

Linking Technology Capabilities to Marketing Requirements: Case of Indonesian Aircraft Industry

Yulianto Suharto^{1*}

¹School of Business and Management
Institute of Technology, Bandung, Indonesia

Abstract. *The relationship between strategic technology planning and the overall business strategy has been one of the growing fields that attract much interest both from academics and industrials point of view. The increasingly important role that technology plays in today's business success is well established. Strategic technology planning activities--within a corporate level--are often implemented by applying integrated planning instrument, which allow firms to consider both technology-oriented and product-oriented aspects. This paper is an attempt to explore the role of strategic planning in the high tech industry using a specific case of aerospace industry in Indonesia. In order to compete effectively in the open global market place, the company must learn to integrate technology management with strategic planning. In other words, all top managers have to link their technology capabilities to marketing requirements.*

Keywords: *technology planning; business strategy; technology capability; marketing requirement; strategic mix*

1. Introduction

Aircraft industry is considered one of the most important and the most strategic industry for Indonesia. It became so important to the economic development of Indonesia since the country has a wide area and is naturally composed of thousands of islands with difficult and different geographical conditions and thus requires adequate transportation. The airplane has the advantage in speed and power to achieve when compared with land

transportation and sea, so as to support the mobility of business activities and citizens who need a quick means of transportation. Aircraft industry is also very strategic for Indonesia as an industry-based high technology; it could lead Indonesia in line with other developed countries. It also showed how a nationalist rhetoric shapes the symbolic and physical construction of technology (Amir, 2007). Based on these views, the Indonesian government develops this industry as a means for technology transfer process.

*Corresponding author. Email: yulianto@sbm-itb.ac.id

Dirgantara Indonesia is the only aircraft industry in Indonesia, which assumed all the missions that have been mentioned above. Dirgantara Indonesia is the name that was inaugurated by the 4th President of the Republic of Indonesia, Abdurrahman Wahid in Jakarta, on August 24, 2000 for the aircraft industry in Indonesia, which replaces the name of IPTN (Nusantara Aircraft Industry) that have been pioneered since about 25 years ago.

2. Business Strategy of Dirgantara Indonesia

Dr. Habibie (long-time minister for research and technology and a former president of the Republic of Indonesia) himself started the Indonesia Aircraft Industry (it used to be PT. IPTN and then changed its name to PT Dirgantara Indonesia) and promoted a concept of four stages of technological transformation with a very catchy phrase: *“begin at the end and end at the beginning,”* encompassing four distinct stages—assembling final products, manufacturing components for assembly, designing product components, and producing new systems. Although he did not disclose the strategic mix explicitly, it is apparent that the commuter aircraft production history of Dirgantara Indonesia: CN-212 (12 seater) assembling in 1976, CN-235 (35 seater) manufacturing in 1983, CN-250 (50 seater) design and manufacturing in 1989, and the plan to produce a completely new aircraft (around 100 seater) by 1995. The company is already producing parts through subcontracting for Boeing (USA) and undertaking high-level design activities for CASA (Spain).

In 1987, inspired by the emerging market of an 800 mid-range airplanes, a small team of engineers conducted a technology-based survey on the emerging market in regional

flights with a range of 800 miles. The team learned that many of Indonesian airlines were still using Fokker 27, an aircraft type that soon will be phased out. A moderate estimate suggested 400 mid-range airplanes, with possibly a higher number in foreign markets. In the early stage, the new project sought to design a 30-seat aircraft, hence the title N230 and renamed it later to N250. Further study revealed that the market wanted a 50-seat aircraft. At the 1989 Paris Air Show, Habibie publicly announced the N250 project to the international aviation community (Amir, 2007).

The N250 is a propeller aircraft that cruises at speeds up to 330 knots, the fastest propeller airplane in the subsonic class. It relies on a fly-by-wire flight control system that provides fully powered, electrically controlled hydraulic service for both primary and secondary control surfaces of an airplane. The N250's fly-by-wire covers three axes—directional, lateral, and longitudinal—a great innovation considering similar systems covered only one or two axes. IPTN engineers later extended the N250's structure to accommodate 70 seats without additional engine power, making it more attractive in the market (Angkasa, 1995).

At that time, Habibie was so confident that the N250 would be competitive in the world market (Berita Buana, 1994). Habibie and team sensed the need to expand its market to the North America. The company began its debut by opened a branch office in Seattle. It also planned to build a manufacturing plant in Mobile, Alabama (Republika Daily, 1995). Obviously, for a developing country such as Indonesia, the superiority of the N250's technical features became a source of pride for the whole country. Claimed to be entirely created by Indonesian engineers, the N250 marked what Habibie called the “stage of

technological independence” (Republika Daily, 1995), which proved that Dirgantara Indonesia had the capability to master sophisticated technologies and move forward in the development of new ones. The N250 was the symbol of technological nationalism that Habibie and his engineers at Dirgantara Indonesia had relentlessly advocated.

2.1. Technology Development

MIT Commission (MIT Press, 1989) conducted a research on industrial productivity in USA and states that --for continued success in world trade, new ideas generated in the United States and elsewhere must be converted into products and processes that world-wide customers want, when they want them, and before competitors can provide them-and those must be produced efficiently and well--. This statement is equally valid for developing countries such as USA, since they accept the free market concept and inspire to join the global economy. Therefore, to compete effectively in the open global market place, a company must learn to integrate technology management with strategic planning. In other words, all top managers have to link technology capabilities to marketing requirements (Sharif, 1994). Dirgantara Indonesia, as a state-owned enterprise is under a strong pressure to be more internationally competitive and to improve its productivity. Top managers of Dirgantara Indonesia are fully aware on the pressure of integrating their business and technology strategies. However a methodology for doing so is still lacking. In addition to the lack of methodology of integrating business and technology

strategies in developing country, there is also a lack of clear understanding of option and opportunities. For example (Sharif, 1994), in the foreseeable future, existing Indonesian industries will have to attempt the difficult task of survival in an open economy on the basis of upgrading their production facilities through imports. But they found out that, exporting raw-materials and primary goods to pay for imported machinery and process know-how, is a losing business, because the purchasing power of these commodities have steadily fallen while that of machinery has continuously risen over the last two decades. Furthermore, state-of-the-art machinery, which can give true competitive edge in the international market, is normally not sold but can only be exchanged for something equally valuable (Pavitt, 1990).

Sharif (1994) proposed his attempt to integrate technological considerations into overall business strategies of an enterprise for successful competition in the international market, under the current circumstances in developing countries. It is found useful to begin the desired integration process by considering presently practiced business strategies, which give, rise to comparative advantage in the market place. The business strategies can be categorized as striving for:

- Price leadership through producer cost minimization;
- Quality leadership through user value maximization;
- Niche leadership through segment feature specialization; and
- Image leadership through customer prestige creation

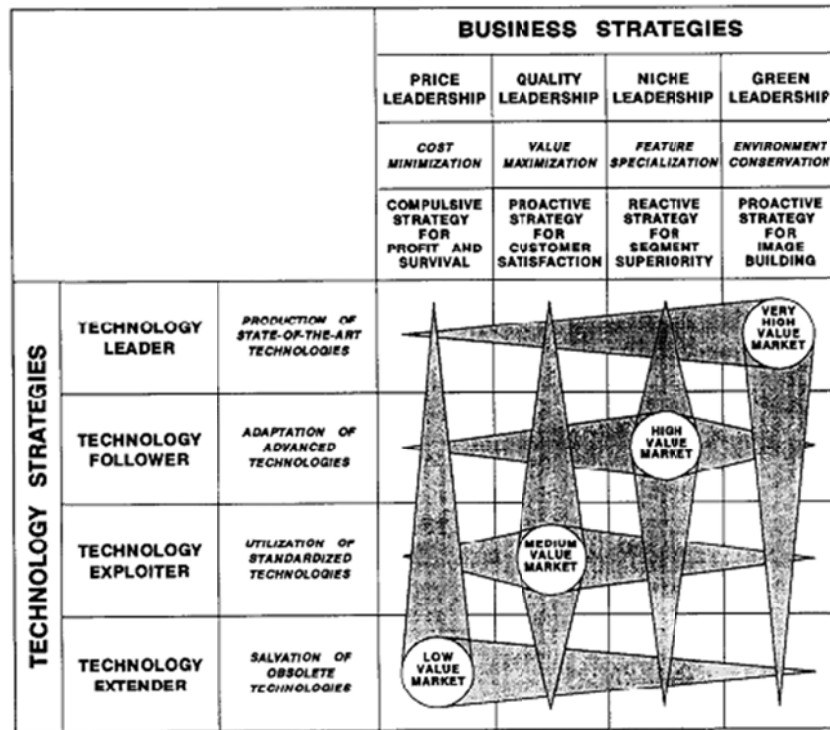


Figure1. Integrating Strategic Mixes to Market (Sharif, 1994).

The shaded area in Figure 1 indicates that although strategic emphasis may shift but earlier stages are not ignored. Different combinations of the business and technology strategies may be utilized for different segments of the market that give different values to the customers and profit to the enterprise. However, it may be noted that success and failures of technology strategy progression depends to a large extent on the intensity and nature of interactions among the elements of the system structure (Sharif, 1994).

In the context of Dirgantara Indonesia, the company currently focuses on follower strategy. If Dirgantara Indonesia could integrate its technology strategy with business strategy that specialize in niche market and come up with reactive strategy to create segment superiority in its niche market, it will result in high value market as described on the Figure1. Its possible that in another decades, the company could emerge

as the technology leader in small commuter segment of civilian airline.

2.2. The Company

Dirgantara Indonesia or Indonesian Aerospace (IAe) is one of the indigenous aerospace companies in Asia with core competence in aircraft design, development and manufacturing of civilian and military regional commuter aircraft. Since being established in 1976, the company has successfully exploited its ability as industry of manufacture and has diversified its product not only in the field of aircraft but also other area such as Information Technology, Automotive, Maritime, Simulation Technology, Industrial Turbine, and Engineering Services (Indonesian Aerospace, 2010). Until the year of 2009, Dirgantara Indonesia has delivered more than 300 units of aircraft & helicopters, defence system, aircraft components and other services.

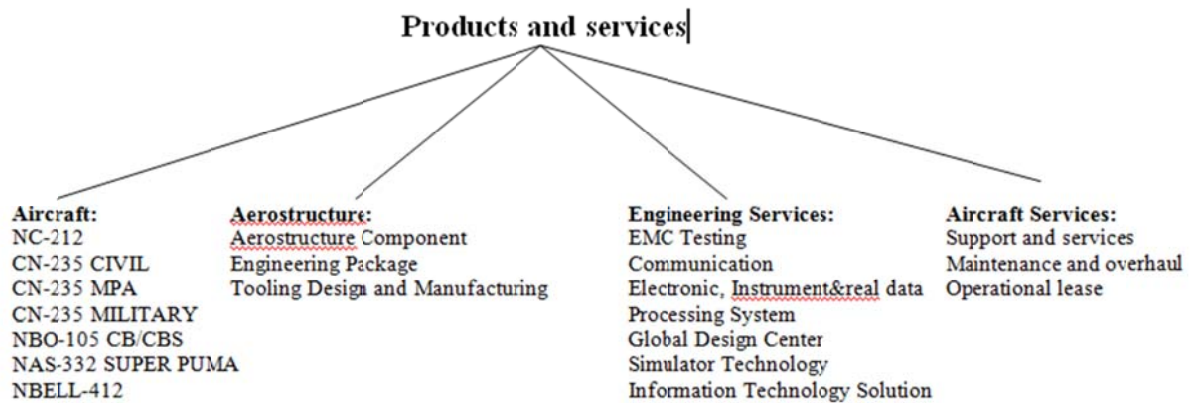


Figure 2. Products and Services of Dirgantara Indonesia (Indonesian Aerospace, 2010).

3. Strategic Business Unit (SBU) in Helicopter Products

Helicopter business unit at Dirgantara Indonesia is a special case. Since 1976, when Dirgantara Indonesia was established, this SBU has enjoyed monopolistic privilege in Indonesia due to the Inpres No.1 1980 (Presidential Instruction; 1980) that exclude competitor by prohibiting importing helicopter that similar in size with its products. Dirgantara Indonesia holds licenses to produce and market 3 types of helicopter: light-class helicopter BO-105 (Euro copter), medium-class helicopter Bell-412 (Bell Helicopter Textron) and heavy-class helicopter Super Puma-332 (Eurocopter) (Sriyanto, 2001).

When the economic crisis hit most of the Asian countries including Indonesia in 1998, the government was under strong pressure not only to invalidate the presidential instruction and to legislate anti monopoly regulation but also to invalidate tariff exemption for aircraft/helicopters' material and component that eventually increases the production cost of the helicopters. In addition to that, the SBU also faced the reality that their technology has reached its mature level. The productivity has decreased and it operates inefficiently. So the company

felt the necessity to have a suitable strategy that could guide them in this harsh environment.

3.1. Economic Crisis in 1998

As a result of the economic crisis in 1998, the government was forced to stop when the additional investment needed for further development of the Dirgantara Indonesia, especially in relation to the N250 aircraft development investment that is very expensive. It should also be recognized that in the earlier level of the development, the cost of development and operations of Dirgantara Indonesia was considered to be very wasteful in the form of purchase of expensive equipment. During Habibie's leadership, some economists said that the company implementing many inefficiencies policy and considered Dirgantara Indonesia as an expensive industry (high-cost aircraft industry), which is not sensitive to market demand. In fact in many cases, other countries that also have aviation industry working with the principles of efficiency and competitive cost structure as the aircraft industry in China, India, South Korea, Brazil, etc.

Dirgantara Indonesia continued to experience liquidity problems and working capital which affects the company's

operations during the year of 1998 until the end of 1999. The government at that time is working hard to find a solution to save Dirgantara Indonesia. One option is the closure as recommended by the IMF (Stackhouse, 1998). But some analyst during that time though that it would be huge financial losses for the country if the company would shut down not mentioned a heavy investment in the form of tens of thousands of employees who are well educated and have the expertise will be lost in vain. In addition, the vast archipelago such as the Republic of Indonesia clearly requires a good and solid aviation and maritime industries as long as it is competitive and in accordance with market demand.

4. The Rescue Program

With such considerations, the government formed a special task force under the authority of ministry of economic. They decided to keep Dirgantara Indonesia with paradigm shift from high-cost aircraft industry to be competitive-cost aircraft industry (competitive airline industry). Product development should not be made on the basis of State power or influence (power approach). Technology push strategy changed to market pull strategy. Production should be determined based on analysis of market demand and competitive ability not determined by the taste of management on certain kind of technology that they like the most.

Paradigm shift is needed in order Dirgantara Indonesia can survive and grow in the future. Some dramatic changing was taken place at that time (Ramli, 2003):

1. The team decided that the period 2000-2003 as a period of consolidation and survival for Dirgantara Indonesia. If this period safely passed, then after the year 2004

Dirgantara Indonesia will only be entering a period of further development. During this time, the team start to formulate a business reorientation, restructuring of human resources, financial restructuring and improving corporate performance.

2. In order to reorient the company's business during the period of consolidation, Dirgantara Indonesia was asked to be more focus on the production of spare parts and components for world corporate giants like Boeing, Airbus, British Aerospace, etc since at that time, Dirgantara Indonesia was already well known for its competitive parts and components production. Another production is limited only to the production of helicopters, CN-235 aircraft and weapons support equipment.
3. Structural changed of directors and commissioners with the criteria of integrity, leadership, technical skills, and must be well-known among the world aviation industry. The last criterion is necessary because during the redemption period, management must be able to get a job order from Boeing, Airbus, British Aerospace. In addition, the number of directors be reduced from 9 to 5 people, and appointed Chief of Staff of the Air Force as the Commissioner (Ex-officio).
4. The company also audited. Financial audit conducted by Ernst & Young, while the prospects for future audits conducted by Deloitte Touche. Deloitte Touche audit conclusion is that the Dirgantara Indonesia has capital in form of: infrastructure, machinery and products that can be

made of capital to build the future of Dirgantara Indonesia better.

5. Debt restructuring and reduction of financial burden. Based on the results of due diligence process of Ernst & Young and Deloitte Touche, and commitment to the New Board of Directors to restructure the company. The special task force also decided to lead a debt restructuring program, with a pattern of "debt to equity swap", To improve the traffic efficiency of raw materials and components, as well as to reduce production costs for aircraft and helicopters, the Minister of Finance gives the status of Bonded Zones to Dirgantara Indonesia.

4.1. Result of The Rescue Program

In May 2002, Ernst & Young's financial audit reports issued Dirgantara Indonesia for fiscal year 2001 to 2002, with unqualified status. Based on Ernst & Young audit, the proven performance of Dirgantara Indonesia showed encouraging results, among others (Ramli, 2003):

1. Sales increased from IDR. 508 billion in 1999 to IDR. 689 billion in 2000 and rose again to IDR. 1.4 trillion year in 2001.
2. The company was able to change its losses to a profit state. In 1999 the company suffered losses of IDR. 75 billion, while losses in 2000 decreased to IDR. 73 billion and in 2001 losses turned into profits of IDR. 11 billion.
3. Business diversification had generate new market segments such as engineering services business and aircraft engineering (Engineering & Technology Services) of 3%, making the software services space systems and information technology as much as 5% and business aircraft interior engineering 0.5%.
4. Decrease in production costs as shown by the increased efficiency of labor. The ratio of sales per labor force increased from IDR 66 million in 2000 to IDR 137 million in 2001.
5. Consumer confidence increased, marked by the success of the sales contract of 2 pieces CN235 aircraft for VVIP version used by the President of South Korea, 2 aircraft CN235 VIP version that will be used for Ministry of Defense and Air Force of Malaysia, and 2 CN-235 aircraft to Pakistan Air Force. In addition, Dirgantara Indonesia obtained long-term contracts for 10 years making wing components for the world's largest passenger super jumbo Airbus A380 from British Aerospace. In addition Turkish Air Force also has appointed a consortium consist of Dirgantara Indonesia and Thales of France to develop the type of aircraft CN235 maritime patrol. The Government of Iran gave credence to experts of Dirgantara Indonesia to work on the conversion project of Russian aircraft into cargo aircraft for military operations.

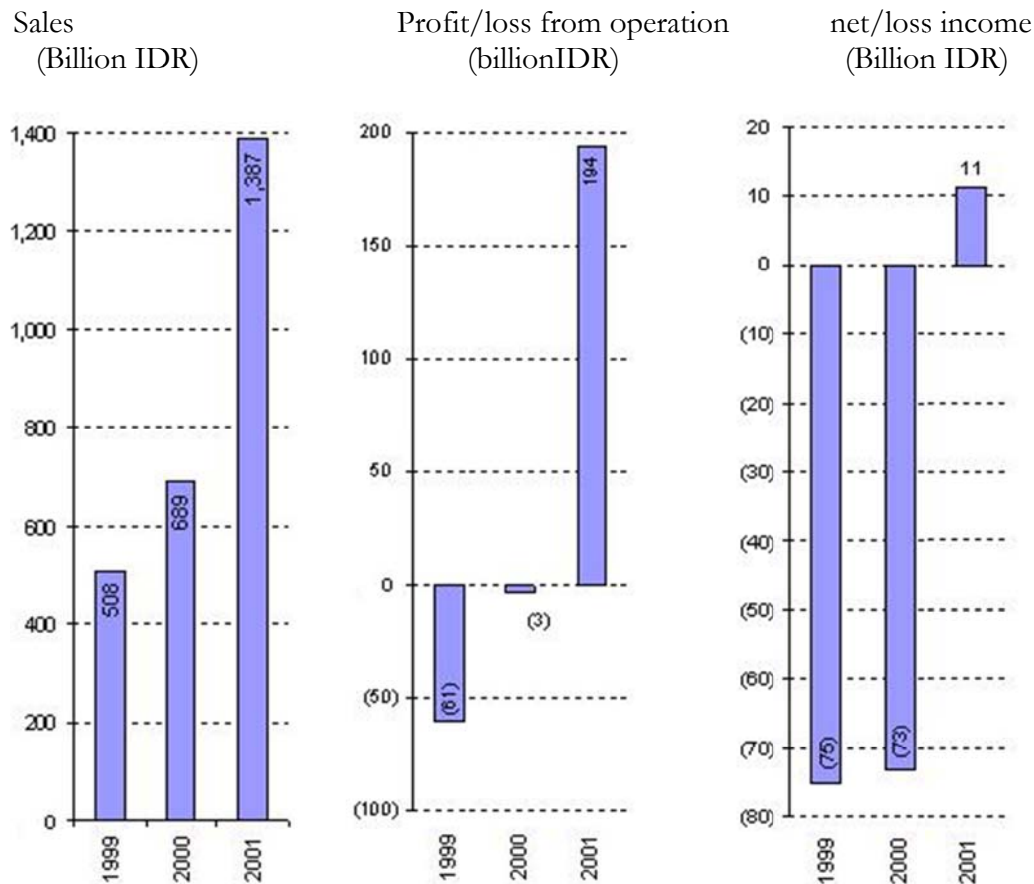


Figure 3. Performa of Dirgantara Indonesia in 1999 – 2001
(Ramli, 2003; Ernest&Young, 2001).

5. Discussion

In many countries, the aircraft industry is strongly regarded as a source of technology renewal and economic development. Over the last few decades, Indonesia, a developing country with a mainly relied heavily on agricultural economy, has been investing in the aircraft manufacturing industry in an enormous amount.

By 1995, the industry employed 16,000 skilled workers and hired hundreds of Indonesia's best scientists and engineers, especially those with doctoral degrees from prominent universities in Europe and North America. Over the course of the next two decades, the government invested more

than US\$ 2 billion in Dirgantara Indonesia, an enormous amount for a developing country with a GNP per capita under US\$ 1000 (Amir, 2007). Until the year 2000, Dirgantara Indonesia has been relatively successful in the area of technology transformation, aerospace technology and mastered in aircraft design, development, and produce small regional commuter aircraft-being. Dirgantara Indonesia has become one of the leading aircraft industries in the region in Asia with core competence in aircraft design, development and production of aircraft carriers, small to medium size for both civilian and military. Analysis shows that this industry has successfully moved from an exploiter strategy to the present level of follower

strategy, and hopes to move into the leader strategy.

However, technological capabilities that have been mastered through the learning process are not coupled with management capabilities, including the ability to anticipate the growing world market fast enough. Weaknesses in the managerial side were compounded by mid-1998 economic crisis and political instability that has shaken Indonesia's economic capabilities. Its status of the original company --fully government owned-- in 2000 turned into a full limited liability company in which PT Bahana Pengelola Industri Strategis (BPIS) as its shareholder.

These conditions lead to the shrinking of the company. Therefore Dirgantara Indonesia changed the paradigm of the organization of technology-oriented industries with the total support of the government towards a more industry-oriented business. Although from the economic point of view (cash flow economics) has not contributed much yet, but it is believed that this industry has become a national asset and has contributed in the mastery of technology (technology cash flow).

The next thing that the company did was business reorientation, HR & Organizational restructuring, financial restructuring and capital and corporate performance improvement programs: performance marketing, business restructuring, and operational efficiency.

Grouping its business to core and non-core and the establishment of business units were done as a part of business reorientation. Human resources re-arrangement program such as--implementing an early retirement program to employees, and the arrangement of

human resources based on competency--were conducted. However, external conditions were changing rapidly in the mid of 90's. The economic crises in Indonesia during 1997-2000 worsen the condition of Dirgantara Indonesia.

6. Conclusion

The pride of being able to create its own aircraft industry has its consequence. The establishment of Dirgantara Indonesia has been the largest and most ambitious investment by the Indonesian government to promote technology development in the country. Despite the heavy investments in engineering and production facilities and various technology achievements to its credit, the company has had limited commercial success.

The case of Dirgantara Indonesia indicates that technology strategy that did accompanied by the right business strategy can lead the company into serious problems. However, there is a hope that Dirgantara Indonesia will change to its optimal organizational transformation. The transformation in question is the ability to leave the past that are less good (the process of learning how to relearn and learning how to unlearn), and then find the future of Dirgantara Indonesia (the process of learning how to learn), especially in the context of the transformation of character of a leader and visionary that is pivotal for the company.

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