TRADE POLICY REPORT NO. 13

The Aerospace Industry:

Prospects for strategic co-operation among the IBSA countries

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SOUTH AFRICAN INSTITUTE OF INTERNATIONAL AFFAIRS

Published in April 2006 by

The South African Institute of International Affairs
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ISBN 1-919969-58-6

Edited and produced by Acumen Publishing Solutions, Johannesburg
Printed by Lesedi Litho Printers, Pretoria

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INTRODUCTION

This report constitutes the final of three components of a collaborative research project – entitled 'South–South trade and investment co-operation: exploring the IBSA initiative' – involving SAIIA, the Centre for International Trade, Economics and Environment (CUTS-CITEE), and the Brazilian Institute of International Trade Negotiations (ICONE). Initiated in February 2005, the project seeks to identify barriers to trade and investment flows among India, Brazil and SA (the IBSA countries), and identify ways in which they can be reduced or eliminated.

The first component of the project was a survey of representatives of 30 SA companies aimed at recording their perceptions of the Brazilian and Indian commercial environments, and the second examined the negotiations aimed at creating a preferential trade agreement (PTA) between the Southern African Customs Union (SACU) and India.

This report explores strategies for strengthening strategic co-operation among the IBSA countries in the aerospace sector. It is based on in-depth interviews conducted by the author with representatives of five SA aerospace and defence firms in the period September to November 2005. They are the state-owned Denel, Aerosud, Reutech, Grintek, and African Defence Systems. Statistical information about these companies – including the numbers of people they employ, annual sales, and annual exports and imports – is provided in Appendix A. The interviews were informed by a semi-structured questionnaire designed by the research partners, and covering seven broad areas (see Appendix C).

The report is divided into five sections. First, it contextualises the discussion by explaining the dynamics of the global aerospace industry. Departing from the position that the current state and future of the SA aerospace industry cannot be fully appreciated without understanding the broader SA defence-related industries, the second part describes the history, ownership structure, and capabilities of the country's defence-related industries. Flowing from this, the next section focuses on the aerospace sector in some detail The fourth outlines the central research findings from the interviews with representatives of the participating aerospace and defence firms. The fifth spells out a proposal put forward during the research on how to take forward the ideas and insights contained in the report.

THE GLOBAL AEROSPACE INDUSTRY

Not only is the aerospace industry a strategic asset; it is also an important generator of wealth, and a driver of technological and economic development, in many industrialised countries. It is also a key source of employment; for example, in 2000 the European space industry directly employed 429 000 people, and thousands more indirectly.[1] The global aerospace sector is poised to expand by 25% in real terms over the next two decades to $250 billion a year, with the number of airlines in service expected to increase to 20 000 by 2020.[2]

In terms of technological complexity the aerospace sector is matched only by the space industry, and both industries produce the highest value-added items of all industries. The high levels of skills and technologies underpinning the aerospace sector render it a dynamic propeller of industrial innovation. These skills and technologies also contribute to high quality and safety standards. Retaining these aerospace capacities, however, requires enormous amounts of research and development (R&D) spending.[3]

Yet the global aerospace industry remains heavily dominated by a few economic powers, with the US accounting for the lion's share of global market share and employment figures (see table 1). It is characterised by very stringent certification requirements and restrictive legislation, creating high barriers for aspirant emerging economies seeking to make inroads into the industry.

The international aerospace industry can be divided into five categories (see Appendix B). For the purposes of this report, they are grouped into two broad categories: 'first-tier' and 'second-tier' suppliers. 'First-tier' contractors are those national states that are key innovators at the edge of technological advance. Typically these are a few big companies that provide wholly packaged systems to both commercial and military markets. Apart from selling the equipment, they maintain, upgrade, and repair it throughout its life span.

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1 Department of Trade and Industry (DTI), 'A strategy for a sustainable, economical and growing aerospace industry,' 9 July 2003.

2 See Honey P, 'A new flight plan,' *Financial Mail*, 14 October 2005.

3 DTI, 'A strategy for sustainable, economical and growing aerospace industry,' 9 July 2003.

Table 1: Annual sales of selected aerospace companies, 2000

Company	Country	Annual sales (rand billion)	Military sales (rand billion)	% military
Boeing	US	423	130	30%
Lockheed	US	235	188	80%
EADS	EU	210	52	25%
BAE Systems	UK	174	139	80%
Raytheon	US	156	125	80%
Northrop	US	79	56	70%
Thompson CSF	France	62	43	70%
Finmeccanica	Italy	35	17	50%
Denel Aviation	SA	1.6	1.4	88%
SA Technical	SA	2.2	0	0%

Source: Paul Hatty, cited in A Strategy for a Sustainable, Economical and Growing Aerospace Industry (ASSEGAI), Pretoria: DTI, 2003.

Nevertheless, the repair and conversion tasks have increasingly been outsourced to other firms.[4]

These companies are fully fledged business integrators, marketing, selling, and delivering aircraft on a large scale in accordance with their contractual obligations. They are also system integrators, presiding over manufacturing contracts and the management of supply chains, even though they do not necessarily undertake the manufacturing itself.

The 'second-tier' suppliers, on the other hand, are states that possess limited but significant aerospace capabilities. They include smaller industrialised countries such as Sweden, Canada and Australia, and emerging economies such as Brazil, India and SA. They supply either subsystems, or parts and components. Their operations range from those that involve advanced system integration to those that focus on medium and low levels of system integration. Characteristically, companies that operate in this industry are required to meet strict certification conditions.[5]

4 Ibid.

5 Ibid.

In recent years, the global aerospace industry has undergone a process of rationalisation and consolidation, driven mainly by company mergers and acquisitions. This has led to a decrease in the number of new aircraft development programmes, triggering stiff global competition among 'first-tier' business and system integrators. Similarly, growing competition among 'second tier' contractors has exerted pressures on the supply chain especially in respect of efficiencies, economies of scale, and margins. This has prompted the system integrators to search for internationally competitive and pricing models.[6]

In their drive to retain competitiveness, the system integrators have sought to reconcile the imperative of increasing efficiencies with the necessity of reducing risk. Owing to the globalisation of the supply chain, the system integrators have been able to develop an extensive pool of subcontractors across the world. In choosing working partners, key consideration has been given to countries that have cost-effective manufacturing solutions, balanced against the need to maintain acceptable production, quality, and delivery standards.

DEFENCE-RELATED INDUSTRIES IN SA

History

Although the origins of SA's defence-related industries date back to the 19th century, it was only in the 1960s that the erstwhile National Party government embarked on a concerted mission to fortify SA's defence capabilities. This occurred in the context of the country's growing international ostracism, as well as domestic and regional resistance induced by the country's apartheid policies.

Defence spending escalated following the imposition of an international arms embargo against SA in 1977, inspiring the apartheid regime's determined drive for strategic independence and self-sufficiency in armaments. As such, the 1980s saw defence production become one of the most important economic activities in SA, employing around 130 000 people and accounting for 9% of manufacturing jobs.[7]

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6 Ibid.

7 Aerospace, Maritime and Defence Association, 'The SA defence-related industries', Centurion, Pretoria, 2005, p 6.

This upward trend in defence expenditure was reversed following changes in SA's foreign strategic environment ushered by the end of the Cold War in the early 1990s. The defence budget shrank by over 50% in real terms between 1989–90 and 1997–8, with the acquisition budget decreasing by over 80% in real terms during the same period.[8] The radical decline in defence spending had a huge effect on domestic defence-related industries, leading to the downsizing, rationalisation, and closure of some defence companies.

The globalisation of the defence industry has prompted a strategic and structural review of the domestic defence sector. Forging international equity partnerships, joint ventures, and strategic alliances with 'first-tier' contractors has been identified as pivotal to the long-term survival of the SA defence sector. SA, in particular, sees its future as that of playing a niche role in the region as a supplier and systems integrator of subsystems and components to foreign weapon manufacturers. Already these working relationships have been established with companies in various countries, including the US, the UK, Germany, Malaysia, France, Italy, Sweden and Germany.

Ownership and structure

Six major companies dominate SA's defence market. These are the state-owned Denel and five private industrial firms, namely African Defence Systems, Advanced Technologies and Engineering, Grintek, Reunert, and BAE Systems. Together, they make up about 90% of defence industry turnover (see table 2 and figure 1).

8 Ibid, p 2.

Table 2: The SA Defence-Related Industry (SADRI)

PRIVATE COMPANIES	
• ATE • ADS • BAE Systems Land Systems OMC • IST Dynamics • CCII Systems • CyberSim • Demco • GISCOE • Grintek • Internex • M-Tek • Paramount Log • Parsec (Pty) Ltd • TAU Aerospace	• African NDT Centre • Aerosud • AMS • ASET • Aztec Components • Contractserv • Apsilon • Flightcraft Aviation • IFS-Defence • LMT • Sediba Netwrok • Siemens • Sinjana Eng cc • Thales Adv Eng • VRG Electronics • Waymark

STATE-OWNED
- Denel (17 units)
- Armscor
- CSIR – Defencetek

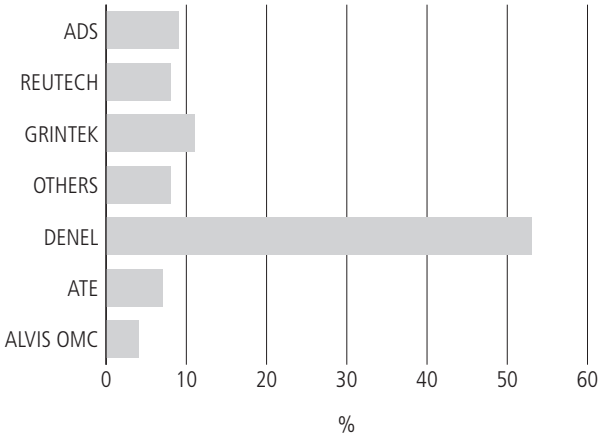
ASSOCIATE MEMBERS
- BAE Systems
- Boeing Africa

HDI/BEE
- Lechabile Quality Systems
- FBS
- Kgorong Investment
- Bohlabela Wheels
- Emzansi Eng Consultants
- ANSYS

JSR LISTED
- Tellumat
- Reutech

Source: South African Aerospace Maritime and Defence Industries Association (AMD), The South African Defence-Related Industries, Pretoria, 2005

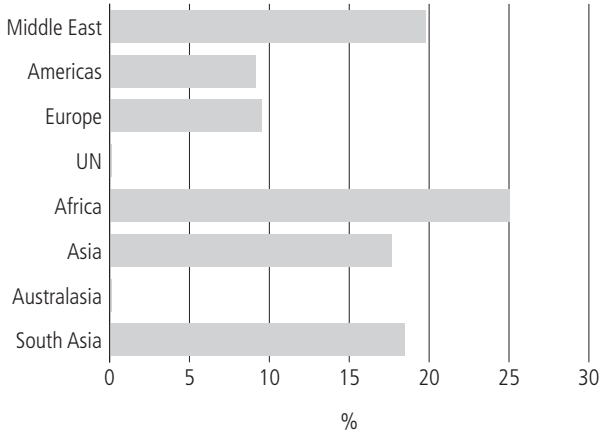
Figure 1: Division of revenue in the SADRI, 2003



Source: AMD, op.cit.

In 2000 defence industry turnover amounted to about R6 billion, with exports accounting for R1.8 billion (see figure 2 for the geographical division of export revenues in 2003). The defence sector is an important national employer, providing direct and indirect employment for roughly 76 000 people. In the 1980s, employment figures in this sector reached a peak of 130 000. Cross-contracting and subcontracting form an integral part of the operations of defence-related industries, and these include several commercial suppliers not necessarily involved in the armaments sector. And over 80% of these operations are concentrated in Gauteng, predominantly in Johannesburg and Pretoria.[9]

Figure 2: Export revenue earned by the SADRI, 2003



Source: AMD, op.cit.

Core competencies

SA's defence-related industries have a diverse core of capabilities in five categories:

- Weapon system or subsystem design, development, manufacture, integration and testing especially for land systems, including their ammunition and fuses.

9 Ibid, p 6.

- Upgrading and life extensions of existing systems.
- Logistic support defence systems.
- Electronics, including avionics for aircraft and helicopters, the guidance systems for missiles and gun and fire control systems.
- Other areas of competence include secure communications, electronic warfare, radar, command, control, communications, computing and intelligence.[10]

Considerable competencies have also been developed in vehicle systems, simulators, unmanned aircraft, and logistics. Key systems produced by the SA defence industry (most under licence and others from scratch) are the Impala MK I and II jet training aircraft, the Kudu transport aircraft, the Bosbok light battlefield transport and reconnaissance aircraft, the Eland armoured car, the Ratel Infantry Fighting vehicle, and the Oryx medium helicopter. There has also been a significant rebuild and upgrade of the French Mirage III supersonic fighter aircraft, the G5 155 mm towed howitzer and G6 wheeled artillery systems, the Valkiri multiple rocket Launcher, the v3A Kukri short range air-to-air missile, the Minister-class fast-attack missile boat, the Rooivalk attack helicopter, the Seeker reconnaissance Unmanned Aerial Vehicle, the Lark anti-tank drone, and the Mokopa anti-tank guided munitions. Moreover, SA defence industries have also developed and built nuclear warheads as well as a space programme encompassing a launch vehicle (missile) and a low-orbit reconnaissance satellite.[11]

The SA National Defence Force (SANDF) considers several technologies and competencies to be strategically important, including logistic support, repair and maintenance of equipment and systems; systems integration; command, control, communication, intelligence and information systems; sensors, signal processing and data processing; combat systems software and support; and simulation systems and war gaming. The SANDF recognises that it cannot rely solely on internal funding sources to maintain its key competencies and technologies. Increased exports and global market penetration are thus vital to the

10 Ibid, p 5.

11 Ibid, p 6.

long-term viability and growth of the SA defence sector.[12] The following issues will be accorded priority in the future:

- harnessing globalisation and international partnerships;
- retaining the SANDF as a base market;
- promoting Black Economic Empowerment;
- achieving a balance between government support and control;
- exploiting industrial participation; and
- pursuing industry profitability.[13]

THE SA AEROSPACE SECTOR

The SA government's vision is to develop the aerospace sector as a sustainable, growing, and internationally recognised industry by 2014. To this end the government has sought to position the sector as a high-value global manufacturing industry and a regional African transport hub. Given the vast wealth-generating potential of the aerospace industry, the growth of this sector is viewed as vital to future national economic welfare.[14] As the Minister of Trade and Industry, Mandisi Mpahlwa, pointed out at the opening of the African Aerospace and Defence trade show and exhibition in 2005: 'This industry falls squarely into our approach to economic development and we have seen that it has potential for export growth, value addition and through international sub-contracting agreements, stimulates industrial innovation, competitiveness and growth further down the supply chain.'[15]

Over the past five years the government – through the departments of Trade and Industry (DTI), Science and Technology (DST), Defence, Transport, and Public Enterprises – has collaborated with local industry, trade unions, academic institutions, and other stakeholders on recasting the industry as a national high-priority sector whose growth trajectory should be modelled on that of the successful automotive sector. In accordance with its Integrated Manufacturing

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12 Ibid, p 4.

13 Ibid, p 3.

14 Interview with Francois Denner, chief director: strategic competitiveness, DTI.

15 DTI, 'Repositioning the SA aerospace industry as a priority sector – the contribution of the Airbus Military A400M programme', Pretoria, 2005.

Strategy, the DTI has unveiled the Aerospace Industry Support Initiative (AISI), an implementation strategy designed to bolster SA's aeronautical, space, and defence industries and ensure their full integration into global aerospace supply chains. It seeks to achieve these objectives by:

- improving the global competitiveness of the SA aerospace industry;
- providing an institutional platform for encouraging partnerships and innovation among the government, industry, and academia;
- identifying, developing, and promoting the interests and capabilities of the SA aerospace industry; and
- accelerating the achievement of the government's strategic objectives, including growth, employment, and equity.

SA's competitive strengths in this industry centre on avionics, aerospace systems development, and the production of airframes and engine components. Other capabilities and expertise relate to inertial sensor systems, testing services, missiles, unmanned aerial vehicles, integrated logistical support, protection systems (for air, sea, and land-based applications), observation and sighting systems, air defence production, and training.[16]

AISI draws on other government plans, such as the Advanced Manufacturing Technologies Strategy (AMTS) of the Department of Science and Technology. One aspect of the strategy, the AMTS Aerospace Network, stresses the importance of innovation, technology, and skills for the sustainable growth of the aerospace sector, and seeks to promote the development of human resources as well as technological capabilities and research to underpin the AISI. The AISI enjoys strong political support, which was recently underscored by the backing given by the ministers of Public Enterprises and Defence for Denel's involvement in the A400M programme with Airbus Military SL. Denel is recasting its business from supplying a large number of products on the global market to becoming a preferred supplier of certain subsystems and components to global defence contractors. To this end, it has sought to forge selective equity partnerships and alliances with global defence contractors.[17]

The AISI is predicated on the notion that SA should exploit its competen-

16 Culled from data provided by Denel and Grintek.

17 Interview with Tristan la Grange, group marketing manager: South America, Denel.

cies and technologies not only to forge international partnerships with the major aerospace original equipment manufacturers (OEMs) such as Airbus, Boeing, and Embraer, but also to promote its national development objectives. This has necessitated the creation of integrated supply chains connecting the OEMs, leading 'first-tier' SA contractors, and clusters of small and emerging companies. The intention is to ensure that the supply chains echo those in the automotive sector, which feature clusters of local automotive suppliers that are integrated into global networks. It is hoped that this will benefit SA by, among other things, moving suppliers up the value chain, creating economies of scale, and generally contributing to the development of the local industry.

The A400M aircraft programme provides pointers as to how the SA government and industry intends to restructure the aerospace sector. This is an international partnership launched in 2003 among SA and seven European partners (France, Spain, Luxembourg, Turkey, Germany, Belgium, and the UK), aimed at designing and building the A400M military transport aircraft. The main contractor is Airbus Military SL, an Airbus subsidiary. In April 2005 the SA government signed a contract to buy eight aircraft and will take first delivery in 2010. As a quid pro quo for the purchase, SA has been guaranteed design-and-build contracts valued at about €400 million for the first 188 aircrafts, with an extra €350 million expected from future production.[18]

SA's participation in the A400M programme has been influenced mainly by industrial considerations. But it has also been driven by foreign and security policy factors, especially the imperative of expanding SA's role in conflict prevention, peace-keeping operations, and humanitarian missions across Africa. Given the limitations of the current SA military transport infrastructure, it is expected that the new transport aircraft will go a long way towards meeting the SANDF's needs and contributing towards the creation of a sustainable development of the aerospace industry in SA.

Denel and Aerosud have been designated as primary SA contractors and will supply the A400M programme with a range of components including wing tips, wing-to-fuselage fairings, centre top shells, composite cargo holds,

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18 DTI, 'Repositioning the SA aerospace industry as a priority sector – the contribution of the Airbus Military A400M programme,' Pretoria, 2005; Interview with Francois Denner, chief director: strategic competitiveness, Department of Trade and Industry.

nose fuselage linings, and other composite and metallic airframe components. Negotiations are under way to extend SA's involvement to engine parts and communication systems as well. Furthermore, both companies will repair equipment during the programme's life span, and are expected to compete for the provision of aircraft maintenance and training services. The aircraft will be finally assembled in Seville, Spain. The A400M programme represents a clear opportunity for Denel and Aerosud to be incorporated into the world's biggest aviation supply chain.[19]

Aerosud, a privately owned company that produces aircraft components and aerostructure, has benefited immensely from the government's industrial participation policy. The policy derives from the government's strategic defence procurement programme, and commits armaments companies to providing industrial offsets in return for contracts awarded to them. Designed to create or retain more than 65 000 jobs, and generate R104 billion-worth of investments, the offsets include direct investments, export assistance, undertakings to utilise parts made in the purchasing country, and the location of final assembly in that country.[20]

Thanks to the industrial participation policy, Aerosud has penetrated the global aerospace market, and secured several long-term contracts. The company's order book currently stands at R4 billion, comprising 15 contracts with a life span of more than five years. It has won a contract to become the exclusive supplier of plastic interior parts for Boeing, and also designs and manufactures aircraft interiors for Airbus. Over the past two years, Aerosud has exported more than 70 000 parts to these major airline companies. It is also supplying galley systems for 100 new Airbus A320 aircraft bought by IndiGo, the low-cost Indian airline. And it has entered into a R650 million strategic alliance with BAE Systems that provides for skills and technology transfer and an order for the export of Airbus A320 jetliner wing components from SA.[21]

BAE Systems has a 30% equity stake in Denel, which was acquired as part of SA's arms procurement package. In terms of the deal, the SA government was

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19 Ibid.

20 Ibid.

21 Cokayne R, 'Industrial particpation policy boosts Aerosud's growth,' *Business Report*, 17 November 2005.

offered an industrial participation package by BAE Systems and Saab in return for buying the Hawk and Gripen aircraft from these manufacturers. As part of its partnership with BAE Systems, Denel was awarded contracts to supply aircraft tooling for the production of the Indian Air Force's new BAE Systems Hawk advanced jet trainer.[22]

Besides Aerosud and Denel, SA firms have forged linkages with other international companies. Grintek has established joint ventures with Saab in Sweden and EADS in Germany, focused on shared R&D and marketing. Other international partners include Snecma, Volvo Aero, Honeywell, Lockheed, and MTU. The industrial participation programme offers SA aerospace and defence firms an opportunity for long-range entry into global supply chains. But it remains to be seen whether the domestic industry will take full advantage of these possibilities.

PROSPECTS FOR STRATEGIC CO-OPERATION: KEY FINDINGS

South–South co-operation

The importance of strategic co-operation among the IBSA countries in the aerospace sector has been championed at the highest political level in SA. When, in September 2004, the Indian president, Abdul Kalam, visited SA, President Thabo Mbeki called on the IBSA countries to intensify trilateral co-operation in the aerospace sector and indicated that SA was ready to share its capabilities, technologies, and expertise with its IBSA partners in this regard.

The interviews conducted for this study revealed that there is currently no or very little form of aerospace collaboration between SA, India, and Brazil. Respodnents generally agreed on the need for co-operation in this respect. As a start, it is important to ask what the rationale for such co-operation should be. Is the objective of co-operating to compete with Boeing and Airbus, or to have a sustainable high-tech industry that can provide skilled employment while making available tailor-made products to global manufacturers at reasonable prices? Besides this, each country's requirements and capabilities need to be identified.

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22 Interview with Tristan la Grange, group marketing manager: South America, Denel.

Table 3: Military expenditures by selected countries, 2004

Rank	Country	Amount
1	US	$370,700,000,000
4	France	$45,238,100,000
7	Italy	$28,182,800,000
9	India	$16,970,000,000
13	Brazil	$11,000,000,000
21	Sweden	$5,729,000,000
31	Chile	$3,420,000,000
34	SA	$3,172,000,000

Source: CIA World Factbook, 2005

Although respondents felt that it was difficult to discuss the levels at which co-operation among the IBSA countries should be pitched in any detail, as this was not easily quantifiable in specific terms, most recognised that three countries found themselves in similar positions and that they needed to collaborate to develop their indigenous industries if they were to counter domination by the major industrial countries.

Three potential areas of co-operation have been identified as part of the agenda of the IBSA Working Group on Trade. The first is the expansion of aerospace supply chains. This is premised on the commercial opportunities offered by the diverse aerospace capabilities of the IBSA countries. In particular, it centres on the prospects promised by Brazil's Embraer, the world's third largest commercial airline manufacturer that produces regional aircraft. From a SA perspective, the demand for regional aircraft in Africa is expected to grow in the near future, with commercial carrying capacity in the region expected to double over the next six years. Not only does this provide considerable opportunities for the provision of a SA-based aircraft maintenance, modification, and upgrade infrastructure to service a regional African jet fleet; it also has the potential to generate significant employment and spin-off companies. Given that its industrial and commercial infrastructure is the most developed in Africa, SA could act as a springboard for the OEMs into the region.[23]

23 Interview with Francois Denner.

The second potential area of co-operation is collaboration on aerospace systems in support of strategic defence needs. The global trend towards the industrialisation of defence production – typified increasingly by the development of weapons systems through international linkages – provides clear opportunities for integrating the domestic defence industry with global supply chains. This can be accomplished through international strategic alliances, which are crucial to pursuing high-value manufacturing programmes and mitigating potential risks to individual economies.

Previous experience has shown that such global partnerships can produce important economic gains and spillovers, especially the transfer of skills and technology. In this context the SA Department of Defence (supported by the DTI) has been engaged in discussions with the Brazilian authorities with a view to either upgrading or replacing some of that country's ageing airforce hardware – mainly fighter jets, but also supporting subsystems. In line with this, Denel has set up an office in Brazil to beef up co-operation with the Brazilian defence sector.[24]

Given its strong competitive edge in electronics, Grintek has made progress in entering the Indian market. Taking cognisance of India's growing defence spending, robust defence, and aeronautical industry, plus its high ambitions, the company is seeking to share its technology with India and supply it with fighter aircraft with self-protection systems.[25] Based on 2004 figures, defence spending in India amounted to $16.97 billion, compared with $11 billion and $3.172 billion spent by Brazil and SA respectively (see table 3).[26]

Yet these prospects are being threatened by the furore sparked by corruption allegations levelled against Denel by the Indian government. Denel has been accused of paying bribes to secure contracts for supplying India with arms. Specifically, the allegations stem from a R24 million contract to supply the Indian government with 400 anti-matériel rifles and an R88 million contract to supply 9 000 rounds of ammunition. Following the publication of the corruption accusations at the beginning of October 2005, the Indian

24 Interview with Tristan le Grange.

25 Interview with Mark Minnies and Gerrie Radloff, senior business development executives, Grintek.

26 I am grateful to Piet Smit, managing director of Reutech, for bringing these figures to my attention.

government announced that it had cancelled all its arms contracts with Denel. Denel has denied any wrongdoing, and a legal process has ensued.[27]

The third possible field of collaboration is around small and micro satellites. Brazil and India have strong competencies in small and micro satellites, including launching capability, while SA has a small but reputable small and micro satellite industry and fully fledged ground support infrastructure. Respondents indicated that the IBSA nations stood to gain from a more co-ordinated and integrated approach in these fields, particularly in exchanging expertise and technology platforms and in fostering closer working relationships between the public and private sectors in all three countries.[28]

Besides these proposals, one respondent suggested a common R&D-oriented project aimed at developing new technology and sustaining strategic resources and/or a joint capital equipment acquisition/replacement programme in terms of which non-recurring costs could be distributed across a broader base.[29] Another suggested that co-operation should start with a clear strategy to pool resources (not physically but conceptually), and then buy from those resources on a sustainable basis.[30] Regarding the role that the aerospace industries could play in supporting small and medium-size enterprises (SMEs) through well-defined supply chains, and in creating wealth and employment, it was pointed out that SME development could only take place in the presence of major partners in each country, for example Aerosud or Denel in SA. Given the high cost and infrastructure barriers, it was not possible for SMEs to participate independently in the industry. Aerosud has been actively developing sub-tier supply by SMEs, and has, via the DTI, successfully solicited EU finance for this.[31]

Capabilities

Respondents asserted that there was sufficient scope for co-operation among the IBSA countries to develop better technological capabilities in aircraft and

27 Fabricius P, 'Denel denies dodgy deal,' *The Star*, 4 October 2005.

28 Interview with Francois Denner.

29 Interview with Ralph Mills, manager: strategy, African Defence Systems.

30 Interview with Piet Smit, managing director, Reutech.

31 Interview with Dr Paul Potgieter, group managing director, Aerosud.

aircraft components production. Even so, they stated that the first step should perhaps be to initiate discussions among the aviation players in each country, and to hammer out a strategy from there. Such a strategy could include each country buying from one another on a preferential basis. They asked whether Brazil's and India's plans left any room for a contribution by SA.

They also suggested that the SA aerospace industry could exploit its competitive niche areas to integrate SA manufacturers with Brazilian and Indian aircraft production sectors through, for example, risk-sharing development and government-supported marketing efforts at the electronic product level. Regarding the prospects for co-operating with India and Brazil on developing an aircraft, a number of concerns were raised, including a lack of funding, a lack of defence co-ordination, and a lack of markets prepared to buy from the IBSA grouping.[32]

Nevertheless, respondents generally felt that the IBSA nations do have the necessary infrastructure to develop a vibrant aerospace sector. And there is a great deal of scope for cultivating complementary niches rather than each country having to wholly finance its industry. SA's infrastructure capabilities vary. R&D spending remains low, although it is growing thanks partly to the AISI programme. SA universities offer useful courses, and the SA aviation baseload underpins the appointment of new engineers. The SA aerospace sector has skilled personnel, and companies are determined to further improve the industry's skills base. For example, Aerosud is planning to increase its staff from 300 to 700 within two years so as to fulfil its current contract obligations, and has been investing in skills training in partnership with the DTI and DST.[33]

SA needs to bolster its financial resources. The Industrial Development Corporation (IDC) is willing to offer financial support, provided a viable business case is made. The country also needs to increase its investment in manufacturing facilities and capital equipment. Some companies, notably Aerosud, have led the way in investing in modern production methods and in increasing production output.[34]

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32 Interview with Piet Smit.

33 Interview with Dr Paul Potgieter.

34 Ibid.

The role of government

The respondents acknowledged that the SA government, by providing a policy framework and incentives, has demonstrated a proactive approach to developing the aerospace sector and furthering international co-operation. They generally agreed that the government should play a central role in developing the aerospace sector and providing it with a strong direction; collaborating with IBSA countries on ambitious projects; addressing concerns around import duties, tariffs, manufacturing and investment incentives, and transaction costs; and providing subsidies for collaborative investment and manufacturing programmes.

Value addition

It is important for the IBSA countries to discuss how they can add value to aircraft production. Both Europe and the US are high-cost manufacturers, and this offers opportunities for emerging economies. It is worth bearing in mind, though, that aviation is a high-risk business requiring very large up-front investments with long term break-even times. It does not readily lend itself to entrepreneurship in the absence of government incentives.[35]

It is debatable whether there is room for a new global low-cost aircraft engine manufacturer. Developing a new turbofan engine will be prohibitively expensive, even if the required technology were to be made available. Therefore, the starting point for any aero engine initiative should be co-operation on existing programmes such as the Embraer regional aircraft. The value addition and co-operation instruments likely to yield optimal benefits are boosting R&D, encouraging shared research, and cultivating joint marketing arrangements and technological exchanges.[36]

35 Ibid.

36 Ibid.

Challenges/threats to IBSA co-operation

As stated earlier, the corruption allegations levelled at Denel by the Indian government represent arguably the most important challenge and threat to co-operation among the IBSA countries in the aerospace sector. This has significant implications for Indo–SA relations, and the matter therefore warrants intervention at the 'highest political level.'[37] Furthermore, one respondent stated that another issue which ought to be resolved is the restructuring of Denel and a clear delineation of its relationship with established private industry, which is a prerequisite for foreign links.[38]

Another challenge concerns the extent of the willingness and capability of the IBSA countries to develop a common interest. Considering that the three countries have been vying to position themselves in an already congested global aviation market, the challenge is whether they can promote co-operation as opposed to competition. Fostering co-operation is possible, but, as one respondent emphasised, realising it will require a 'win-win focus project'.[39]

At a commercial level, there is the challenge of reconciling the dilemmas faced by the SA and Brazilian defence industries, both of which have been experiencing the same problems of overcapacity against the backdrop of declining defence expenditure. This has resulted in companies in these countries viewing the IBSA arrangement not in terms of co-operation but rather as a means of opening new markets. A related concern is the perception that the IBSA mechanism seems to be have been revolving around SA, with limited India–Brazil activity. This perception needs to be dispelled if IBSA is to be taken seriously by the aerospace sector in the IBSA countries.[40]

IBSA co-operation might also be influenced by the attitude of Indian and Brazilian partners to the transformation of the defence-related industries in SA in keeping with the government's policy of black economic empowerment (BEE). BEE is designed to facilitate the entry of emerging businesses and previously marginalised black entrepreneurs into the defence and aerospace sectors by,

37 Interview with Tristan la Grange.

38 Interview with Piet Smit.

39 Interview with Dr Paul Potgieter.

40 Interview with Ralph Mills.

among other things, helping them to overcome the stringent technical barriers that prevent small and emerging companies from participating in the industry. Early in November 2005 Phatsima Aviation – a BEE company – acquired a 20% stake in Aerosud, increasing Aerosud's total BEE shareholding to 28%.[41]

A further issue that needs to be tackled is whether the Airbus/A400M strategy pursued by SA can be balanced against South–South co-operation in the IBSA context. Moreover, there is a challenge of dealing with matters related to transaction costs, shipping costs and delivery times.

CONCLUSION, AND WAY AHEAD

The interviews with representatives of aerospace and defence companies revealed a clear general interest in the proposed IBSA aerospace co-operation programme. As the report has underlined, some justifiable doubts and misgivings were raised about the efficacy of the scheme, but these were overwhelmingly overshadowed by a desire and enthusiasm to build relationships with Brazilian and Indian aerospace companies as reliable and valued business partners. This should provide a starting point for a substantive dialogue among the IBSA nations. The DTI in SA has offered to host a preliminary meeting of aerospace players in the IBSA countries to explore ideas, proposals, plans, and strategies that can take the aerospace initiative forward. And it has asked SAIIA to liaise with CUTS and ICONE with a view to setting up such a meeting at the earliest opportunity. SAIIA proposes that this meeting be held in Pretoria at the end of April 2006. If this gathering succeeds in laying a firm foundation for co-operation, and yields meaningful outcomes, it could lead to follow-up meetings in Brazil and/or India.

41 Cokayne R, 'Industrial particpation policy boosts Aerosud's growth,' *Business Report*, 17 November 2005.

APPENDIX A: COMPANY STATISTICAL INFORMATION

Aerosud

Name of interviewee: Dr Paul Potgieter
Name of company: Aerosud
Area of operation: Aircraft structures design and production involving sheet metal, plastic and composite technologies, aircraft upgrades, and airline interior products.
Number of employees: 350
Annual sales: ZAR200 million
Annual exports: 95% of turnover
Annual imports: Mainly raw material, about 30% of turnover
Primary exporting destinations: US, Europe
Primary importing destinations: Suppliers of approved aircraft materials, mainly US and Europe

African Defence Systems

Name of interviewee: Ralph Mills
Name of company: African Defence Systems
Area of operation: Defence Industry
Number of employees: 220
Annual sales: ZAR450m
Annual exports: Very variable – ZAR30m
Annual imports: Defends on foreign content of programmes – ZAR40m
Primary exporting destinations: Middle East
Primary importing destinations: Europe (France in particular)

Grintek

Names of interviewees: Mark Minnies and Gerrie Radloff
Name of company: Grintek
Area of operation: Avitronics
Number of employees: 400

Annual sales: ZAR350 million
Annual exports: 85% of above
Annual imports: 25% of above
Primary exporting destinations: Middle East, Europe
Primary importing destinations: USA, Far East, Europe

Denel

Name of interviewee: Tristan La Grange
Name of company: Denel
Area of operation: Marketing, South America
Number of employees: 10 000
Annual sales: ZAR2 billion
Annual exports: 75% of above
Annual imports: Difficult to quote figures because the different divisions import components from a wide range of international suppliers
Primary exporting destinations: Middle East, Asia Pacific, South America, Europe and US
Primary importing destinations: See remark under 'annual imports'

Reutech

Name of interviewee: Piet Smit
Name of company: Reutech
Area of operation: Military electronics
Number of employees: 700
Annual sales: ZAR400million
Annual exports: $30 million
Annual imports: $15 million
Primary exporting destinations: Middle East, South Asia, Africa, Europe
Primary importing destinations: Europe

APPENDIX B: AEROSPACE INDUSTRY TIERS

Tier	Description	Descriptors
1. Complete system	An entire aircraft with all the required subsystems already fully integrated. This tier could also include logistics support, upgrade and maintenance of the system for a specified period. Examples • Rooivalk helicopter • Airbus A380 • Hercules C130 • Players • Denel • Airbus • Boeing • Lockheed-Martin • Embraer	• Highest value added products • System/business integrator level • Low volumes • High level human resources • Very little manufacturing • Mostly assembly
2. Major subsystem	Subsystems that are made up out of a significant number of minor subsystems. This would still involve a level of system integration not dissimilar from the first tier Examples • Complete powerplant • Main airframe sections (e.g. wing) • Undercarriage • Complete avionics system • Players • Rolls-Royce • GE • Snecma • ATE • Bombardier	• High value added products • System integrator • Low volumes • High level human resources • Little manufacturing • Assembly

Tier	Description	Descriptors
3. Minor sub-system	A defined assembly of components indivisible into other systems. Examples • Aerodynamic control surfaces (flaps) • Gearboxes • Navigation systems • Weapons and ordinances • Computer systems • Players • Denel • Aerosud	• Medium value added products • Sub-contractor • Medium volumes • Medium level human resources • Production skills • Manufacturing • Assembly intensive
4. Component	A device with a clear function that is of no use unless integrated into a tier 3 system. Examples • Electrical circuit boards • Machined engine parts • Valves and pumps • Players • Turbomeca Africa • Smiths	• Medium value added products • Sub-contractor • High volumes • Medium level human resources • Production skills • Predominantly manufacturing • Assembly intensive
5. Part	A unit that can be defined as a single monolithic part. In some cases the part has not had any value added to it through for instance assembly or machining processes. Examples • Un-machined castings • Shafts • Rivets • Electrical components such as resistors capacitors, etc • Players • Snecma foundry • Denel foundry • Westland	• Low value added products • Sub-contractor • Highest volumes • Medium level human resources • No integration • Solely manufacturing • No assembly

Source: DTI Assegai Strategy, 2003.

APPENDIX C: IBSA SECTOR STUDY QUESTIONNAIRE

Statistical information

Name of Interviewee	
Name of company	
Area of operation	
Number of employees	
Annual sales	
Annual exports	
Annual imports	
Primary exporting destinations	
Primary importing destinations	

General

1. What is the state of the SA aerospace industry?
2. Where is SA's aerospace industry heading?
3. Where should SA's aerospace industry be heading?

IBSA economic relationship

4. What countries do you import from/export to? (Brazil/India)
5. Why are you importing/exporting from these countries? (Costs, market access, product availability, product quality)
6. Are you aware of the IBSA Initiative?
7. Are you aware of the aerospace industry in Brazil and India?
8. In the future, are you looking forward to exporting/importing/investing/receiving investment from Brazil and India?

South–South co-operation

9. Are you aware of any form of aerospace co-operation between SA and any other country?
10. Is there any form of aerospace collaboration among SA, India and Brazil?

11. At what level(s) can the aerospace industries in the IBSA countries pitch their co-operation? Whole aircraft and huge sub-system manufacture? Component and simple sub-system manufacture? Etc
12. Do you have any other ideas for co-operation, for e.g. making and not assembling engines?
13. The international aerospace industry is heavily tilted towards the industrialised countries, with the US accounting for the lion's share of the global market and employment figures. How can the IBSA countries work together to tackle entry barriers (e.g. certification requirements) to the international aerospace industry?
14. How can the aerospace industries in the IBSA countries exploit their strategic positions in their respective economies to create wealth and employment, for example by supporting SMEs (directly or indirectly involved in aerospace) through well-defined supply chains?

Capabilities

15. Does India have the capability to manufacture a commercial 400 seater aircraft?
16. How can the IBSA countries co-operate to develop better technological capabilities in the field of aircraft and aircraft components?
17. How can the Indian aerospace industry exploit niche areas in which it has an advantage to integrate Indian manufacturers into Brazilian/Indian aircraft production sectors?
18. What are the prospects for cooperating with Brazil and India on developing an aircraft, which can compete with Boeing and Airbus? What are the hurdles?
19. What are the major concerns that you have in this co-operation? Lack of trust, poor capabilities etc
20. Do IBSA countries have the required infrastructure to develop a vibrant aerospace sector?
    (a) Government support
    (b) R&D
    (c) Educational institutions
    (d) Skilled human resources

(e) Financial resources
(f) Manufacturing efficiency/facilities
(g) Capital equipment

21. How can IBSA countries organise the aerospace supply chain? Can they learn from the Airbus experience? How can the distance element be tackled?
22. How can the IBSA countries achieve competitive, cost-effective production, faster delivery times, improved quality levels and greater flexibility?
23. How can the aerospace technological divide between the IBSA countries and the developed countries (US, EU) be bridged?
24. How can the aerospace industries in the IBSA countries successfully integrate themselves into global supply chains (e.g. Airbus's global supply chain) as valued and reliable partners?

Value addition

25. How can the aerospace industries in the IBSA countries successfully integrate themselves into global supply chains (e.g. Airbus's global supply chain) as valued and reliable partners?
26. Is there a need for a Southern aircraft?
27. Is there an opportunity for a new low-cost aircraft maker in the world?
28. Is there opportunity for a new low-cost engine maker in the world?
29. Is there a missing link that can be targeted; E.g. R&D, design capabilities etc
30. What form of value addition and co-operation instruments do you envisage in the future with regard to IBSA co-operation?
    (h) Locking in to developed country manufacturing systems
    (i) Developing Southern manufacturing systems
    (j) Focus on R&D
    (k) Shared research
    (l) Joint marketing arrangements
    (m) Technological exchanges

Role of the government

31. What role should the government play in developing the aerospace sector and furthering IBSA co-operation?
    (n) Developing aerospace sector in general, without playing a role in the direction of specialisation
    (o) Opening the civil aerospace industry for FDI
    (p) Collaborating with IBSA countries on ambitious projects
    (q) Addressing issues around import duties, tariffs, manufacturing and investment incentives, and transaction costs etc.
    (r) Subsidies for collaborative investment and manufacturing programmes
32. What form of public investment is required to build a vibrant aerospace sector?
33. What structure should be in place for government co-operation in the aerospace sector within IBSA countries?
34. What form of public–private partnership is envisaged for developing the aerospace sector?

Threats

35. Are there any trade offs between co-operation with Southern countries and business with Northern countries?
36. Will co-operation between IBSA countries be any better than co-operation with developed countries with respect to economic and development gains?