as an "industry" also experiences life cycles. During peace-time the military should be reduced to a core size. Rebuilding a larger military capability is both expensive and a lengthy process. During times of impending conflict, nations increase the size of their defence forces. Restoring or increasing a defence capability is very expensive and takes considerable time. The end of the Cold War resulted in the drastic reduction in military spending internationally.

The major world powers and others have down-sized their defence forces and closed down many of their units and bases.

The ensuing conflicts such as those in Iraq and Yugoslavia have exerted pressure on those military organisations that were left.

More wars today rage within countries than between nations. This is true of Africa where many countries are embroiled in internal conflicts, often with interference from neighbouring states. Many of these conflicts involve light infantry often using the ubiquitous AK47.

Some states such as those involved in the Ethiopia-Eritrea border war and others operate sophisticated weapons. Examples include weapons such as Su 27 and MIG 29 fighter aircraft, Hind 24 attack helicopters; and tanks equipped with night vision equipment and fire control systems (Thom 2000: 8). Some of these advanced weapons could be used against the RSA.

B. THE DEFENCE INDUSTRY

The international defence industry had therefore also experienced a general decline after the end of the Cold War.

The influence of advanced technology during the war conducted by the Allied forces against Iraq and later the groups in Yugoslavia, has rekindled interest in military applications. Many of these applications such as the Global Positioning System (GPS), which was developed by the USA's DoD for military purposes, have been adopted for civil purposes.

The RSA defence industry has started experiencing growth in demand for its Products, from foreign countries. Large overseas companies have acquired several local firms. These firms

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are now manufacturing and designing Products on behalf of their principals for foreign clients.

Conflicts or wars could lead to embargoes or sanctions against the RSA. The RSA requires its own core capabilities for such contingencies.

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2.5 KEY SUCCESS FACTOR ANALYSIS

2.5.1 INTRODUCTION TO KEY SUCCESS FACTOR ANALYSIS

The key success factors of success in the existence of a military organisation are those abilities required to win a conflict, since these abilities would discourage aggressors and ensure a peaceful existence for the nation. In the same way, the SANDF's factors of success are those that enable it to effectively and efficiently defend the RSA from aggression, preferably by deterrence. Deterrence is that capability that ensures that a potential aggressor hesitates to attack for fear of losing the conflict. The uncertainty generated in a potential aggressor by a country's flexibility and capability, can be a deterrent. Effective deterrence is therefore the key success factor.

2.5.2 KEY SUCCESS FACTORS

A defence force must be capable of executing operations and the quality of the operations is determined by whether the defence force in question wins any conflict in which it may become involved. Meiring (2001: 1) stated that the core function of the SANDF is to execute successful operations in which the aggressor is defeated (*wenoperasies*).

The principles of war are the elements that a defence force uses as a basis to win conflicts. The principles of war can therefore be regarded as key factors of success for the SANDF. These factors do, however, require certain resources to develop and sustain them. The table in Appendix C: shows those areas in which the resources may contribute towards the SANDF's successes. The ETF is concerned with the conceptualisation, development, acceptance, support, upgrading and disposal of Products, Products Systems and the associated processes, and is therefore well- placed to contribute towards the SANDF's key factors of success. The table in Appendix C: shows those areas in which the ETF can contribute to the success of a defence force. As part of a larger system, resources may contribute to more than one key success factor by design or by accident. The key success factors desired for one, or a series of operations are an issue of operations to be determined by research and force design.

Table 4 presents a summary derived from Appendix C: , of the areas in which the ETF may contribute to the SANDF's success factors.

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Focus	ETF Contribution Areas to Support SANDF Success	
	Engineering	**Technical Services**
Products Systems and Products	Systems Engineering/Systems design for: • Capability • Compatibility • Dependability • Supportability • Ease of operation • Cost-effectiveness • Flexibility Verification of compliance of designs with specifications. Validation of compliance of designs with user requirements. Configuration management. Project management.	Availability at required rate and location. Configuration management. Project management.
Command, Control, Communications, Computers, Intelligence, Information, Surveillance, Reconnaissance and Electronic Warfare (C4I2 SR EW)	Same as in the case of Products Systems and Products Systems Engineering/Systems design for: • Penetration denial capabilities for Information and Communications Technology (ICT) Products. • Deception capabilities for Products	Availability at required rate and location. Configuration management. Project management.
Technology	Ability to identify new technologies suited to SANDF applications. Management of technology	Application of technology in support process.

Table 4: Areas in which ETF contribute to the SANDF's Factors for Success.

Resources and ETF contributions often affect more than one of the key success factors. An example of this, is an airborne refuelling capability, which results in “Mass of force”, “Manœuvre” and “Surprise”. User Systems employ resources such as mission planning tools and weapons effectiveness planning to achieve “Economy of Force” and the “Selection and Maintenance of the Objective”. Information and planning tools are force multipliers that should be at the disposal of commanders. As the availability of information to commanders and staff officers grows, the more its integrity becomes a factor. Denial, leakage and

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corruption of information pose a real threat to a successful command function. The protection of the information and the infrastructure used to disseminate it is a highly important task (Pretorius: 2001: 1).

The resources that support the principles of war and the ETF contribution to them, is made to them are strategic issues that depend on the approval of the executive. The strategic requirement need these resources has been recognised and defined by the RSA Government. The resources in question appear to match those identified in Appendix C: (Defence Review 1998: Chapter 13). The contribution of the ETF is a significant key to the success of the SANDF as a credible deterrent.

Certain resources are required to achieve success in certain areas. These are typically, personnel, training, technology, experience, finances and an organisational climate. The Strategic Management of Technology and Innovation is described in section 3.2 and the Management of Knowledge, Expertise, Skills and Culture is described in section 3.3.

2.5.3 COST-EFFECTIVENESS

Achievement of all the key performance objectives presented above is possible with unlimited resources. The chief resource preventing this achievement of success is finances. Consequently, a balance between cost and effectiveness is required. Figure 9 shows this relationship. The sloped line in the graph shows a trend towards constant cost-effectiveness. The dashed horizontal line presents the minimum required level of effectiveness for a given situation.

The cost may be derived from the net present value (NPV) of the financial or cash flows over the life of the User System. Effectiveness, being dependent on subjective judgement, is a more difficult parameter to quantify. The NPV method is a more accurate technique of assessing the feasibility of a programme.

The User System labelled as “A” Figure 9, has a low cost and a low effectiveness; as it is below the minimum required level of effectiveness and it is therefore unacceptable. The User System labelled as “B”, has the same cost-effectiveness as “A”, but a higher cost and effectiveness. Because it is above the minimum required level of effectiveness, it is an acceptable option. The User System labelled as “C” in Figure 9, has a lower cost-effectiveness than “A” or “B”, but a higher cost and lower effectiveness. Because the poor cost-effectiveness, and because it is below the minimum required level of effectiveness it is

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unacceptable. The User System labelled as “D” in Figure 9, has the same effectiveness as “B”, but a lower cost. It is therefore more cost-effective. The User System labelled as “E”, has a greater effectiveness than “B” or “D”, but a much higher cost, and therefore appears to be less cost- effective. The most desirable solution will be that User System whose performance is such that it will be capable of successfully dealing with all the plausible threats, at the lowest cost. In this case it appears to be “D”.

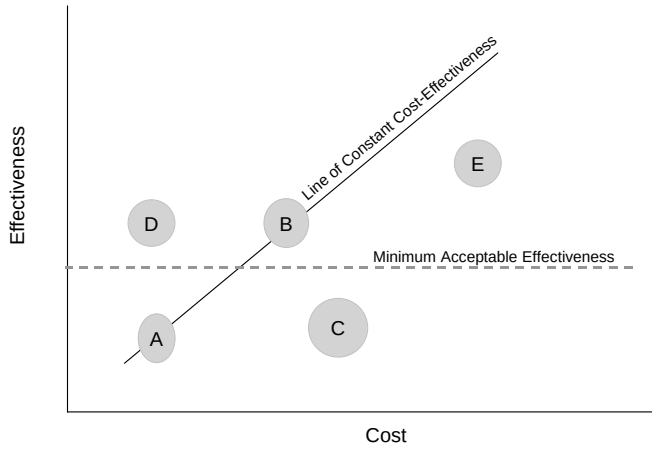

Figure 9: The Relationship between Cost and Effectiveness.

When cost-effectiveness is studied, consideration should be given to the total life cycle of the User System. The acquisition of a Products System precedes the establishment of a User System. The total cost of the User System includes the operation and support costs.

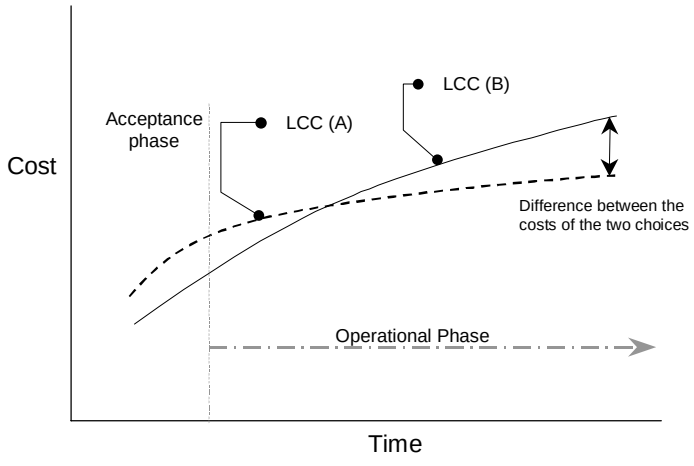

Figure 10: Comparative Cases of the Cost of Acquisition, Operating and Support.

Figure 10 presents a seductively low acquisition price accompanied by a curve (“B”) depicting escalating operating and support costs. Curve “A” in Figure 10, is an example of a Products System with a relatively higher acquisition cost, but lower operating and support

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costs. The curves represent the cumulative costs of the two. In the longer run, the acquisition of Products System “A” is more cost-effective, if it is assumed that they are equally effective. The calculation of the NPV for each option is essential for sound judgement and decision-making.

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2.6 AN ANALYSIS OF THE INDUSTRY ENVIRONMENT IN WHICH ORGANISATIONS COMPETE

2.6.1 FIVE FORCES ANALYSIS

Porter (1985: 4) developed a model of the competitive forces affecting an organisation. The purpose of studying these forces is to enable the organisation to develop a strategy that will give it a competitive advantage and thus enable it to outperform rivals.

According to Porter (1985: 5) industry competitiveness is based on the influence that the five basic forces shown in Figure 11 exert on the organisation. These forces are the following:

- The bargaining power of suppliers.
- The bargaining power of buyers.
- The threat of substitutes.
- The threat of new entrants.
- The extent of competitive rivalry.

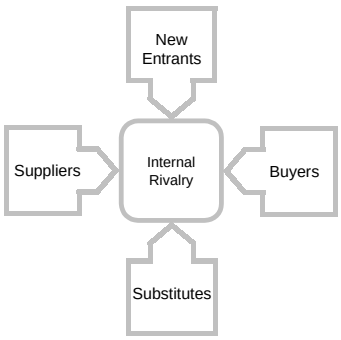

Figure 11: Porter's (1985: 5) Five Forces Model.

Although non-profit organisations generally do not compete for resources, the general rules of this model can still be applied to them (Lynch 2000: 125). Defence forces, which are non-profit government organisations, however do compete. The competitors of a defence force are the defence forces of other countries. During periods of conflict, their means of competition is the conduct of war, and during peace-time, the task of preparing for contingencies. Their competitiveness is determined by their ability to successfully conduct their operations and the quality of the resources they use. A measure of the quality of their resources could be the competitive advantages offered the by technology they use or the dependability and availability of their weapon systems, all of which are functions of the ETF roles.

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A. THE BARGAINING POWER OF SUPPLIERS

The sources of Products and technology and the sources of personnel are the two main categories of supplier. Within these two categories there are two further classes, the new and the upgraded.

Since the end of the Cold War, the demand for defence Products has diminished considerably, leaving a shrinking market to a large number of suppliers. The supply has been greater than the demand, presenting the buyers with greater leverage when considering the acquisition of defence Products. This situation of buyer advantage is visible in the current acquisition process to re-equip the SANDF.

The phases that follow acquisition require training, spares, support and various other services. Once the buyer has bought a Product, it may be unable to use the support services from any source but that particular supplier. This situation could result from a contractual agreement or the uniqueness of the Product, its spares and the training required. The supplier will then gain bargaining power.

Once in the owner's inventory for a period, the Products will require upgrading of the capability, dependability or availability to remain militarily competitive.

The suppliers will enjoy an advantage if the SANDF has purchased, and is committed to operating their Products and therefore, supporting them. The suppliers will also have the leverage associated with being the design authority for the Products. Changes or modifications will require approval by the design authority. However, the choice of developing a local design authority can be prohibitively expensive.

The SANDF has a broadly based local military industry at its disposal to perform many of the services required to limit dependence on one supplier.

The SANDF finances the Defence Evaluation and Research Institutes (DERI), which supply technological support through evaluation and research services. This is a source that provides the SANDF with a technological competitive advantage.

Politics normally influences arms acquisitions and the RSA has presumably chosen the most well-disposed countries with which to do business.

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Certain aspects of Products and Products Systems are significantly complex and therefore necessitate substantial investment for the establishment of local capabilities. Reliance on the supplier could be more feasible than the local capability option. The RSA has counter-trade agreements with suppliers involved in the arms acquisition programme. This significantly alleviates the buyer's vulnerability to developing a weak position.

The RSA has an advantage as a buyer on account of its position as a potential gateway to Africa. This is an attractive incentive for foreign non-African industries to do business with Africa.

The SANDF's major area of weakness lies in its inability to attract and retain competent and skilled personnel. Attempts to remedy this situation by the establishment of ARMSCOR have been partially successful, but this has drawn engineering skills away from the operational and support area of the SANDF.

Both industry and the SANDF have a need for ETF personnel. The need of industry and the SANDF for ETF personnel are represented by the line labelled Demand (SANDF) in Figure 12. The supply of ETF personnel is represented by the curve labelled Supply (ETF) in the same figure. The intersection of these demand and supply curves, represents the point of equilibrium where ETF personnel will be equally attracted to industry and the SANDF, assuming that remuneration is the only factor that plays a role. This point which is marked Equilibrium (SANDF), represents the average level of remuneration of ETF personnel.

Industry will attempt to attract these scarce resources by increasing the remuneration or reward it offers. This will raise the demand curve to the level of Demand (Industry) in Figure 12. This will cause the point of equilibrium to move to the point labelled Equilibrium (Industry). Figure 12 shows how the equilibrium between the supply of ETF personnel and SANDF demand differs from that of industry. The horizontal axis shows that the quantity of ETF personnel attracted to industry will be greater than attracted to the SANDF.

The further loss of ETF personnel to emigration, reduces their numbers, so that the ETF supply curve will move to the left as Supply' (ETF) in Figure 12. Industry will then have to increase the remuneration it offers to attract or retain personnel. This increase is represented by the intersection of the Supply' (ETF) and Demand (Industry) curves at Equilibrium' (Industry). If the SANDF fails to adequately adjust the remuneration it offers, its ability to attract ETF personnel will be represented indicated by the value at Equilibrium' (SANDF).

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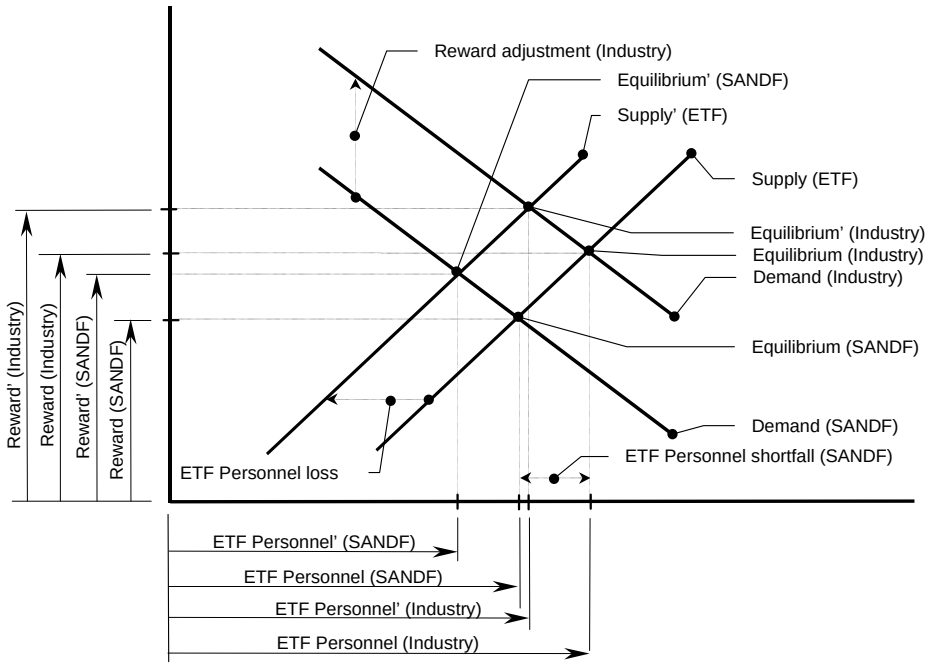

Figure 12: ETF Personnel Supply and Demand.

Bothma (1999: 1) has cited the cost of outsourcing technical services during the 1997/1998 financial year as, being R470 million after the loss of 63 sergeants and 24 flight sergeants from the technical branches, during the preceding years. If the salaries of the members had been tripled, cost would have would have amounted to than less than 10% of the price of the outsourcing contract. Of the SAAF's trained transport pilots, 169 resigned from 1989 to 1996. Considering that the training of one transport pilot costs about R1,8 million, there would appear to be a fundamental flaw in the personnel retention strategies of the SANDF.

Sustaining its capabilities with a diminishing defence budget, challenges the SANDF's ability to set priorities in the allocation of finances. Further factors contributing to the loss of personnel appears to be the uncertainty of career prospects and declining service benefits in the SANDF. As a buyer, the SANDF falls short in terms of the supply of high-level personnel, but appears to hold a strong position in the area of acquisition of Products.

B. THE BARGAINING POWER OF BUYERS

The bargaining power of suppliers and buyers are inter-linked. The suppliers in the arms procurement chain are in a market with low demand. A procurement process favourable to the RSA as the buyer is more likely under the current market conditions.

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The major client of the SANDF is the RSA government. As the owner of the budget the government controls it.

As the client, the government uses the SANDF in several roles. These roles include supporting the SA Police Services (SAPS) and provincial and local authorities in disaster management, United Nations operations, co-operation with foreign countries and diverse diplomatic tasks.

The defence budget has diminished to the point where the SANDF has difficulty in maintaining its capabilities. The intention was to reduce the SANDF to consist of a small care force, but the government has failed to provide the mechanisms required to retain critical skills and shed superfluous members. The DoD therefore has difficulty achieving the desired expenditure ratio between personnel and equipment (JSCD 2000: 1).

C. The Threat of Substitutes

UN forces have replaced several national military forces in operations throughout the world. UN forces could, therefore, be used as a substitute for a national defence force. The government would, however, have little control over its operation and loyalty. Nations generally prefer to have their own defence forces, which they can control and use as an instrument of state.

Engineering services originate from military organisations. However, today there is a tendency to outsource these services to a lesser or greater degree. Total control and ownership of engineering services can provide considerable advantage but at considerable cost. The SANDF is required to be a small, technologically advanced core force. To achieve this goal, it is necessary to develop a balance between outsourcing and operating core competencies internally.

The Department of Foreign Affairs is the government instrument that is used to resolve potential conflicts with diplomacy.

The UN has employed private armed services to perform military tasks and has found them to be more cost-effective than conventional military forces of counties. The RSA government has, however, decided to eliminate the operation of private military services by means of legislation. This form of substitute does, therefore, not appear to be a threat to the SANDF.

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D. THE THREAT OF NEW ENTRANTS

Defence against aggression by foreign military forces is the main reason for the SANDF's existence. There is no indication of any conventional military threat against the RSA in the foreseeable future.

Organised criminal syndicates have replaced the military as the dominant forces in several regions word-wide. Although this is essentially the domain of the police, they have often been unable to deal with the superior resources of the crime syndicates. National governments have effectively lost control over areas controlled by the syndicates and this has enabled the syndicates to operate with impunity in these areas.

E. THE EXTENT OF COMPETITIVE RIVALRY

In attempting to deal with this competitive rivalry, the SANDF is at a disadvantage on account of its poor retention of trained personnel and the low level of expertise embodied in its personnel.

The SANDF has lost so many key combat and professional members to the private sector that it has a dire shortage in its core business areas namely those of the fighter pilots and in the support areas, the engineers. The SANDF has been forced to contract support for Products Systems to external contractors at a premium. Many former SANDF personnel perform this work on behalf of the contractors.

The SANDF has lost most of its ability to act as an intelligent client, relying instead on external contractors such as ARMSCOR and private sector firms to supply it with engineering, technical and logistics expertise.

2.6.2 FOUR LINKS ANALYSIS

In some areas organisations compete with rival organisations and in others they co-operate with other organisations. Co-operation can take place through informal relationships or through formal, contractually defined and binding joint ventures. A graphic model of the four links model is presented in Figure 13.

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Co-operation with the role-players within its environment may contribute to the success of the organisation by (Lynch 2000: 133):

- Reducing costs.
- Supporting the achievement of a possible sustainable competitive advantage.
- Establishing more sustainable relationships outside the organisation.

This type of beneficial co-operation should therefore be actively sought. The analysis of the nature and strengths of the relationships between the organisation and the external role-players is performed by means of the Four Links model (Lynch 2000: 132).

The following paragraphs describe the links between the SANDF and the organisations in its environment:

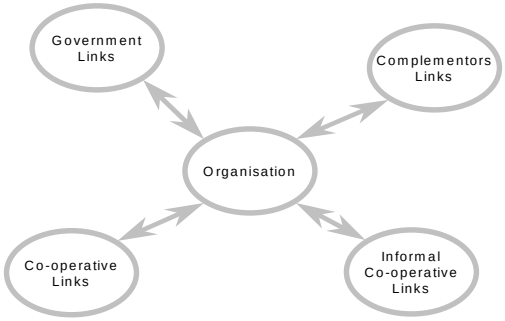

Figure 13: The Four Links Model (Lynch 2000: 133).

A. INFORMAL CO-OPERATIVE LINKS

Informal co-operative links and networks develop when organisations co-operate in striving towards a common goal, without a binding contractual relationship.

Product Suppliers and DERIs

The informal co-operative links and networks between Product suppliers and DERIs develop both prior to and during a formal contract. They continue to exist for a period after the closure of a contract and are based on personal relationships.

Even after they have left to new areas of responsibility, SANDF members are inclined to refer related queries to their acquaintances at DERIs or Product suppliers. Conversely, DERI or Product supplier personnel also tend to retain contact with SANDF members. Informal

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discussion of work activities contributes to a higher level of shared knowledge and may initiate new areas of technological or Product innovation and development.

There are however, factors that pose a threat to the informal links between SANDF members and their DERI or Product supplier acquaintances. These factors include the danger of the recruitment of personnel from the SANDF, this weakening the latter's skills base, the possibility of "insider trading" by the divulgence of plans or other sensitive information, and less-than-strict acceptance of deliverables, and bribery.

Inter AoS Links

Members of the AoSs may share expertise with their counterparts in other AoSs on a voluntary, informal basis. This free flow of knowledge can enhance the capabilities of the SANDF as a whole, as described in paragraph 2.6.2B.

Combined Operations with Foreign Military Organisations

Military forces from two or more countries sometimes combine to take part in activities such as operations or exercises at the User System level to broaden their experience and improve their doctrines. Enduring relationships can develop between the members of those forces involved in combined operations or training. The sharing of ideas and knowledge enhances in-house skills.

The threats that accompany this type of informal co-operation, however, include potential security breaches and loss of uniqueness in methods.

B. FORMAL CO-OPERATIVE LINKS

These comprehensively defined contractual links are the Product of much consideration and mutual understanding over a significant period. To be established, the linkage must be considered beneficial to all the organisations involved. These links are subject to a higher degree of formality and permanence than the informal links and depend on the harmony between the strategies of the participating organisations.

Formal links allow a structured approach to co-operation.

Product Suppliers and DERIs

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The SANDF enjoys formal co-operative links with the DERIs, parastatals, private industry and foreign defence forces.

Educational institutions such as universities, technicons and technical colleges provide formal training to SANDF members, enhancing their competencies. The SANDF also uses foreign institutions for advanced training. Universities can often support the efforts of DERIs by means of co-operative agreements such as that between the CSIR and the University of Pretoria.

Product suppliers and DERIs are contracted to perform services or supply Products as deliverables that comply with certain quality, quantity, schedule and cost-related requirements. These projects generally have a long duration, and consequently foster links between the organisations. DERIs support operational methods by research, development and simulation and contribute towards the enhancement of the SANDF's capabilities by the development of new doctrines and Products.

Informal links are also Products of this process. Co-operating organisations develop and strengthen their commitment to the high-level goals of the programme. Mutual respect and understanding is also developed. Future co-operation in dealing with new contracts can be enhanced by the success of the co-operation during the preceding contract. Ideas and concepts are shared, affecting the direction new technology, methods and growth take. Contractors can become more aligned to these new directions.

Poor fulfilment of contractual obligations may sour the relationship, reducing future co-operation and destroying the potential synergy. Firms may fail to delivery on account of bankruptcy, loss of skills and capabilities or unforeseen damages. Furthermore, the organisation may supply key technology to less than well-disposed forces.

The fact that some Product suppliers are located in distant countries makes regular contact difficult. The availability of the Internet has however, reduced this difficulty, to some extent.

ARMSCOR is the mandatory procurement agency through which the SANDF's Products Systems and Products are acquired. The organisation also provides support not available within the SANDF.

Inter AoS Links

Air Force pilots would view ships as either targets or threats, whereas to the naval combat officer, an aircraft would constitute a threat. Pilots and combat officers who exchange their experiences could gain deeper insight into the activities each party practises, and this could enhance operational expertise. Similarly, the ETF members of the AoSs will benefit from sharing their experiences and expertise.

During formal activities, members of the AoSs can share their expertise with their counterparts in other AoSs. This formal exchange and development of knowledge can enhance the joint capabilities of the whole SANDF. Doctrines may be changed, adapted or fine-tuned after assessment of the way they interact in joint operations or other activities. These formal links inevitably lead to informal co-operative links.

Combined Operations with Foreign Military Forces

In common with contractual links, combined training and operations have a formal basis. Forces share their expertise and doctrines, often upgrading both during and after the process. Future combined activities should have improved efficiency and effectiveness, benefits having been derived from earlier combined operations. New concepts, technologies and processes can be derived from the co-operation process.

Divulging information on a force's physical, and other assets to another force can diminish the force's potential to surprise an adversary. Inadvertent disclosure of such information by personnel of the other force, could benefit organisations less well-disposed to the RSA.

C. COMPLEMENTOR LINKS

Many of the formal co-operating parties include services that complement the SANDF's role and provide supporting activities. Examples of complementors include the following:

- The Department of Foreign Affairs which employs diplomacy in resolving conflicts
- The Department of Health, which provides medical services in places where there are no SAMHS facilities serving SANDF members, and which joins the SANDF's SAMHS whenever disaster support is required.
- Local authorities which use the disaster support the Army's Engineering Corps .

These complementors allow the SANDF to concentrate on its core business. With the help of the Department of Foreign Affairs, the SANDF can contribute positively to the stability,

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security and peace in the region. There is, however, always the danger that the role-players could confuse their roles and overstep their functional boundaries without the knowledge of the others.

Each AoS within the SANDF is meant to complement the others. An example of this complementing of functions is the SAAF, which operates helicopters from SA Navy ships at sea, or transports SA Army troops to areas in which they have to execute operations.

The Department of Arts, Culture, Science and Technology (DACST) complements the SANDF's work in the area of technology as described in section 2.3.5 above.

D. GOVERNMENT LINKS

As a state organ, the DoD and therefore the SANDF has strong links with government. The government mandates the DoD to execute its function and authorises the scope of its activities. Many of the government links have already been discussed in the previous paragraphs.

The Directorate of Technology of the SANDF also functions as an advisor to the DACST in technology issues.

The government on the other hand allocates a financial budget to the DoD by means of a parliamentary vote. In return, the government expects the SANDF to fulfil its expectations. Thus the Government may require the SANDF to comply with the policies of other State departments. By, for example, adhering to the personnel remuneration policies prescribed by the State, the SANDF has failed dismally in its efforts to retain personnel. This is especially the case in key occupations such as those of pilots, naval combat officers, engineers, artisans and other senior experienced personnel.

There is also a danger that the government of the day could interfere in the SANDF to the detriment of the national interest.

2.6.3 COMPETITOR AND PRODUCT PORTFOLIO ANALYSIS

A. COMPETITORS' OBJECTIVES

An external aggressor would typically intend to occupy RSA territory and impose a new political system on the country. The RSA has no external threat presently (Synge 2000: 287).

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A military aggressor would typically follow the principles of war presented in paragraph 3.1.3.

Neighbouring states of the RSA such as Botswana, Zambia and Zimbabwe are re-equipping, modernising or reorganising their forces (Synge 2000: 59). Presumably these countries are ensuring that they will be able to defend their own sovereignty.

The RSA's main risk remains its ability to control the high levels of crime in the country. Sophisticated criminal syndicates in the country have a vested interest in ensuring that they are able to continue their business without disruption by law enforcement agencies. The syndicates include illegal narcotics traders.

Vigilantes spurred on by government inaction, are acting against the criminal groups, often relying on illegal means.

Technological capabilities are often assets useful to competitors. Competitors may, for example, strive to improve their probability of succeeding against the RSA's forces by making use of competitive technology.

B. RESOURCES

In terms of military resources the SANDF has few competitors in Africa.

Many African countries have ageing military equipment and, having inadequate expertise, they are generally unable to maintain these resources. Other countries despite their poor economies, have re-equipped themselves. Some countries such as Angola, Ethiopia and Eritrea have acquired advanced fighter aircraft such as the MiG 23, the MiG 29 and the Su 27. Many weapons such as surface to air missiles (SAM), are commonly available in Africa, are suitable for insurgents and pose a significant threat to conventional forces.

The SANDF would however require a significantly large inventory to contend with guerrilla warfare based on light infantry weapons. The RSA would also require considerable resources for securing its extensive borders against insurgents.

Illegal immigrants entering the country have few resources except stealth. Criminal syndicates also require few resources to blend in with the local population and avoid detection. These syndicates can however afford land, air and sea transport whenever required.

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C. PRODUCTS

The Products of the SANDF's military competitors include the domination by a foreign military force, subversion by guerrilla groups, intimidation of the local population by terrorists and, the spread of anarchy and lawlessness by criminal syndicates.

The Products of the SANDF's technological competitors include greater threats and superior or competitive logistics.

2.6.4 CLIENT ANALYSIS AND MARKET SEGMENTATION

There are several levels of clients in the national defence process.

The primary client of the SANDF is the nation. Through its democratic representatives, the nation demands the delivery of those services for which the SANDF is mandated. The expectation exists that the SANDF should be small and technologically advanced. The "Markets" for the SANDF's services are presented in Table 5 below.

The SANDF's client may also be a foreign country requesting support, or international organisations such as the United Nations or the OAU, requesting support in peace operations. Such operations may require the SANDF to comply with a diverse set of requirements such as having specific operational capabilities or the ability to integrate logistically with other systems.

Top Level	Engineering Technical Family Contribution
RSA Government	
National Defence	Technological competitiveness Dependability, capability & availability
Support of SAPS	Dependability, capability & availability
Support of other Government Departments	Dependability, capability & availability
Defence technology	Technological expertise
International	
Support operations	Dependability, capability & availability
Regional co-operation	Dependability, capability & availability

Table 5 : Markets for the SANDF's and the ETF's Services.

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The second level of client of the SANDF is within the SANDF itself. The SANDF's main internal client is the C JOps who is responsible for force application as required by the Government. The Air Force provides air power in the form of fighter, ground attack, transport and EW aircraft. The Army provides land-based forces such as infantry, artillery, an engineering corps, support functions and logistics. The Navy provides maritime combat and support forces. The SAMHS provides military health support to the forces. Table 5 presents the "markets" for the services of the SANDF's ETF.

Each of the AoS have its own infrastructures, but they also share common resources such as transport and stores. Each AoS has its own ETF which provides it with services.

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2.7 ENVIRONMENTAL ANALYSIS FINDINGS

2.7.1 ENVIRONMENTAL DYNAMICS FINDINGS

Since the end of the cold war, thanks to the growing dominance of regional and domestic interests, the complexity of political, defence and associated industries has increased significantly.

The probability of a nation encountering a novel scenario has increased considerably since recent political and technological changes took place.

There is great pressure on organisations to conceive and execute their plans before others. The rates of change in many political, scientific and technological dispensations have exceeded expectations, making prediction more difficult. It is probable that the rates of change of these factors will remain high in the foreseeable future.

The increased availability and quality of information has enhanced the probability of our correctly predicting future events.

Although the availability of information has enhanced the predictability of the future, the increased rate of changes in some areas makes it difficult to predict some of the likely changes in the political, economic, social and technological environments.

2.7.2 FINDINGS RESULTING FROM THE POLITICAL, ECONOMIC, SOCIO-CULTURAL AND TECHNOLOGICAL ANALYSIS

A. FINDINGS: POLITICAL ANALYSIS

The RSA is governed by the majority ANC alliance. This government has introduced a host of new laws, some of which have adversely affected the creation of employment and the availability of skills. Steps have, however, been taken to correct this situation.

The SANDF has difficulty attracting and retaining skilled key personnel on account of its poor salary structures. Attempts at promoting representivity appear to have exacerbated the situation.

Several sub-Saharan African states suffer both inter-state and intra-state conflicts as well as political instability. Weaker African states are often unable to maintain the rule of law throughout their territories, thus affording criminal syndicates a free rein.

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The SANDF has a challenging security task, given the threat of organised crime with considerable resources, the inability of many neighbouring governments to enforce law in their countries and the extent of the RSA's land and maritime borders.

The RSA appears to have no external military threats for the foreseeable future. The prevalence of wars and conflict is expected to increase in Africa. This threat of instability could require intervention in the form of peacekeeping or military operations by the RSA. Newer, more capable weapons that have begun to proliferate in Africa could pose a threat to the success of these operations and to SANDF personnel. Criminal syndicates have demonstrated their ability to acquire and deploy sophisticated communications equipment, aircraft and weapons.

In addition to this, labour movements now enjoy significant influence in government.

B. FINDINGS: ECONOMIC ANALYSIS

While some examples of high standards may be found in the education system, the RSA's education on the average has serious deficiencies specifically in the area of science and maths teaching. These deficiencies contribute to the country's poor performance at tertiary level.

The RSA has a strong economy based mostly on the provision of services, agriculture beingin the process of losing its significance. The value of the RSA's currency has dropped considerably, frustrating attempts at building infrastructure for the local industry with key foreign Products.

Globalisation has caused many firms to close down, whereas the competitive firms have found new global markets.

The RSA has a high level of unemployment, which has even increased during recent years. The trend among skilled professionals and entrepreneurs to emigrate is weakening any capacity of the local industry to grow.

While the RSA has a higher GNP per capita than any other African countries, its military expenditure as a percentage of GNP is lower than that of these countries. The RSA's military expenditure as a percentage of GNP is in fact lower than the world average. The sub-Saharan African region has poor countries with low GNP/capita that are unable to satisfy the economic needs of their populations.

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C. FINDINGS: SOCIO-CULTURAL ANALYSIS

In all but a few African countries where dissidents are not tolerated, the trend is towards consensus-seeking.

The poor communities in Africa are a source of youth seeking their wealth through their participation in conflicts or even banditry.

Global competitiveness reviews present RSA government officials as incompetent. The SANDF has suffered several serious incidents, this casting a shadow over the standard of discipline in the organisation. The unacceptably high crime rate in the RSA is attributed to police incompetence. With police protection the 56th worst out of 59 countries, he risk of crime scares off many potential investors.

The RSA has a growing problem in that the shortage of skilled people is being aggravated by an inability to educate and train people adequately, and by the steady emigration of professionals and businessmen.

While life expectancy as a measure of health is high, there are great differences in the quality of health care offered in different areas and at different levels in the RSA. AIDS seems set to continue with its trend of the past, which is one that has claimed many lives in Africa. Population growth in the RSA has declined with the majority of the people urbanising.

Income is unevenly distributed in the RSA, wealth being concentrated in small groups within small patches of both the black and white communities.

D. FINDINGS: TECHNOLOGY ANALYSIS

The RSA government has developed what appears to be a coherent science, engineering, technology and innovation policy.

The defence sector is an important repository of skills and knowledge. While the RSA government regards a strong technology base as essential for defence, most African countries need foreign assistance, because they are unable to maintain their weapons inventories effectively.

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There is a great shortage of scientists and engineers in the RSA, but this situation is considerably worse in the rest of Africa. The RSA's situation in this respect is aggravated by emigration.

Technology has had a significant impact on Africa, changing the way things are done, sometimes reducing employment, and at other times generating jobs.

The RSA has demonstrated a significant ability to harness and exploit technology to develop industries in the face of strong globalisation efforts.

2.7.3 MARKET GROWTH ANALYSIS FINDINGS

Although military forces world wide are decreasing in size, some African countries are spending more on sophisticated weapons to cope with regional and internal conflicts. These could pose a threat to the RSA or the SANDF when they operate in these regions.

The defence industry and its technology have become considerably more competitive. In addition to this, the defence industry, still produces innovative weapons and many other Products. The RSA defence industry has also become a significant role-player in exports, thus ensuring its own survival and growth.

2.7.4 FINDINGS: ANALYSIS OF KEY SUCCESS FACTORS

The RSA's greatest return from the SANDF, is the prevention of war through deterrence, and its second greatest return would be winning an unavoidable war.

If the key success factors of a defence force were the principles of war, such a defence force would require:

- the availability and efficacy of Command, Control, Communications, Computers, Intelligence, Information, Surveillance, Reconnaissance and Electronic Warfare (C4I2 SR EW) and other capabilities embodied in Products Systems;
- technological innovation capabilities;
- improved or changed capabilities, availability and dependability in Products Systems;
- "stealth" capabilities; and
- Products Systems that are simple, robust and easy to operate.

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2.7.5 FINDINGS: ANALYSIS OF THE ENVIRONMENT OF A COMPETITIVE INDUSTRY ENVIRONMENT

A. FINDINGS: ANALYSIS OF THE FIVE FORCES AFFECTING THE ORGANISATION

In the rivalry encountered in this competitive environment, the SANDF suffers a disadvantage on account of its poor retention of trained personnel and the expertise embodied in these personnel.

The SANDF has lost so many key combat and professional personnel to the private sector that it has a dire shortage in its core business areas namely those of fighter pilots and engineers in the support areas. The SANDF is now forced to contract the support of Products Systems to external contractors at a premium. Many former SANDF personnel perform this work on behalf of the contractors.

The SANDF has lost most of its ability to act as an intelligent client, and now relies on external contractors such as Armscor and private sector firms to supply it with engineering, technical and logistical expertise.

B. FINDINGS: ANALYSIS OF THE FOUR LINKS BETWEEN THE ORGANISATION AND ITS ENVIRONMENT

The links the SANDF has with local authorities, the Department of Health, foreign military forces and DERIs positively support the SANDF's military capabilities. The Department of Foreign Affairs complements the SANDF in the area of relations with foreign nations.

The SANDF's informal links with DERIs, industry and foreign military organisations, are very valuable and should be nurtured. Caution should, however, be exercised in areas where security breaches or unethical behaviour could develop.

Through ARMSCOR, the DERIs and Product and service suppliers provide the SANDF with certain items. The quality of the links between the organisations enhances the quality of the services rendered. Improvement to the links is desirable.

Inter-AoS co-operative links in the spirit of jointness are very valuable and require further strengthening to enhance the knowledge and capabilities of the AoSs.

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C. Findings: Competitor and Product Portfolio Analysis

The SANDF's competitors either intend to impose a new political system on the RSA or, to create anarchy so that they can advance the interests of criminal syndicates, by creating a suitable environment for them in which to pursue their illicit activities.

The SANDF's competitors have relatively limited resources, although the potential is there for some of the competitors to serious threaten own forces with sophisticated weapons, some of which some may be man-portable. Another serious threat is the potential for the formation of lightly-armed guerrilla bands that would be difficult to control or detect in the poorly policed Southern African region.

The RSA's extensive borders are difficult to protect against criminal syndicates and the large numbers of illegal immigrants that penetrate them, some with contraband and illegal arms.

D. Findings: Client Analysis and Market Segmentation

The SANDF provides the RSA government, and through it to international bodies, with defence capabilities. C JOps is the client of each of the AoSs, each which contribute their unique services towards the national defence capability. Each AoS is a client of the ETF.