

# Leveraging Value Chain Competencies & Resources on a Global Platform: The Case of HAL

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*Strategic industries companies which are 100% controlled by emerging economy governments faced difficulties when these economies opened up/liberalized. These companies faced all round competition from international big players. This paper studies Hindustan Aeronautics Ltd (HAL) during last ten years from 2001 to 2009. Strategic industries use the gap analysis in their value chain by studying the dynamism of external forces in future time frames and internal resources. They successfully choose and implement corporate strategies which minimize risks and help in fix the resource gaps. The paper also analyzed how HAL leveraged knowledge (marketing, political connections) and resources (distribution channels, human resources, production facilities) for developing competitive advantages in their own country and also in international expansion.*

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## Introduction

A news which came in all the major financial news papers in the world on 22nd October 2009 in absolute terms changed the image of an emerging economy state-owned aeronautics company. In the history of Boeing this was the first time when the company had signed to supply a very complicated part called flaperons for the Boeing's 777 series commercial jetliners. The 777 flaperon is a complex composite assembly that is instrumental in controlling the airplane's and maneuverability in flight, referred to as a 'control surface', flaperons work both as an aileron to control roll as a flap to control lift. Boeing had earlier signed a 10-year manufacturing contract (\$1 billion or Rs. 4,650 crore) in December 2007 with Hindustan Aeronautics Ltd for making subsystems for its fighter planes such as F-18 Super Hornets and Apache helicopters. "HAL and Boeing share a very special relationship. Showcasing HAL's composite manufacturing capability on one of the world's premier long-haul commercial jets positions us for even greater opportunities at the forefront of technology," said Soundara

Rajan, Director, Corporate Planning & Marketing, HAL (Boeing, 2009). Boeing's relationship with HAL dates back to 1991. Boeing India President Dinesh Keskar said "The composite 777 flaperon that HAL will produce represents a significant leap forward in technological capability, and supports Boeing's strategy to work in partnership with India's aerospace industry for the long-term". (Boeing, 2009)

It was a long way for a 100 % Government of India owned strategic defense industry company to achieve. As on 2010, HAL has 19 production units and 9 research and design centers in 7 locations in India. It has sold its products in more than 20 countries. The company has total 26 types of aircrafts. Out of which 12 types of aircrafts have been manufactured using in-house R & D and 14 types produced under license. By 2010 March, HAL had manufactured more than 3550 aircrafts, 3600 engines and overhauled over 8150 aircrafts and 27300 engines. HAL is the largest player in the Aerospace industry in India. HAL supplies its products to all the

three major defence wings in India namely, Army, Navy and Air force. To maximize its resources usage, building synergies and minimizing risks and increase revenues, HAL entered Civil Aviation with launch of Dornier (14 seater) and civil versions of Advanced Light Helicopter.

How does an emerging economy company, which is in a strategic industry, chart its global strategy, why and how? We would be looking at the outside in approach (PEST and industry forces) and inside out perspective (resource and value chain perspective). We discuss how an emerging economy, strategic industry company has transformed itself and grew in the international arena. Government of India has defined all the institutions and government owned companies in Defence Department and Space Department as strategic institutions and allowed 26% FDI in the defence production space with some restrictions. There are around eight defence public units. As can be seen from table 1 HAL is the largest public sector unit (PSU) in terms of turnover and exports volume.

**Table 1 Indian Defence Public Sector Companies: 2008-09**

Name of the Company	Total Turnover (Rs. Crore)	Export Turnover (Rs. Crore)
Hindustan Aeronautics Limited	Rs 10,373.38	Rs 436.58
Bharat Electronics Limited	Rs 4,624	Rs 80
Bharat Earth Movers Limited	Rs 3013.47	Rs 304.34 (including trading)
Mazagon Dock Limited (MDL)	Rs.2568.93	Nil
Goa Shipyard Limited (GSL)	Rs 508.01	Nil
Garden Reach Shipbuilders & Engineers Limited (GRSE)	Rs 672.69	Nil
Bharat Dynamics Limited (BDL)	Rs 465	Nil
Mishra Dhatu Nigam Limited (MIDHANI)	Rs.364.03	Rs 1.38
	(value of production before ED)	

Note:1 Crore = 10 Million

(Source : Dept of Defence Production, Govt of India )

It is clear that HAL is the largest defense public sector and has exports turnover of 4365 Million Rupees. Other public sector units do not have any exports and even if they have some exports it is more of trading. The above are the reasons that we have taken HAL as the study point in industry international strategy in emerging economies.

### **Aeronautics Industry**

**In the commercial aircraft industry, the competition is immensely intensive even though it is mainly between Boeing and Airbus.**

In the commercial aircraft industry, the competition is immensely intensive even though it is mainly between Boeing and Airbus. Economies of scale in the commercial aeronautics industry comes from the ability to spread fixed costs over a large output. Boeing is spending an estimated \$5 billion to develop its Boeing 777 jetliner. Boeing needs to sell around 300 aircrafts to get respectable amount of profit. The economies of scale here are significant, with average unit costs falling by \$40 million as output expands from 100 units to 500 units.

“In addition to economies of scale, learning effects also exist in this industry. Learning effects were first documented in the aerospace industry where it was found that each time accumulated output of airframes were doubled, unit costs declined to 80 percent of their previous levels. Thus the fourth airframe, typically 80 % of the second airframe to produce,

the eighth airframe only 80 percent of the fourth, the 16<sup>th</sup> only 80 percent of the eighth, and so on. This observation implies that the \$80 million in per unit variable costs required to build a 777 will decline over time as output expands, primarily because of gains in labor productivity. Thus, while variable costs per unit might be \$80 million by the time 100 aircraft have been manufactured, by the time 500 aircraft have been manufactured, they may have fallen to \$60 million per unit” ( FMBD 2000). “World demand is large enough to support only a limited number of aircraft producers at high output levels. Forecasts suggest that the global market for long-range aircraft with a seating capacity of about 300, such as the 777, will be about 1500 aircrafts between 1997 and 2008. If we assume that Boeing has to sell about 500 aircrafts to make a decent return on its investment, this suggests that the world market is large enough to support only three producers profitably!” (FAA, 2012).

Extensive aircraft portfolio is required to satisfy the requirements of customer airlines. Pressures from customers are forcing aircraft manufactures to develop products which can be run by only one pilot. An aircraft producer has to give leasing and financing services to customers over and above other requirements of customers. As airlines face financial difficulties, financing terms become a key selling factor. Alliances, joint ventures—especially with foreign government funded programs—and extensive lobbying, political posturing in national and international forums. “Some 45 businesses in 6 Asia-Pacific Economic Cooperation (Apec) economies provide Boeing with

about 70 different parts and major assemblies...” (Boeing, 2005)

As can be seen from a brief overview of the commercial aircraft industry, political, financial, customer forces effect the product development and sale of aircrafts. In defence aircraft sales the competition is more intense and political forces and costs are the major influencing factors.

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### **Political, Economic, Social, Technological (PEST) Analysis**

#### **Political Factors**

Political factors include government regulations and legal issues and define both formal and informal rules under which HAL must operate. HAL, being a public sector undertaking under the Ministry of Defence, there is a large impact of political factors on its strategies. Following are the examples:

- Government type and political stability: India is a democratic country with governments elected by the people. In recent years we have seen stability in the elected government. So the political scenario may be considered favourable for industries.
- Freedom of press, rule of law and levels of bureaucracy and corruption: In Indian democracy press has free-

dom of expression. As such it is a positive factor for any industry

- Regulating rules: HAL was created to provide services to defence services specially The Air Force. Because of high security involved, Government favors procurement of services for defence from a public sector company with its own control
- Employment laws laid down by the government which provide for minimum employment to the people and job security for its employees
- Environmental regulations that any company has to adhere to and the necessary certifications to be obtained from various government certified agencies like ISO, etc. For example HAL is ISO 14001 environmentally certified.
- India has a federal tax structure whereby both the Central and the State governments impose a range of taxes. The Central Government levies income tax on both corporate and individual incomes as well as indirect taxes such as customs duties, central excise and service tax. The State Government imposes other indirect taxes such as Value Added Tax (VAT) and the like. The complex and multi-tiered tax structure in India makes domestic manufacturing uncompetitive in a range of situations for example in defence sector some imported supplies of defence goods to MoD are subject to lower incidence of taxes than locally supplied goods.

- The civil aerospace industry is similarly disadvantaged. The tax incentives are available for R&D in only Special Economic Zones (SEZs) but these are limited and not broad-based enough to provide meaningful relief. Particular mention needs to be made of the indirect taxes on aircraft servicing in India, customs duties, service tax and VAT. This does not create a very conducive environment for competitive development of technology.
- Economic growth: India has been characterized with a positive growth rate throughout the next decade. As such the aircraft industry is expected to grow.
- Interest rates: Interest rates will help determine the availability of funds for expansion and growth. Stable interest rates will ensure stable growth in the aircraft industry
- Exchange rates: Since aircraft industry is a complex and capital intensive industry with a large number of parts of the supply chain in foreign lands, it is undoubtedly affected by the fluctuations in the exchange rate.

On the whole, the Government encourages private investment in both the civil and defence aerospace sector with the goal of encouraging technology transfers and achieving indigenization only. The Indian Government has significantly liberalized the civil aviation sector. It welcomes domestic private participation in manufacturing and R&D in the aerospace sector with 100 percent foreign direct investment (FDI) allowed on the automatic route in most areas, the exceptions being air traffic services. The defence sector has more restrictions: while 100 percent domestic private investment is allowed, subject to licensing, in the manufacture of defence equipment, there is a cap of 26 percent on FDI (which is also subject to licensing requirements, and there are other restrictions as well). (PWC, 2009)

### **Economic Factors**

Economic factors affect the purchasing power of potential customers and the firm's cost of capital. The following are examples of factors in the macro-economy that affect the aircraft industry:

- Inflation rate: In the recent days we have seen huge rise and fall in the inflation rates. This creates lot of uncertainty in the industry. The recession has largely impacted the aircraft industry.
- Unemployment and labor supply: India is in a favorable spot for good factor conditions and skilled labor. Unemployment is quite high compared to developed nations. As such it is an ideal place to locate a major part of the value chain of the aircraft industry in India
- Labor costs: Labor costs are comparatively low and education levels are high which is favorable for an aircraft manufacturer. R&D in India costs 50% lower than in developed countries.
- Levels of disposable income and income distribution: In India air travel is still considered a luxury and the

amount of disposable income available for air travel is low. But with the gradual increase in the income levels of the average Indian, the aircraft industry may hope to grow in future.

- Impact of globalization: Globalization has opened new doors and has brought all companies in level playing field although not without certain restrictions. Components and assemblies can now be outsourced and technologies licensed from other countries. (Barney, 1997)

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### Socio-Cultural Factors

Social factors include the demographic and cultural aspects of the external macro-environment. These factors affect customer needs and the size of potential markets. Some social factors that affect the aircraft industry include:

- Population growth rate
- Age distribution (demographic profile)
- Career attitudes
- Emphasis on safety
- Health, education and social mobility and attitudes
- Employment patterns, job market freedom and attitudes to work
- Press attitudes, public opinion, social attitudes and social taboos

- Lifestyle choices and attitudes
- Socio-Cultural changes

### Technological Factors

Technological factors can lower barriers to entry, reduce minimum efficient production levels, and influence outsourcing decisions. Some technological factors that affect the aircraft industry include:

- Research & development activity
- Automation
- Technology incentives
- Rate of technological change
- Impact of emerging technologies
- Impact of internet, reduction in communications costs and increased remote working
- Impact of technology transfer

### Strengths

- Capabilities- HAL uses high technologies in its manufacturing processes.
- HAL has a diversified product base related to aircraft industry.
- Competitive advantage - only manufacturer of aircrafts in India.
- Unique Selling Point- Quality Policies ISO 9001:2000, prestigious customers like IAF, Boeing, Airbus, etc.
- Resources, assets, people- highly trained professionals from elite institutions.

- Experience- More than 60 years of existence in the aviation sector. 12 types of aircrafts have been manufactured with in-house R & D and 14 types produced under license. The company has manufactured over 3550 aircrafts, 3600 engines and overhauled over 8150 aircrafts and 27300 engines.
- Financial reserves- Company has a net worth of Rs 10260 crores.
- HAL has 19 production units and 9 research and design centres in 7 locations in India. This covers most of the Indian geography.
- Company has implemented Lean manufacturing processes and Kaizen on shop floors which helps manage production activities better.
- Location and geographical spread- various divisions are located in prime locations in various cities in India.
- HAL policies entail a high security of job and financial benefits.
- The company provides an environment, which allows freedom to innovate and experiment various ideas and thoughts.
- Better employee satisfaction may be achieved by providing better facilities.
- Technology development and innovation- advanced technologies; CNC machines, etc. will boost production activities.
- HAL follows time consuming protocols for meeting requirements of production.
- Lack of basic facilities like drinking water, poor canteen services, etc. leads to employee dissatisfaction.
- Poor work culture due to the inherent built-in job security in the company.
- Interference of labor unions into production activities lead to delays in production plans.
- Deadlines not taken seriously by many employees due to lack of knowledge.
- Poor remuneration or incentives compared to competitive counterparts.
- Technologies in HAL are less advanced compared to those in developed nations. As such heavy competition is faced in export performances.
- Plan predictability- Poor planning of production activities leads to loss of valuable production time.
- Morale, commitment, leadership- Poor HR policies and low employee morale resulting in high attrition.

#### **Weaknesses**

- Gaps in capabilities- Old and worn out machines and poor infrastructure lead to slow production processes.

#### **Opportunities**

- Market developments- Good market growth opportunities within the country and abroad.
- Export to other countries like other developing nations.
- New markets, vertical and horizontal- Diversification into other related

products like passenger aircraft segment may help HAL grow.

- New target markets- Exploring new target market in the South Asian and African countries will build better prospects for the company.
- New Unique Selling Point- Customization of products as per the requirement of the customer for better customer satisfaction.
- Major contracts from customers like Boeing and Airbus.
- Business and product development. More research and development into fifth generation aircrafts and stealth technologies.
- Partnerships- Outsourcing its activities to vendors in and outside India helps in reducing costs involved.
- As the Indian market, specially defence is opening up, foreign players will require the help of local producers for localization and maintenance requirement.

### Threats

- Political effects- Changes in government policies from time to time might hamper the smooth running of the company.
- Competition- Other external competitors like Boeing, TATA, etc. may eat-up prospective market share.
- Limited customer base because of the high cost of the products.

- Vital contracts and partners- Non compliance of production schedules may lead to liquidation of contracts and loss of important customers.
- Loss of competent professionals- Brain drain of highly trained technicians and engineers.
- International Relations- As most external customers are governments of other countries, international relations may affect the growth prospects of the company.
- World Economy - Recession in the world economy may lead to lower expenditure on defence.
- Inability to attract skilled technicians or professionals.
- Changing government policies and the influence of government agencies affect the smooth functioning of the company.

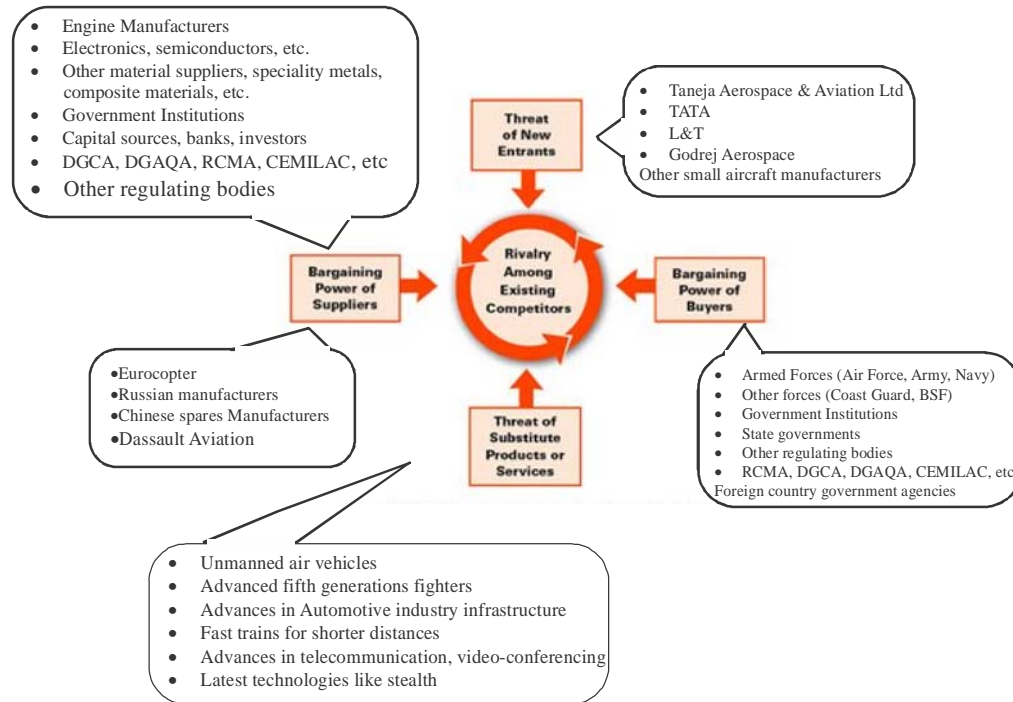
This SWOT analysis brings out the various internal and external factors that need to be considered while preparing the Strategic Plan for the company.

### The Bargaining Power of Buyers

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HAL's main buyers being the armed forces, government agencies retain considerable power. The customers' power becomes more visible during downturns in the economy, as dur-

Fig. 1 Industry Analysis Porter's five forces analysis



(Source: Porter, 1985)

ing these times the armed forces optimize their operations and cut their investments due to the defence budget pressures. But this power is exhibited by the customer while considering purchase of new equipment. In the case of services and spare parts, HAL has a competitive advantage and the customer has no option but to buy the service and parts. HAL is bringing this to balance by seeking more orders like OEM orders from aerospace companies and also international orders from defence forces of other countries. The bargain power of the buyers is moderate to strong.

### The Bargaining Power of Suppliers

Engine manufacturers represent the single most significant group of suppliers. There are only a few of such manufacturers like General Electric, Pratt & Whitney (US), Rolls Royce (UK), CFM (Europe) who compete to supply the engines. Each of them has their advantages and disadvantages. Even when planes are usually designed for more than one engine types and the fact that customers enter in separate negotiations with the engine suppliers to determine the choice of the engine for their planes based on their prices, engine manufacturers yield

considerable power. This is because their manufacturing capacities are limited and booked in advance. Yet in case there is spare capacity engine manufactures can offer huge discounts. The game is purely based on advanced and accurate forecast. In future, the need for higher fuel efficiencies, increased reliability—especially for twin engine transatlantic wide bodies—and more power for the new large body aircraft is forcing engine manufacturers to enter in joint development programs. Therefore it can be assumed that their bargaining power is going to significantly increase as they undergo concentration

Regulating bodies, such as the DGCA, CEMILAC, RCMA, etc., may be considered as suppliers to the industry as they determine the constraints that the industry has to deal with. The bargaining power of these institutions is considerable and they can create major obstacles for the final approval of the aircrafts.

There are large number of suppliers for other material and parts with ample capacities. Therefore they do not yield such high power. But while the options are available galore, the specifications and design may leave a manufacturer limited on the choices and hence increasing the power of the supplier.

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### Threat of New Entrants

At first look, any new entrant in this market faces a steep, uphill battle. Some of the very high barriers to entry that and new entrant has to deal are:

- Local government and international regulations
- Capital requirements
- Extremely skilled labor needs
- Sophisticated support industries
- Need to have proven track record before getting orders
- Long breakeven cycle

However, one cannot completely exclude this possibility. Just as Europe did, Japan or China may decide that this industry is strategically vital for their long-term well being and encourage a highly subsidized entry in the market by their national champions. In the case of Japan, subsidies may even not be necessary as the sophisticated industrial infrastructure and naturally protective trade policies may very well encourage Mitsubishi or another firm to engage in the battle.

The former Soviet Union represents a significant growth potential for the big three, but also has its own national aircraft industry. While this market may be open to competition, it is also possible that the Russian Tupolev enhances its capabilities, rationalizes its operations and succeeds in entering the market with a low cost, no frills product strategy, especially in emerging countries. Indian manu-

facturers of smaller aircrafts like Taneja Aerospace & Aviation Limited and components manufacturers like Dynamic Technologies Limited are fast gaining access to the technologies that will enable these companies to stand competition to HAL. Finally, although highly unlikely, existing defence aerospace companies may be tempted by a late entry or re-entry—such as Lockheed—as they see their traditional military market dwindle. We would rate the threat of new entrants to be moderate (Porter, 1990).

### **Threats of Substitute Products or Services**

It is difficult to imagine, for the foreseeable future, a direct substitute for commercial or military aircrafts. Air travel is the most effective, secure, convenient and economic transportation method. However, a few threats exist, especially in the low end:

**Fast trains offer between cities less than 600 kilometers a very attractive solution.**

Fast trains offer between cities less than 600 kilometers a very attractive solution. As their speeds approach and exceed 200 kmph, they bring such travel below three hours from one city to another; a performance that hardly any airline can match. After the start of TGV service between Paris and Lyons, Air Inter faced a 50% reduction in air travel between the two cities (Andrew 2010). If such solutions are implemented widely in India—a very speculative assump-

tion—for instance, a great many airlines may lose market share and as a consequence reduce their fleets, which will directly affect the aircraft manufacturing industry. Likewise, advances in automotive industry, such as cars capable of very high speeds, under electronic control on specially equipped highways may have an impact on aircraft industry. Due to the highway development initiative of the government, the roads are posing a serious threat as an alternate mode of travel than air (Osborne, Stubbart & Ramaprasad, 2001). Inter Continental Ballistic missiles and such other advancements in the long-range attack weapons also pose as substitutes to military aircrafts. Finally, advances in telecommunications techniques, collaborative computing, and desktop video-conferencing based on broadband, cable type services may reduce business travel requirements and impact the aircraft industry. We would rate the threat of substitutes to be low (Kurt, 2008).

### **Global Value Chain of HAL**

“The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms. Value chain activities can produce goods or services, and can be contained within a single geographical location or spread over wider areas” (<http://www.globalvaluechains.com>).

**Fig. 2 Global Value Chain of HAL Value Chain of Hindustan AeronauticsLtd**

Infrastructure Acquire capital, perform accounting, legal approvals, and administrative task for each activity					
Human Resource Management	Recruiting, hiring, training and compensating the staff.	Ensuring attraction of the best brains to the firm and they stay abreast about the latest in the field.	Recruiting, hiring, training and compensating the staff.	Ensuring most effective communicators are hired who can do techno-sales.	
Technology Development	Train and help the company to identify the best technologies available and suitability of the same for HALs use.	Indigenously develop technology to create the parts locally for a longer time and at cheaper rates. Evaluate and suggest the technology partners for manufacturing.	Reduce transportation cost at highest security.	Help make technological presentations specially for comparisons with other vendors	
Software Development	Develop software for cost and quality regression for vendor selection Software for Quality control and monitoring	Develop software for quality control during assembling. Software for engineering design and aids to assembly services	Software for quality control	IT enabled Marketing research	Logging and maintaining database of issues and fixes. Mechanism of query registration and resolution
Procurement	Negotiation of contracts for technology. Material and components from Indian and international companies.	Procure best-suited technology and site at cheapest price. Insure continuous and economical supply of services and up gradation of plant	Procure most economical means of distribution.	Procure most economical means of communication	Economies service,
	Technology selection - Evaluation and finalization of technologies, materials and components. Vendor selection - Evaluation and finalization of suppliers (includes country decision)	Research and development activities. i.e. developing new models for better efficiency, speed, passenger comfort etc. Develop and manufacture parts of the planes owned by Indian during their lifetime. Manufacture new with the defense partners Design and manufactures planes itself.	Shipment and transportation to buyer site (critical for exports) Ensuring delivery of its products and services in an efficient and discreet manner.	Marketing HAL products and services to defense, civil and foreign customers. Liaise with Govt. and Defense agencies to understand their policies and requirements	Maintain, overhaul, service and repair planes of all Indian defense services irrespective of its make and kind. Repair and maintenance services for its products. Customer interaction for its services.
	In Bound Logistics	Operations	Outbound	Marketing logistics	Services

HAL is in the capital-intensive aerospace manufacturing industry and is characterized by a high focus on technology.

(Variable taken from Prahalad & G. Hamel, 1990; North, 1990; Barney, 2002)

The aerospace value chain is complex and is characterized by a long project life cycle spanning R&D, engineering design, manufacturing, assembly and aftermarket (spare parts, overhaul and service).

*Research & Development:* HAL has nine Research & Design Centres engaged in the design and development of combat aircraft, helicopters, aero-engines, gas turbines, engine test beds, aircraft communication and navigation systems and mechanical system accessories spread across the country. These are:

- Aircraft Research and Design Centre
- Rotary Wing Research and Design Centre
- Aircraft Upgrade Research and Design Centre
- Transport Aircraft Research and Design Centre
- Engine Test Bed Research and Design Centre
- Strategic Electronics Research and Design Centre
- Aerospace Systems & Equipment Research and Design Centre
- CM and PL Research and Design Centre

HAL has so far undertaken its own research and design activities. This being a very high value addition activity is undertaken by HAL. Various upgrades to aircrafts like MiG 27M, Jaguar, etc have been carried out to make these aircrafts more capable for Indian Air force.

**Since 1980s, HAL has started to move up the value chain.**

*Engineering Design:* Since 1980s, HAL has started to move up the value chain. Its operations saw a rapid increase which resulted in the development of new indigenous aircrafts such as HAL Tejas and HAL Dhruv. HAL also developed an advanced version of the MiG-21, known as MiG-21 *Bison*, which increased its life-span by more than 20 years. It has been developing designs for Light aircrafts and Helicopters. The two well known examples of its success in design and development are:

1. Design and development of the completely new Advanced Light Helicopter, which was designed in collaboration with *Messerschmitt-Bölkow-Blohm* now Eurocopter Deutschland), Germany.
2. Design and development of Light Combat Aircraft, with Dassault Aviation of France as a consultant to review the Project Definition and provide advice based on its extensive aviation expertise.

*Manufacturing:* The number of components and subassemblies in any

aircraft may vary from 12000 parts to 30000 parts. All these parts and sub-assemblies have to be manufactured before being assembled into the aircraft. In the manufacturing realm, most value is added to the raw material. The various components and subassemblies are at present brought from following sources:

*In-house manufacturing:* HAL has facilities and manufactures most of the very critical components in house like the undercarriages of aircraft, many special rubber components, very critical Titanium components and sub-assemblies, etc. These are state of the art facilities and match international standards. The location in India coupled with the long experience provides it a competitive advantage in costs. Therefore HAL has also obtained several multi-million dollar contracts from leading international aerospace firms such as Airbus, Boeing and Honeywell to manufacture aircraft spare parts and engines.

*Outsourced to Indian Vendors:* No company in the world can make all the parts of a final product itself. HAL has also developed a healthy list of vendors who manufacture the parts for its current projects like Su-30 MKI, ALH, LCA, etc. The outsourcing helps HAL to make better use of its resources (skilled manpower and finance). HAL establishes a win-win relationship with these vendors. HAL supplies the design, technologies, raw materials and other necessary support. These companies learn latest technologies and supply aircraft components to HAL. HAL gains from these vendors in terms of low cost of fabrication. At the same time qual-

ity of components is ensured by final inspection by HAL Quality department. HAL has out-sourced manufacture of components ranging from Wing stiffeners to sub-assemblies like the vertical fins of aircraft and these vendors have been able to successfully meet the requirements of HAL to a great extent.

**HAL gains from these vendors in terms of low cost of fabrication.**

#### Analysis

1. HAL is good in quality management and process management
2. Has an excellent resource distribution structure
3. Competencies are strong, equal to international standards
4. Indian factor of production advantage
5. Does not have cutting edge new technologies, special in materials and part manufacturing
6. The investment required in developing the material science and competent advance parts manufacturing very high.

#### Global Outsourcing

HAL has been integrating various aircrafts to the customers' requirements with some very high technology systems. For example ALH is flying with twin 1000 shp Turbomeca TM333-2B turbo-shaft engines supplied by Turbomeca, France while the THL 20-20mm gun turret is supplied by Nexter Systems (formerly

Giat), France. The Light Combat Aircraft (LCA) comes fitted with Israeli avionics and radar. These are the multi-function displays (MFDs) by Sextant (France) and Elbit (Israel), the helmet-mounted display and sight (HMDS) cueing system by Elbit, and the laser pod supplied by Rafael (Israel). The ejection seat of LCA has been sourced from the Martin-Baker. The software used in the design and development of 3-D laminated composite elements, Autolay Integrated Automated Software System has been licensed to both Airbus and Infosys. The LCA is powered by General Electric F404, F404-GE-IN20 engine at the prototype stage. General Electric was awarded US\$105 million contract in February 2004 for development engineering and production of 17 -IN20 engines for LCA. (HAL 2010)

To compete with global competitors like Boeing, Airbus, Eurocopter, etc. HAL started to look at alternatives to manufacture the various components of aircrafts outside the HAL facilities. Over the past few years, HAL has been able to develop new vendors all over the country and world. All the new projects have at least 15% of the value being contributed by the outsourced vendors. HAL has been engaged in creating value for the customers by controlling the entire value chain from research and development to the aftermarket overhaul and services support, which is not feasible now in the new competitive environment.

### **Assembly & Testing**

Assembly of aircrafts and testing is a task of great expertise acquired over

years of training and practices. It is the highest value addition activity for HAL for manufacturing under collaboration. Even for indigenously designed products the value addition is very high. Without the proper assembly all the parts are a heap of metal and electronics. A smallest mistake can make a loss of millions of Rupees and lives even at the test stage or even later. HAL undertakes assembly of the aircrafts in its various facilities in Bangalore and Nasik factories. The flight testing of the aircrafts is also carried out at these locations before the aircraft is handed over to the customer.

### **Marketing & Sales**

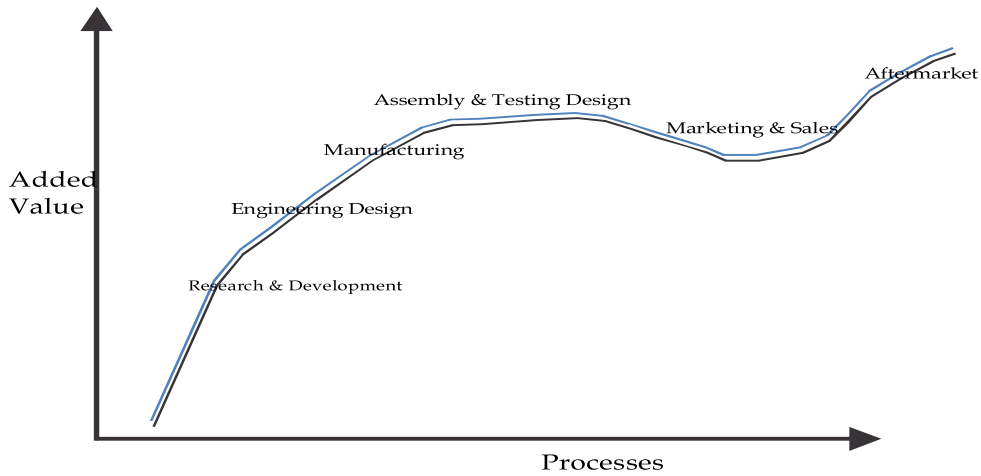
HAL has also formed agreements with global companies for promotion of aircrafts developed in India. For example, HAL and Israeli Air Force are jointly marketing the Israeli avionics fitted export versions of ALH. HAL has a very large customer base of national and international organizations, governments and companies. Indian customers include the army, air force, navy, coast guard, and Border Security Force. HAL's global customer base includes those from Myanmar, Nepal, Bolivia, Turkey, Surinam, Mauritius etc. Among civil operators in India are: ONGC, State Governments of Chhattisgarh, Jharkhand, Karnataka, Geological Survey of India, National Disaster Management Authority etc. Among civil operators outside India includes Peruvian Health Services. Other customers are from UK, Philippines, France, Israel, USA, Maldives, Japan, Namibia, Peru, Oman, Malaysia, Thailand, UAE, Vietnam etc. (HAL, 2010)

**Aftermarket**

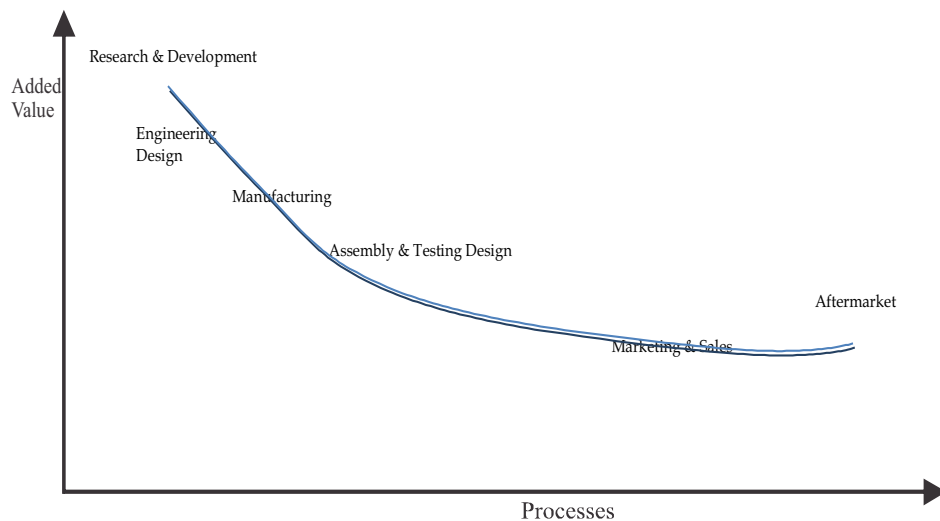
different qualities and prices. HAL provides overhauling and service support to all its customers in India and abroad. The com-

maintenance and upgrading required for aircraft components and assemblies required to service airplane, after it leaves the factory. After-or overhaul or upgrade the aircrafts are market is a large market in the aerospace industry requiring a wide range of parts of aircrafts at customers' site (Peng, 2001).

**Fig. 3 HAL Value Curve for Manufacturing under Collaboration/License ( HAL, 2010)**



**Fig. 5 HAL Value Curve for Manufacturing Self Designed Planes ( HAL Documents & Interviews)**



**Cost, Quality & Efficiency**

Value chain of aircraft industry is geographically spread based on various cost heads, quality and efficiency considerations. Few of these have been identified below. Now for each activity, viz. R&D, Design, Manufacture (each part),

Assembly, Aftermarket, and each customer segment, such analysis is carried out. This gives way to geography and ultimately vendor (or self) selection for each activity. We intended to give these metrics for each such activity, however, such data being confidential, indicative analyses framework is being suggested.

	Cost	Quality	Speed
Labour	India	Americas	Japan
Material	Europe	Americas	Europe
Skill	Europe	Europe	Europe
Inspection and Quality Control	Americas	Americas	Americas
Efficiency	Japan	Japan	Japan
Logistics/Transportation	Americas	Americas	Americas

**Global Strategy Formulation-  
Outside in Approach**

HAL's global strategy is undoubtedly based on the requirements of its customers. However, the customer segment chosen is itself based and extended on its core competencies. Hence, its approach cannot be classified as entirely inside out or outside in. It follows a modular strategy in this regard. Modules based on core competence, and served for customer preferences. HAL's global strategy can be of the following two generic strategies: (Hoskisson, Eden, Lau & Wright, 2000; Porter 1980; 1985; 1996)

industry because of the following strengths:

- Access to the required capital making a significant investment in production assets; this investment represents a barrier to entry that competitor firms may not overcome.
- Skill in designing products for efficient manufacturing, for example, having a small component count to shorten the assembly process.
- High level of expertise in manufacturing process engineering.
- Efficient low cost supplier base.

*Cost Leadership:* Some of the ways through which firms acquire cost advantages are by improving process efficiencies, gaining unique access to a large source of lower cost materials, making optimal outsourcing and vertical integration decisions. HAL has the potential to become the cost leader in the aerospace

**Being in India, HAL has a unique cost leadership.**

Being in India, HAL has a unique cost leadership. Worldwide the aviation manufacturing units are based and thrive in the developed world, where the cost is high. Due to the economies of scale and lack of

domestic market, it is very difficult for any small company (despite being backed by the government of the country) to enter the industry on its own in developing world. In fact even Airbus is promoted and supported by the entire EU. The main possibilities of competition could come from China. But due to its communist background, politics and language it has much less acceptability. Under these circumstances HAL has a competitive advantage on its input costs compared to Western companies without a threat of local competition which can be leveraged for its global strategy.

**HAL has chosen its segment very well.**

*Focus:* HAL has chosen its segment very well. It understands that it can not be a main stream supplier of large civil aviation planes. But due to its association with IAF it has created inimitable knowledge in small fighter planes such as LCA. Therefore HAL is focused on making small aircrafts of less than 8 seats only which are light and have to fly only small distances. Such products are suited to customers in Africa and Latin America in addition to India.

HAL has its customers located globally. While it has users of parts and services located in Asia, South America and Africa its contract manufacturing customers are located in US, Europe and MEA. Aerospace being a small well knit community is well aware of the activities of every player in the field. The customer contacts are established through personal relations and typical sale and marketing

factors are missing. Flying to meet the customers is affordable and preferred. Under such circumstances HAL chooses a mode of direct export or through partner who add value in relationships, securing local approvals and liaisoning. HAL pursues exports and contractual agreements in its markets in Vietnam, Nepal, Burma, Africa and Latin America.

### Conclusions

The aerospace industry is rapidly becoming global for the following reasons:

- There are very few players, but intense competition and very high capital requirements drive the need to maximize volume and tap all possible markets. It is unthinkable to have a national or regional strategy and expect to succeed in this industry.
- As many customers—including various governments across the world—consider the aircraft industry strategic, they want a share of the action. As a consequence, partnerships, joint ventures are aplenty. In fact such deals, mergers and joint ventures become a must in order to remove trade barriers.

HAL has grown internationally by:

1. Leveraging India as a low cost hub
2. HAL is leveraging knowledge of India and its production facilities by having joint ventures with foreign companies in India and abroad.
3. HAL used international licensing deals for technology absorption and product development.

4. HAL developed its resources and capabilities through licensing and joint production strategies. Boeing (2009), <http://www.boeing.co.in/News-and-Media-Room/News-Releases/2009/October/Boeing-HAL-Sign-Agreement-for-777-Flaperon-Assembl>
5. HAL entered into more related aircraft product lines. Boeing (2005), (<http://classes.soe.ucsc.edu/ism158/Winter05/boeing.htm>)
6. Used Indian diplomatic relations with friendly countries for exports. FMBD (2000), Book on International Business and Trade, Free Market Business Development Institute, Portland State University
7. HAL implemented international outsourcing strategies for managing cost and international building brands. FAA, (2012), [https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/aviation\\_forecasts/aerospace\\_forecasts/2012-2032/media/2012%20FAA%20Aerospace%20Forecast](https://www.faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2012-2032/media/2012%20FAA%20Aerospace%20Forecast).

Global value chains and associated production networks offer significant opportunities for HAL.

Defense public sector companies which come under strategic industries can grow internationally by:

- a) First having a clear process of strategic planning
- b) Finding gaps in resource and capabilities and filling them through licensing, joint ventures strategies.
- c) Using International outsourcing and supply chain strategies for developing competitive advantage.
- d) Leverage country advantages in production and marketing.

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