

FIELD SECTORAL REPORT:
THE AEROSPACE INDUSTRY IN BRAZIL

SOUTH-SOUTH ECONOMIC COOPERATION:
EXPLORING IBSA (INDIA-BRAZIL-SOUTH AFRICA)
INITIATIVE

Draft for comments
(Not to be quoted/cited)

SOUTH-SOUTH ECONOMIC COOPERATION: EXPLORING IBSA INITIATIVE

AEROSPACE SECTORAL STUDY

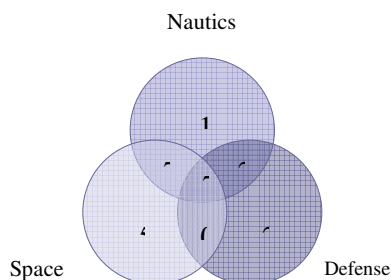
THE BRAZILIAN AEROSPACE SECTOR.....	2
THE BRAZILIAN AEROSPATIAL SECTOR AND THE INTERNATIONAL MARKET	3
THE HISTORY OF THE SECTOR IN BRAZIL	4
THE EMBRAER PRODUCTIVE CHAIN	5
SECTORAL SURVEY	7
<i>Survey Findings</i>	8
General Questions	8
IBSA Economic Relations.....	9
South-south cooperation.....	10
Capabilities.....	11
Value Addition	13
Role of the government	13
Threats.....	14
FINAL CONSIDERATIONS	14
BIBLIOGRAPHY	16

The Brazilian Aerospace Sector

Aerospace is one of the most dynamic sectors of the Brazilian economy. As a direct result of strategic investments undertaken by the government since the 40's, a highly competitive and internationalized industrial and technological hub has emerged in the country. Four main factors lend the sector its definite strategic nature:¹

- Its direct relationship with national security;
- Its high degree of technological linkages and spillovers;
- Its ranking as one of the country's main exporters; and,
- Its productivity levels and growth perspectives.

In Brazil, the aerospace sector comprises three different areas: (1) aeronautics, which refers to manufacturers and suppliers involved in the production of civil aircraft, airplanes and helicopters, propulsion systems and electronics - among others; (2) defense, which refers to the production of aircraft and systems for military purposes; and, (3) space, which refers to manufacturers and suppliers of satellites, launchers and special surveying systems both for military and non-military purposes (weather and telecommunication systems, for example).



Total Firms	35
Firms per area	
Aeronautics	28
Defense	11
Space	19

According to data from the Brazilian Association of Aerospace Industries (AIAB), the sector comprises around 35 firms that operate in these three areas, at times in more than one of them.

Clearly, the main component of the aerospace sector in Brazil is the Brazilian Aeronautics Enterprise ("*Empresa Brasileira de Aeronáutica*"), Embraer. Of a total of 18,000 jobs in the sector in 2003, the firm accounted for 13,000 direct and 3,000 indirect jobs. Embraer is also responsible for 80% of the revenues by micro and small sized enterprises in the aerospace sector. The great majority of national firms in the aerospace sector are somehow integrated into Embraer's chain of production and supply. Recently, a group of 11 service supplying firms got together in a form of joint venture with a view to streamlining their work with Embraer, thus facilitating their integration into the international aerospace market as well.

Embraer and its partner and contracted firms perform mainly in aeronautics and defense. There are also in Brazil firms that are fully devoted to the aerospace market such as Orbital and Orbisat, for example. In addition, there are multinational firms such as Helibrás, the subsidiary of the European helicopter manufacturer, which is as such the only helicopter manufacturer in South America.

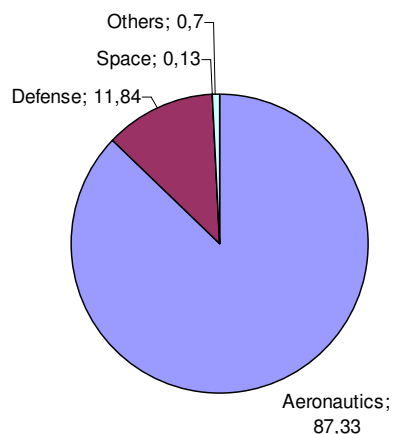
The Brazilian Aerospace Sector and the International Market

As from 2000, Brazil's aerospace trade balance began to register surpluses largely as a result of the bullish market for Brazilian regional commercial aircraft exports. Since then, the surplus obtained in the sector has become a key element in Brazil's overall trade balance. The data by AIAB for the period 2001-2003 are the following:

	2000	2001	2002	2003
Annual Revenues	3.200	3.400	3.010	2.530
Total Exports	2.835	3.110	2.710	2.230

In US\$ million

Revenue Participation per area in 2003



The graph on the side shows the breakdown *per* area in 2003 in terms of revenues for the aerospace sector in Brazil.

Data on the aerospace trade balance are from the Ministry of Development, Industry and Foreign Trade:

	2001	2002	2003	2004
Exports	5.025	4.220	3.413	4.525
Imports	3.300	2.190	2.199	3.411
Balance	1.725	2.030	1.214	1.114

In US\$ million

Comparing the export data with the annual results by Embraer one can have a clear idea as to the importance of the firm for the overall aerospace sector in Brazil:

Aerospace Sector Exports

	2002	%	2003	%	2004	%
EMBRAER	2.493	59,1%	2.052	60,1%	3.170	70,1%
Other firms	1.727	40,9%	1.361	39,9%	1.355	29,9%
Total for the sector	4.220		3.413		4.525	

In US\$ million

The History of the Sector in Brazil

Strategic investment in the aerospace sector takes off right in the middle of the Second World War with the creation of the Ministry of Aeronautics in 1941. Four years later, the Ministry launches the idea of creating an Aeronautical Technological Center (CTA) with the objective of seeking self-sufficiency in strategic areas within the aeronautical realm. Thus, in 1946, the Organizational Commission for the CTA is created and begins to operate.

The Commission chose the town of São José dos Campos as the ideal location for the CTA given its geography, access routes and overall favorable characteristics for the setting up of the necessary structure. In 1947, the course of aeronautical engineering that existed in the Institute of Military Engineering in Rio de Janeiro was transferred to São José dos Campos. This was the beginning of the process that led also to the creation of the Technical Institute for Aeronautics ("*Instituto Técnico da Aeronáutica*"), ITA, placed within the CTA. The first graduating class from ITA was in 1950 and the institute has since been widely renown for its academic excellence in matters relating to the aerospace sector.

In 1954, the CTA was formally created and in the following months the "Research and Development Institute" (IPD) was incorporated into the Center with a focus on undertaking research and development for projects and aeronautical simulations. ITA and IPD would account for a host of projects aimed at the development of a fully national aircraft in the following decades.

Embraer would be created in 1969 as a state company. Its first big project was the production of the EMB 100, an airplane that had been conceived and tested by the IPD. It would come to be known as the "Bandeirante".

Assembly line production for the Bandeirante would start in 1971 and the first sales would follow in the upcoming years. Concomitantly, Embraer, would start developing projects on demand for the Brazilian Air Force (FAB) in what would become a strong partnership up to present days.

In 1975, Embraer registered its first export contract, delivering Bandeirantes aircraft to the Uruguayan Air Force. With the growth of the firm, its aircraft started to be registered in specialized international regulatory institutions. With the growth of foreign markets, Embraer would establish a presence in the U.S. in 1979 and in Europe in 1983. By the 90's, the firm had developed commercial and military projects and expanded its sales to major markets such as the U.S., Great Britain and Italy, among others. The beginning of the 90's was marked by a serious financial crisis that shook up the firm. In 1990, it had to downsize from 13,900 to 9,900 in a process that was then only starting but that would culminate with the privatization of the company in 1994.

Since then, Embraer has gone through a deep restructuring process. With a high research and development investment, new strategic partnerships and government support, Embraer was successful in reestablishing itself in the short term as the great hub for the aerospace industry in Brazil. The main thrust of the restructuring process was the integration of Embraer into the international markets for regional jets. The firm was the biggest Brazilian exporter in 1999-2001 and has since then ranked third, with export levels above US\$ 2 billion yearly.

Currently, Embraer operates in four market segments: commercial, corporate, defense and other activities.ⁱⁱ In the commercial segment, the firm produces and sells two families of aircraft – the ERJ-145, a 37-50 seater jet and the ERJ-170/190, a 70-106 seater jet. The corporate segment refers to Embraer's manufacture of private jets. In the defense segment, Embraer manufactures jets that use the same platform as the ERJ-145 for intelligence purposes, surveillance and reconnaissance and other jets with the EMB-320 platforms for fighting purposes. The last segment is comprised of supporting activities such as after-sale services, replacement parts, repair and maintenance of aircraft. In the last 3 years, the commercial aviation segment has accounted for between 70 and 80% of the total revenues of the firm.

The Embraer Productive Chain

Embraer's productive chain is structured according to two basic directives. The first directive is to seek flexibility and competitiveness by means of the coordination of partner networks in the development of airplanes - as opposed to focusing on the overall development of full-fledged aeronautical systems. The second directive is to organize production according to aircraft "families". According to an author,

"A family of aircraft is defined as a set of airplanes of varied sizes and specifications that are, nevertheless, derived from the same project and, thus, share construction and operational similarities" (translation by the author)ⁱⁱⁱ

By means of its *families*, therefore, Embraer minimizes production costs by adapting the same assembly lines for the production of various types of airplanes.

As to its partners and contracted relationships, Embraer establishes 3 different types of relationship:

Risk partners. These are normally multinational firms that supply large aeronautical systems and joint Embraer's projects as investors and participate in the development of these projects, take on risks, and receive payment in accordance with the revenues generated from sales;

Suppliers. The great majority is comprised also of multinational companies but these do not take part in the development of projects, only supplying components and other inputs;

Subcontracted. Small and medium-sized services suppliers which are in large measure firms created and conducted by former Embraer staff that supply specific services on demand by the firm.

CHARACTERISTICS OF EMBRAER'S PRODUCTIVE CHAIN PARTICIPANTS BY CATEGORY

	Risk Partners	Suppliers	Subcontracted
Participation	Co-development with Embraer. Take on risks	Respond to specifications by Embraer	Receive Inputs and Specifications from Embraer and sell services by man/hour.
Family 145	4 (Structure and Interiors)	350 (Avionics, Electronics, Propulsion, Mechanics-Hydraulics)	Engineering Services of Projects/Systems; Other services and chemical treatment
Family 170/190	16 (Avionics, Electronics, Propulsion, Mechanics-Hydraulics, Structure, Interiors)	22 suppliers overseas	<i>Ditto</i>
Location	Most overseas	Most overseas	Brazil
Purchasing Policies	Exclusivity contract; Investment amortized with sale of airplanes (payment in 110 days)	Exclusivity contract (payment in 75 days); contracts of 1 to 3 years (payment in 30-90 days)	Contracts of 1 to 2 years (payment in 30 days); service orders.

Source:*Embraer.*

Sectoral Survey

The survey undertaken with Brazilian aerospace sector companies took place in the second semester of 2005. By means of a list of member firms of AIAB, a representative sampling of firms in the sector was drawn together taking into account not only their economic weight but also their areas of activity. Overall, 12 firms were contacted but not all demonstrated interest in contributing with the project.

A few initial considerations are in order regarding the undertaking of this survey in Brazil. Firstly, from the outset it became very clear that the sector tends to be very reserved, having great difficulty in sharing information regarding its structure and operations. The great majority of firms reacted with distrust at the initial presentation of the project's aims and objectives. A host of additional information and clarifications had to be forwarded in many cases before obtaining authorization for participating in the survey. The main concerns referred to any linkage between the project and the Brazilian government and to the exact sources of financing for the research. This applied mostly to defense companies which tend to have a very close relationship to government and whose business tends to be highly confidential for that very reason. Also, given the small size of the sector in Brazil and the recourse to high technology, the concern with preserving information from getting to competitors figured also very prominently as a deterring factor.

Secondly, the questionnaire used for the interviews proved to be too extensive in spite of the relevance of the questions. Normally, the persons interviewed (directors, vice-presidents and CEO's of the firms) did not have the time to participate fully in the survey and the 35 questions actually contributed to their hesitation in taking part. Another fundamental problem was the content of the questions, often very similar or regarding very similar issues, thus causing a high degree of repetition in the responses. A related problem with the questionnaire was its strong emphasis on aeronautics by contrast with the other two areas – defense and space. Thus, several firms opted for not taking part since they considered the content of the questionnaire mostly inapplicable to their activities. Ironically, one of the main findings of the survey (discussed below) was that the most promising areas for bilateral or trilateral cooperation were precisely defense and space.

The sampling was undertaken with a view to including firms from all three areas of the aerospace sector. Had the main criterion been the economic relevance of firms, the survey could have been perfectly conducted on the basis of Embraer's testimony alone since the firm accounts for more than 50% of all jobs and roughly 70% of all exports in the sector (2004). Thus, in addition to Embraer 11 firms were selected on the basis of their relative size and operation in the different areas. The 12 firms initially contacted were as follows:

FIRM	STATE	OPERATING AREA
Aeromot	RS	Aeronautics, Defense and Space
Atech - Tecnologias Críticas	SP	Aeronautics, Defense and Space
Avibrás	SP	Aeronautics, Defense and Space
Cenic	SP	Aeronautics, Defense and Space
Embraer	SP	Aeronautics, Defense and Space

FIRM	STATE	OPERATING AREA
Helibrás	MG	Aeronautics, Defense
HTA - High Technology Aeronautics	SP	Aeronautics
Mectron	SP	Aeronautics and Space
Omnisys	SP / RJ	Aeronautics and Space
Orbisat	SP / AM	Space
Orbital	SP	Space
VEM	RJ / RS	Aeronautics

Eight firms responded to the questionnaire. Four of them, Aeromot, Atech, Embraer e Orbisat, responded positively and the interviews took place accordingly. Another four, Avibrás, Helibrás, Orbital e VEM, gave various reasons for not wanting to participate. Avibrás and Orbital refused to participate because they considered that their area of activity was not covered by the questionnaire (little participation in aeronautics and little involvement in the international market). The Vice-President of Helibrás, the only helicopter manufacturer in South America, Mr. Eduardo Mauad, explained that all the major decisions are taken by headquarters with little autonomy for regional subsidiaries like his own. Yet, the firm has already subsidiaries and partners both in India and South Africa. Finally, VEM – Varig Engineering and Maintenance ("*Varig Engenharia e Manutenção*") – was recently acquired by the Portuguese commercial carrier, TAP, and this made it impossible for the firm to participate. As to the remaining four firms, Cenic, HTA, Mectron e Omnisys, no responses had been returned by the time the present survey was concluded (10 November 2005).

Survey Findings

The presentation of survey findings will follow the division adopted in the questionnaire itself: (1) general questions; (2) IBSA economic relations; (3) South-south cooperation; (4) Capacities; (5) Value-addition; (6) Government role; and, (7) Threats.

General Questions

Generally, the perception of the interviewed firms is positive regarding the future of the aerospace sector in Brazil – particularly in the area of aeronautics.

Two of the four companies interviewed highlighted the technological prowess of Embraer and its capacity to compete with sectoral world leaders. One of the interviewed emphasized that in the last 10 to 15 years Embraer developed marketing and commercial techniques in the most important client markets which have been responsible for effectively launching it as a prominent exporter by the end of the 90's. Embraer will continue to focus on the regional jet market but is fully aware of the need to attract world-class suppliers to Brazil so as to contribute to the development of the sector while generating jobs in the national market.

One of the interviewed emphasized that despite the good performance in the aeronautical segment, the space segment is less developed than its counterparts in southern countries such as China or India. The main concern here is the recourse and

development of indigenous technology. In his opinion, both industry and government should place greater emphasis on space programs, mainly with the support, development and use of national technological resources.

Two out of four of the interviewed found that industry was on the right track overall.

IBSA Economic Relations

Only one of the interviewed firms did not have any dealings at all with the international market. The others had as their main export and import markets the U.S. and Europe. In two cases, Latin America figured as an important buying market while other countries, such as Japan, Australia and China, were also mentioned as playing at least a marginal part in trade and investment in the sector. Two companies have traded with India and South Africa before but these countries do not figure yet as relevant partners in their overall business scheme.

The main defining factor for exports has been the existence of dynamic markets in both Europe and the U.S. The Embraer Executive affirmed that the company has been operating in those markets for over 20 years. Regarding imports, all interviewed concurred that the main defining factor was the quality of the products. Price was mentioned by two of the interviewed while a third company mentioned the need for supplying firms to be internationally certified so as to permit the final homologation of the final product: the aircraft.

Regarding diversification in imports, the representative of Embraer emphasized that the market for aviation systems is highly oligopolized, there existing few alternatives in terms of suppliers with competitive prices, high degree of quality, production in scale and adequate time horizons. Another interviewee said that there might be alternative supplying possibilities in markets such as Russia or India but these had never yet been seriously explored by his firm.

Only one interviewee knew of the IBSA Initiative. Three interviewees were adamant in affirming having never heard of the project before the initial contact undertaken for the survey. The president of Aeromot said he knew of the initiative because he had been to both India and South Africa on official government missions but remained highly skeptical about its effective prospects.

All interviewees had some knowledge regarding the aerospace industry in India and South Africa. One of them said his knowledge of the sector in India was only through the media while he fully ignored it in the case of South Africa. Embraer, Orbisat and Aeromot already have had commercial relations with both countries. Embraer has already exported to both countries. Aeromot has been involved in specific sales to South Africa but has been frustrated in entering the Indian market. Orbisat has had contacts with India and seems very close to closing deals with South African firms. In spite of all these pre-existing relations, however, none of the interviewed firms pointed to a significant increase in business or investments in IBSA countries in the near future.

South-south cooperation

Two aerospace cooperation projects involving Brazil were mentioned in three of the interviews: the cooperation program with China for the development of the CIBERS satellite and the cooperation program with Russia in the area of satellite launchers. Cooperation programs with France and Germany were mentioned twice. Only one of the interviewees acknowledged the existence of a cooperation program with India while South Africa was never mentioned in that connection.

The cooperation with the aerospace industries in IBSA countries is not seen as very promising. Two of the interviewees considered such cooperation infeasible. The aeronautical segment in both India and South Africa are perceived as being less developed than in Brazil and the rest of the world. Embraer already has its own global network of partners and suppliers and the prospect for firms from IBSA countries to join such a network is seen as dim indeed. One of the interviewees was skeptical about "taking the productive chain" as far as India or South Africa as opposed to "bringing it" to Brazil.

As to the space sector, three of the interviewees could see some form of cooperation with India, in particular. India has a more developed space sector than Brazil and cooperation could work in satellite manufacture and launching technology, optical radars and image sensors, and satellite launching vehicles. According to one of the interviewees, the main objective of the aerospace sector in South Africa is to join a cooperation project as an exporter of certain inputs. Apparently, there is in South Africa a significant stock of military aircraft parts from the apartheid times which are only now being put on sale in international markets. The Brazilian Air Force has supposedly been a client in that context which is something not well seen by the Brazilian aerospace industry.

Only one of the interviewees, the representative from Embraer, presented a different suggestion as to the integration possibilities with IBSA countries. Given the international presence of the company, he emphasized the importance of the regulatory consequences of WTO agreements and mentioned in that context the Agreement on Subsidies – the object of a major dispute between his firm and the Canadian Bombardier. He said that the WTO effectively permits developed countries to maintain their subsidization to firms in the sector whereas developing countries are barred from doing the same. In his opinion, IBSA countries should fight to end such nefarious distinctions between developed and developing countries and thus to diminish the competitive disadvantages encountered by firms from the South in world markets. He went as far as to suggest that a G20-type of grouping should be created around the aerospace subsidies issue.

Technical barriers generally do not present a problem for Brazilian firms. There is a general consensus that the certifications required for the sector are indeed necessary in order to maintain high levels of quality and safety. In the words of an interviewee, "*to make airplanes is serious business*". Nevertheless, a few questions were raised. The regulation relating to emissions and noise practiced in the European Union is more restrictive than the one recommended by the International Civil Aviation Organization (ICAO) and requires firms to make adaptations to their projects depending on the

itineraries and airports in question. One of the interviewees also sees the cooperation with IBSA countries as a form of bargaining for more technology transfer in the sector from developed to developing countries.

Regarding wealth creation and the generation of jobs, all interviewees agreed that growth in the sector has a multiplying effect for segments that are in the productive chain. Such process occurs already and growth could deepen that practice. One of the interviewees emphasized the need to streamline Embraer's productive chain. Currently, the firm works with foreign partners and suppliers; Aeromot, for example, was the supplier of seats for the Bandeirante and Brasília airplanes but lost biddings for the 145 and 170/190 families for not having access to financing as directly and cheaply as its competitors in other countries. In his opinion, there should be government programs that, through financing, could influence the nationalization of such segments of the productive chain.

Another interviewee pointed to an interesting relation. In addition to the traditional impacts generated by Embraer's exports (revenues, dollars, balance of payments), a study sponsored by the firm itself and undertaken by *Fundação Getúlio Vargas* (FGV) showed that Embraer exports have a direct impact on the trustworthiness of the country as a whole. The study demonstrated that as Embraer exports grow the country tends to see a decrease of country risk levels – something which is good not only for Embraer but for all Brazilian interests that seek access to financing overseas.

Capabilities

All interviewed concurred on Brazil's capacity to produce long-haul airplanes. Nevertheless, all concurred as well on how this is basically a matter of decision by Embraer which has so far opted not to venture into that market in order to thus to avoid competing with the giants in the sector – Boeing and Airbus.

As the representative of Embraer pointed out, the firm avoids the long-haul market because of the enormous difficulties to compete with the two pre-established giants. According to Embraer, three elements are necessary in order for a new project to be launched: a "launching" client (in other words, a client that is previously interested and committed to the project), the specific technology for its development, and, the financial resources to be expended during the implementation of the project. In the case of long-haul aircraft, even though the technology is known in Brazil, there are no interested clients or funding available for the necessary investment in such a project. According to another interviewee, venturing into the long-haul market would be a "suicide" for Embraer.

The perceptions of those interviewed were coherent with their initial responses with respect to IBSA cooperation in the aerospace sector. Cooperation in defense and space could make sense while aeronautical cooperation was discarded by all interviewed. The representative from Orbisat explained that cooperation with IBSA countries could only occur in the presence of much more significant political incentives from the governments involved. He gave as an example the sale of radars for the detection of oil spots in the ocean to South Africa. The sale proposal was made months ago of

equipment which South Africa clearly needs, with a highly competitive price in the international market: the sale has not yet occurred, however, due to some internal political problem which has blocked the necessary evaluation process. In the understanding of the interviewee, the participation of the Brazilian government in a matter such as this is crucial – without which, things will simply not move. Another problem related to the lack of funding for the development of new products. Orbisat intends to sell radars already installed in Embraer aircraft but has been unable to do so due to the lack of funding, lack of interest on the part of Embraer and the lack of priority on the part of the government in financing the production of a pilot aircraft for demonstration purposes.

The main obstacles to a deeper cooperation with IBSA countries have to do with market access and the relationship with India and South Africa. One interviewee described a number of difficulties in doing business in South Africa and two others singled out the Indian case. The business culture in India is, according to some, "difficult to comprehend" for Brazilian executives, particularly with respect to decision-making hierarchies in government and a high level of corruption overall.

Regarding the infrastructure necessary for cooperation to take place, all interviewees mentioned the need for governmental support. Even in the presence of a greater contribution than in the recent past, access to available funds is restricted. Support should be made more accessible to all involved and not just to Embraer.

Investment in research and development was mentioned by all interviewees as various areas suffer from a lack of prioritization. Deficits in R&D are highly visible in segments such as geostationary satellites and launchers. Even though the quality of undergraduate learning is excellent, there is a generalized lack of investments in graduate courses at master's and doctorate levels – the type of learning that can effectively contribute to producing researchers and, therefore, technological innovations. Financial resources are also mentioned as highly deficient, particularly with respect to interest rate levels and loan duration.

Despite being skeptical with respect to the effective integration of the aeronautical productive chains of the IBSA countries, the representative of Embraer clarified that distances and freight and logistical costs are variables of low relevance to the sector. More important are the technical requirements and the high values and quantities negotiated. Also, according to various firms, there is no significant technological differential between Brazil and the developed countries. Brazilian industry already masters the most advanced technologies in the aerospace sectors it has a presence in.

The representative of Orbisat raised the possibility of an effective partnership with India in the satellite and radar productive chains. He considers that government programs that aim at joint development and that are supported by joint financing schemes are the best forms of cooperation. The executive cited as an example the ground surveillance radars for the protection of air space that the Indian government has recently bought from Israel: Orbisat has technology and capacity to produce the same type of equipment for half of the price charged by the Israeli competitor but has no presence in the international market nor contacts in the Indian government to compete effectively in such transactions.

Value Addition

Only one of the interviewees was enthusiastic regarding the development of an aircraft "from the South" and the creation of a new producer of low-cost airplanes. He believed that "the South" would have advantages in producing new and modern airplanes with a differentiated price that could penetrate international markets.

Nevertheless, the opinion of other interviewees was quite different. The market of long-haul aircraft is totally segmented and highly competitive. The demand for this type of aircraft is in developed countries and not countries in the South. The firms that supply this market are well established and have access to an incomparable level of resources, thus making any entry into their segment virtually impossible.

The perception is similar with respect to turbines. The development of turbines involves a highly complex technology which in turn demands heavy financial commitments. As with airplanes, the segment is highly oligopolized among four large multinational companies, all from developed countries.

Despite the current negative perspective, research and development was the element most referred to as a possible cooperation instrument for IBSA countries. Market agreements, joint research and technological swaps were also mentioned in that context. Once again, whenever mentioned, cooperation was only foreseen in defense and space and not in aeronautics.

Role of the government

There are varying perceptions regarding the role of government in IBSA cooperation initiatives. Generally, the interviewed were skeptical of what the government could do internationally or through an initiative such as IBSA since it had not fared all that well internally. In other words, it is difficult to imagine how the government could do something through IBSA that it has not been able to do internally anyway. IBSA in that sense was viewed not as a complement to internal initiatives but as another example of internal flawed strategies at the international level.

Among the responses to this section of the survey, the following elements were put forward:

- Support for the development of a project in defense and space;
- Financing of firms at interest rates that are comparable and compatible with the international market and with time horizons that match the effective development cycle in the sector (at times, up to five years);
- Support for the nationalization of segments of the productive chain;
- Acting as intermediaries between national firms and foreign governments.

One of the interviewees considered that the best strategy for governments would be to stimulate small enterprises to take part in objective and specific projects. Thus, there would be a direct recourse to national manpower and real positive results could be had

in the short term. There was a suggestion that a special entity could be created for the implementation of this sort of policy, specific to the aerospace sector of IBSA countries. Another idea was to charge relevant national regulatory agencies in the three countries to coordinate cooperative initiatives in the sector.

Some mentioned presidential visits as a means to open markets in the three countries but generally, interviewees regarded events, fairs and commercial visits as more beneficial after an initial contact between relevant markets.

Threats

Only one interviewee believed that an effort such as IBSA could help in improving bargaining conditions with countries from the North in the aerospace sector. Developed countries still protect their aerospace industries given their economic and strategic importance but for most of the interviewed IBSA could not change that scenario much no matter how much cooperation actually existed among the three countries.

Three interviewees did not believe there could be any real preference that could replace the current relations with the developed countries. Two interviewees were not even concerned with that prospect since the probability that South-South cooperation could become more relevant than commercial relations with the North was very low indeed. Southern industries simply did not detain sufficient technology to pretend to substitute that which originated in the North.

As to IBSA as an alternative to cooperation with developed countries, two interviewees said that Brazil could indeed benefit from IBSA given the effective potential for technology transfer among the three countries. Two others disagreed saying that cooperation with developed countries could bring interesting benefits even though it was not normally prominent in technology transfers. The representative of Embraer said that cooperation with India and South Africa does not hold much for Brazil in the short term since both of those countries are late in their technological development in the aeronautical sector.

Final Considerations

Generally, a few conclusions may be attempted regarding the perception of the Brazilian aerospace sector about the IBSA Initiative.

- There are existing commercial relations with India and South Africa in the aerospace sector but they are very small when compared with the Brazilian sector's integration into the world economy;
- The general perception of the Brazilian sector is that in aeronautics Brazil would have very little to gain through cooperation since its industry is much more advanced and globally integrated;
- Cooperation could be promising in defense and space – and not in aeronautics;

- Cooperation in the manufacture of long-haul aircraft or turbines is not feasible among IBSA countries. Commercially, it should not be interesting for Brazil to cooperate in regional jets either;
- The aerospace markets of IBSA partners, particularly that of India, are considered very difficult for Brazilian firms. The decision-making process is seen as highly complex, slow and inefficient;
- There is a lot of distrust regarding the efficiency of any international cooperation in aerospace since the Brazilian State has not fared all that well internally in promoting the sector. There is therefore a credibility problem with the Brazilian government when it intends to move forward on things internationally that it has not been able to do domestically;
- Many question the value of transnationalizing productive chains as opposed to bringing world-class suppliers to operate in the national market thus "nationalizing" production in a manner which increases jobs, efficiency and competitiveness;
- Specifically, forms of having the State act on behalf of cooperation in aerospace matters within the IBSA context could include the following:
 - Support for the development of projects in defense and space;
 - Financing of firms at interest rates that are comparable and compatible with the international market and with time horizons that match the effective development cycle in the sector (at times, up to five years);
 - Support for the nationalization of segments of the productive chain;
 - Acting as intermediaries between national firms and foreign governments.

Bibliography

ASSOCIAÇÃO DAS INDÚSTRIAS AEROESPACIAIS DO BRASIL. *Institutional Site*. Available in: <<http://www.aiab.org.br>>. Accessed in: 19 October 2005.

Embraer, Empresa Brasileira de Aeronautics S.A.. *Institutional Site*. Available in: <<http://www.Embraer.com.br>>. Accessed in 19 October 2005.

GOMES, Sérgio B. V.; BARTELS, Walter; LIMA, Jorge Cláudio C. de Oliveira; PINTO, Marco Aurélio C.; MIGON, Marcio Nobre. *O Desafio do Apoio ao Capital Nacional na Cadeia e Produção de Aviões no Brasil* ("The Challenge of Supporting National Capital in the Airplane Productive Chain in Brazil"). In: Revista do BNDES, Vol. 12, No. 23. Rio de Janeiro, June 2005. p. 119-134.

LIMA, Jorge Cláudio C. de Oliveira; PINTO, Marco Aurélio C.; MIGON, Marcio Nobre; MONTORO, Guilherme C. F.; ALVES, Marcelo de F.. *A Cadeia Aeronáutica Brasileira e o Desafio da Inovação* ("The Brazilian Aeronautical Chain and the Challenge of Innovation"). In: BNDES Setorial, No. 21. Rio de Janeiro, March 2005. p. 31-55.

ⁱ LIMA, et. alii. 2005. p. 33.

ⁱⁱ LIMA, et. alii. 2005. p. 50.

ⁱⁱⁱ LIMA, et. alii. 2005. p. 50-51.