

## Singapore

### I. Current National Security Situation

Strategically, Singapore is an economic link between the industrial and developing countries of East Asia, Europe, and the Middle East. As a small nation-state of about 3 million people heavily dependent on trade,<sup>1</sup> Singapore's national security is not threatened as much from a single country, but from the disruption of commerce. Singapore's external trade is more than triple its GDP. The possibility of a war spilling over into Singapore's SLOCs and territory is a concern, as well as the paramilitary operations of transnational or sub national groupings.

Singapore views the Asian-Pacific region as a dynamic one with many uncertainties. The relationships between the United States, China, and Japan are key, and there are many unresolved disputes in Korea, the Spratly's, and South Asia. Russia and India also influence the security environment.<sup>2</sup> However Singapore's proximate security concerns stem from the potential for ethnic and cultural strife in neighboring countries, excessive nationalism, and dependence on Malaysia for water and gas.<sup>3</sup> There is also increased piracy and illegal immigration in the adjacent waters, turmoil in Malaysia, and the distinct possibility that internal conflict in Indonesia could eventually upset the ASEAN security balance.<sup>4</sup>

Singapore promotes its security concerns as active members of the Association of South-East Asian Nations (ASEAN) and the Five Power Defence Arrangement (FPDA). The FPDA nations (Australia, Malaysia, New Zealand, Singapore, and the UK) strive for high interoperability of forces, tested via frequent exercises. Additionally, the evolution of the ASEAN Regional Forum has contributed to regional security confidence.<sup>5</sup>

#### *Military requirements*

Should conflict arise, Singapore geographically has little strategic depth within which to defend. The lack of depth also decreases warning time. The result is a strategy based on air, naval, and amphibious forces that are technologically superior when compared with regional potential adversaries.<sup>6</sup> A doctrine of forward defense, preemptive strike ("preventive attack"), and strategic mobility is invoked to keep the battlefield away from the economic assets that are Singapore's lifeline.<sup>7</sup> She has the best air-strike capability in southeast Asia, and leads the region in tactical UAVs.<sup>8</sup> She also intends to create the most sophisticated C3I system in the region.<sup>9</sup>

Singapore's defense philosophy is to rely mostly on conscripts and reservists, creating a highly trained force with technically advanced weaponry. Technology is exploited to provide the necessary advanced training. There is a deterrent quality associated with having the best-trained and equipped force in southeast Asia, which is enhanced by Singapore's efforts to create friendly defense relationships in the region.

Singapore intends to develop its armed forces to “build on its strengths to become a first class armed force that is able to fulfill a variety of roles and missions.”<sup>10</sup> The three branches of the Singapore Armed Forces (SAF) also strive for a high degree of tri-service integration.

### *Total security*

In spite of the consistent priorities given to the development of improved defense capabilities, Singapore’s overall national security strategy is one of “Total Security.” This approach recognizes that there are several different aspects of national strength—political, diplomatic, economic, sociological, and psychological—that are the foundations for the security of a nation. Hence the importance of economic power, internal stability, national consensus, international regional responsibilities, and international relations, as well as military power.<sup>11</sup> Singapore policy explicitly links issues and actions in one area to those of another. This approach is one of the factors that has contributed to the success to date of Singapore’s armament strategy and defense industrial policy. She has created a balanced system of acquisitions, logistics, and local defense industrial capability within the context of a long-term plan designed to counter perceived threats.

### *Collaborative strategy*

Singapore also takes a collaborative approach to her security problems. She has worked to develop good regional-balancing relationships with China, the United States and Japan. To provide access to advanced training facilities, she has developed relationships with Taiwan, New Zealand, France, Sweden, Brunei, Indonesia, Britain, Bangladesh, Malaysia, Thailand, Brunei, and Myanmar. To provide access to technology, she has developed relationships with Sweden, the United States, Russia, France, Israel, Australia, and Germany.<sup>12</sup>

Singapore has a special economic and military relationship with the U.S. Although technically non-aligned, Singapore has always welcomed U.S. presence in the region and was the only country to offer facilities to the U.S. military when they left the Philippines.

### *Defense budget*

In 1997, Singapore’s military expenditures were \$5.7B (1997\$US), compared to \$2.8B (1997\$US) in 1991.<sup>13</sup> This placed Singapore 21<sup>st</sup> globally.

The strength of Singapore’s economy has permitted the defense budget to increase every year throughout the decade of the 1990’s. They increased their defense budget from 1997 to 1998 not only in real terms but also as a proportion of GDP.<sup>14</sup> In 1998, the US \$4.3B defense budget was the largest in ASEAN. Singapore also has the highest defense expenditure per capita in the entire Asian-Pacific region.<sup>15</sup>

## II. National Defense Industrial Base

After gaining independence from Great Britain in 1966, Singapore's established its own defense industry to minimize reliance on foreign countries for resupply during wartime. Prior to independence, Britain's military establishment on the island not only provide defense capabilities, but also contributed about 13 percent of Singapore's GDP.<sup>16</sup> In 1971, British forces withdrew, leaving the responsibility for the defense of Singapore to the local government.<sup>17</sup> By 1975, three government-owned corporations assembled, rebuilt, and overhauled small arms, artillery, armor, military aircraft, and ships. In 1979, the government started to promote the sale of indigenous-designed weapons abroad. The government also created special incentives to encourage foreign countries to come to Singapore to produce military equipment, using this as a base for further expansion into Asia. This would also promote employment in Singapore's high technology industries, with accompanying reduction in weapons production costs. The government also marketed Singapore's military equipment abroad via its own corporation, Unicorn International.

Singapore's defense industry was set up to provide a sustainable in-country capability for supplying the Singaporean Armed Forces (SAF) during combat. The result is a strong armaments industry that not only provides indigenous defense capability, but also is an engine of technological growth and is becoming an important internationally competitive revenue generator. Since its separation from Malaysia in 1965, Singapore has emphasized the development of a self-sustaining network of state-owned research and development institutions that can develop the technology required by the state-owned production companies. The management of armaments is via a triangular relationship that exists between the SAF, the Defence Technology Group (DTG), and the indigenous defense-industrial base.

### *The Defence Technology Group*

The DTG, the engineering and scientific arm of the Ministry of Defence, is one of the largest technological organizations in Singapore. This group focuses on the research, development, enhancement, and customization of high-technology weapons, C3 systems, sensors, land, and naval platforms. One of its subordinate directorates, the Defense Science Organization (DSO), focuses on the development and promotion of science and technology that enhances Singapore's defense and security. In 1997, the DSO became DSO National Laboratories, a not-for-profit corporation, with greater commercial flexibility and modern business processes. The DSO also will exploit its technologies in non-defense areas when it is consistent with the national interest.<sup>18</sup>

Recently the Ministry of Defence decided to reorganize the DTG to decrease the time it takes to field newly acquired weapons and newly developed technology. This will result in the creation of a new statutory Board, the Defense Science and Technology Agency (DSTA).<sup>19</sup> The intent is to be able to better anticipate, respond to, and exploit future technology trends and challenges in order to maintain the technological edge of the Singapore Armed Forces.<sup>20</sup> The DSTA's responsibilities will include the acquisition,

upgrading, and development of weapon systems, including the management of defense-related research and development activities.<sup>21</sup> Prior to forming the DSTA, Singapore spent five years studying the defense technology organizations of Sweden, the UK, and the US, with particular attention to Sweden, a country with manpower limits similar to Singapore's. The DSTA will be able to offer higher salaries than the Ministry of Defense in order to be able to compete with industry for talented personnel.<sup>22</sup>

### *Singapore Technologies*

Singapore Technologies (ST) Pte LTD is the holding company for most of Singapore's defense industry and many other government-linked corporations. Originally divided into five business areas, the Engineering area manages most of the armaments industry to include: Chartered Industries of Singapore, ST Aerospace, ST Shipbuilding and Engineering, Unicorn, Allied Ordnance, and ST Automotive. The other significant defense technology organization is the engineering and scientific arm of the Singapore Ministry of Defense: the Defense Technology Group. ST evolved as a result of four different stages in the development Singapore's local defense industry during the period 1967-1995.<sup>23</sup> ST is a "government-linked" company, under public sector control but at the same with shares offered to the public on the local stock exchange.<sup>24</sup>

In addition to supporting the SAF, Singapore Technologies has leveraged its core defense capability to venture into the commercial sector. This helps to make its support more cost-effective by operating from a larger base and also contributes directly to the industrialization and economic growth of the Singaporean economy.<sup>25</sup>

### *Singapore's Global Top 100 Defense Industries*

In 1991 Singapore had no companies in the global Top 100 as measured by annual defense revenue.<sup>26</sup> By 1999 one Singapore company (Singapore Technologies Ltd) had made the list.<sup>27</sup> Annual defense revenue Singapore Technologies Ltd was \$715(1999\$US), which placed the company in the 45<sup>th</sup> position globally.

## **III. National Armament Strategy**

Counter to many Asian-Pacific countries, Singapore, constrained by both population and resource base, has never sought complete defense-industrial sovereignty. Indigenous capabilities are focused on the ability to assure supply and maintenance of essential items during wartime, and the technical expertise to adapt foreign-purchased weaponry to Singapore's needs during peacetime.<sup>28</sup> Singapore also pursues technology to offset her declining birth rate and shortage of skilled manpower.<sup>29</sup> Singapore's armament strategy is thus a combination of indigenous production and outright purchase of weapons and systems and technologies.

### *Indigenous production*

Singapore's indigenous production encompasses tanks (AMX-13), aircraft (A-4 and F-5), armored vehicles (M113 APC), howitzers (FH88/2000), infantry fighting vehicles (Bionix) and naval patrol craft. Singapore has expressed interest in purchasing attack helicopters, communications equipment, missiles, advanced jet fighters, radar systems, ASW technology, air defense systems, anti-mine technology, C4I systems, simulation and gaming and other high-end information technologies.<sup>30</sup> At the same time, Singapore minimizes reliance on single sources of foreign armaments. To this end, she maintains a large complex of licensed assembly, production, and technology agreements with the US, UK France, Italy, Sweden, Thailand, and Taiwan.<sup>31</sup> Singapore has a history of switching sources when impediments associated with one country stand in the way. For example, in the mid-1980's, the US denied transfer of technologies necessary to upgrade C-130 aircraft to provide aerial refueling capabilities. Singapore signed agreements with Israeli Aircraft Industries, who successfully performed the conversion.<sup>32</sup>

Singapore deliberately concentrates its resources on a few niche technology areas that provide additional value to purchased weaponry. Retrofitting and upgrading capabilities have received a major emphasis, including the integration of new sub-systems in existing platforms to extend lifetimes and/or upgrade performance.<sup>33</sup> In some areas, Singapore's systems integration capability is also very well developed. For example, Singapore Shipbuilding and Engineering (a subsidiary of ST) has indigenously designed and produced a modern naval patrol ship equipped with state of the art anti-submarine, anti-air, and electronic warfare systems, and Harpoon missiles.<sup>34</sup>

### *Import strategy*

Importing foreign product and process technology has been a deliberate part of Singapore's national armament strategy. Government policy requires technology transfer and training to be provided as a part of all licensed production contracts. Although no formal defense offset policy exists today, Industrial Cooperation Programs serve the same function. Singapore hopes to develop indigenous capabilities via technology transfer that will ultimately allow at-home maintenance and upgrade capacities, leading ultimately to domestic design and production capabilities.<sup>35</sup>

Singapore's preference is to buy US defense-related products because of the technological advantages and superior logistical support provided. These include offset agreements such as the arrangement with the US to buy F-16 fighters, which included a co-production offset for aircraft sub-component manufacture and alternate aircraft equipment.<sup>36</sup> Singapore plans to eventually replace the F-16s with more advanced aircraft. Candidates include the Dassault Rafael, and, eventually, possibly the US Joint Strike Fighter.<sup>37</sup>

The Royal Singapore Navy has recently purchased four ex-SKJOORMEN Swedish submarine, including a training package. The RSN views this purchase as a first step in cost-effective graduated approach (purchasing a system and training from a established operator) that will eventually lead to improved indigenous armaments capabilities. The RSN believes that Singapore's highly educated personnel will be able to rapidly assimilate modern technology, and this efficiency will help counterbalance Singapore's small size. The Singapore Navy is also the process of replacing older ships that are nearing the end of their useful lifetimes. LSTs are receiving priority, to be followed by replacements for missile boats.<sup>38</sup> The RSN has aspirations to be a world class Navy, based on an organizational culture of continuous learning, innovation, and pursuit of excellence. The RSN benchmarks its capabilities against world class standards to facilitate its self-improvement process.<sup>39</sup>

Singapore recently signed a contract with the French company DCN International for six stealth frigates. The first will be produced in France, and the remaining five in Singapore by Singapore Technologies. The Singapore decision resulted from an international competitive procurement in which responders were to submit proven stealth designs. Besides DCN, competing companies were Litton (USA) and Kockums (Sweden). Product quality and technical excellence were decisive factors in the decision.<sup>40</sup>

Singapore also recently agreed to purchase a first installment of eight Apache Longbow attack helicopters for delivery in 2002. If this happens, she will be the first southeast Asian country to purchase attack helicopters.<sup>41</sup> This decision was the result of year-long discussions with several alternative sources of attack helicopters.<sup>42</sup> Recently Singapore requested purchase of the US Advanced Medium Range Air-to-Air Missile (AMRAAM) for its F-16 aircraft. The purchase request, an issue of US export control, is under deliberation in the United States.<sup>43</sup>

### *Cooperative Developments*

Singapore also is interested in participating in international collaborative armaments programs, for example the US Joint Strike Fighter program.<sup>44</sup> Singapore also has collaborated with Israel to produce Spike anti-tank guided missiles for use in the Singapore armed forces.<sup>45</sup> In 1999 Singapore and Indonesia agreed to jointly develop and use a Naval Gunfire Support Scoring System to support naval exercises. Singapore is currently cooperating with the French firm Direction des Constructions Navales International (DCN) to build five frigates for the Singapore navy, and is also involved in Turkish and Brazilian fighter upgrade programs.<sup>46</sup> Singapore has wide ranging defense cooperation agreements with France, Sweden, the UK, and the United States, and is currently seeking to execute a similar agreement with Germany.<sup>47</sup>

### *Overseas Training*

Singapore deliberately emphasizes the value of overseas training to speed the technology assimilation process, which also allows benchmarking their own abilities against of those of more capable militaries such as that of the United States.<sup>48</sup> Singapore continually refines

its training procedures, and increasingly depends on simulation for cost-effective and realistic training. Over the last few years Singapore has acquired new training facilities in France and South Africa, and is seeking other opportunities.<sup>49</sup> The lack of sufficient airspace also necessitates the use of foreign training facilities. Singapore has four long-term aerial training detachments in the United States (Chinook, aerial-refueling, F-16C/D), with additional long-term training detachments in Australia and France, and short term-training deployments to Australia, Indonesia, Malaysia, New Zealand, and Bangladesh.<sup>50</sup>

Foreign technology assimilation has been greatly facilitated by Singapore's investments in human capital, education, and training facilities, and a civilian economy focused on high-technology knowledge-intensive, and hence dual-use, industries. Singapore also heavily promotes local research and development. Government plans and programs toward these ends include a Strategic Economic plan focused on human resources, international investment, promotion of innovation, and the development of the most lucrative industrial clusters. A complementary Strategic Technology Plan supported the funding of education of much larger numbers of local scientists and engineers. Today the number defense scientists and engineers has been estimated to be about 1000 out of the total of 11,300 in the combined civilian-military base.<sup>51</sup>

#### *Arms import level*

In 1997, Singapore's arms import level was \$400 (1997\$US), compared with \$521 (1997\$US) in 1991.<sup>52</sup> This placed Singapore 28<sup>th</sup> globally.

Singapore's recent ability to purchase arms on the international market was reduced by the Asian financial crisis of 1997-1998. Singapore's currency dropped 13% against the US dollar in the year following June 1997, depreciating their purchasing power for defense procurements.<sup>53</sup>

## **VI. Perspectives on the International Arms Export Market**

Singapore continues to search for defense products that can be sold on the international market. In 1995 Singapore Technologies Automotive (ST-Auto) achieved its first export success with the sale of an upgrade kit for the AMX-13 Light Tank. The new BIONIX Armored Infantry Fighting Vehicle for the SAF, the first modern AFV to be designed and manufactured indigenously in South East Asia, is also being offered for sale on the international market to customers in Europe and South America. ST-Auto also is looking for new partners and joint ventures, striving to become a world-class player in the international defense market.<sup>54</sup>

Charted Industries, one of Singapore Technologies subordinates, also has been successful in the international arms market for small arms, including the Ultimax 100 light machine gun, and the SR88A assault rifle, and a 40 mm grenade launcher.<sup>55</sup>

Singapore's defense industrial base also has an international reputation for its retrofitting and upgrading capabilities. For example, ST recently received a contract, in collaboration

with an Israeli firm, to upgrade Turkey's F-5E fighters.<sup>56</sup> Because of its indigenous capabilities, Singapore is also heavily courted by other regional nations (e.g. Malaysia and Indonesia) to help them develop their own defense industrial capabilities.<sup>57</sup> Recently Singapore Technologies has been pursued by Daimler Chrysler Aerospace, Germany, to be a technology provider for the development of the Mako advanced trainer/light fighter program.<sup>58</sup> ST has also been forming joint ventures to help enter overseas markets. For example, it has a memorandum in place with Vickers Defence Systems Ltd in the UK to develop and market the Bionics infantry fighting vehicle in the European market<sup>59</sup>.

ST also recently announced a new articulated armored All-Terrain Tracked Carrier (ATTC), mainly for the export market. A new passive protection package for the ATTC was developed by IBD of Germany. The ATTC also has design growth potential, as well as potential commercial applications.<sup>60</sup>

#### *Arms export level*

In 1997, Singapore exported \$90M (1997\$US), compared with \$57M (1997\$US) in 1991.<sup>61</sup> This placed Singapore 20<sup>th</sup> globally.

## **VI. Transformations in the Defense Industrial Base**

Singapore's defense industrial base has undergone a series of major transformations since its establishment in 1967. During the period 1967-1971, five separate government-owned companies, each focused on different warfare areas, were created. In 1974 these were placed under a defense holding conglomerate, that in 1989 was renamed Singapore Technologies to reflect the deliberate expansion of business into non-defense work.<sup>62</sup>

Originally formed as five separate subsidiaries, ST was reorganized in the 1990's into fourteen strategic business areas. This reorganization was designed to leverage core competencies into both defense and non-defense markets. Shared infrastructure for production, retrofitting, and maintenance has facilitated both spin-on and spin-off in the aerospace and ship-building areas. Acquisition of commercial technologies into the defense sector via spin-on was a major reason that ST shares are offered for sale publicly. This also facilitates strategic partnerships and joint ventures with other public foreign commercial companies. ST has become a broad based technology company with special strengths in information technology and semiconductors.<sup>63</sup> ST Aerospace has joint ventures with Singapore International Airlines, Eurocopter, Pratt and Whitney, and Chinese aerospace companies, and more than half of ST Aerospace's revenue is from the commercial sector.<sup>64</sup>

Singapore Technologies, as many other large defense companies, was created to recognize the limits to growth imposed by domestic markets and foreign competition. One of the solutions to this problem is to diversify into civil production. ST Group has converted from entirely military production commitments to receiving. By 1994, 62 percent of its business form civil activities like telecommunications, electronics, computers, civil aerospace, commercial logistics and precision engineering.<sup>65</sup> By 1996 this fraction had increased to 80

per cent. ST is a strong international commercial corporation, employing over 21,000 people and with total annual revenue of \$4B. Defense diversification has become an important part of Singapore's defense industrial model.<sup>66</sup>

At the same time, the Singapore defense market is not growing fast enough to satisfy the growth requirements for ST, who is now turning to strategic aerospace or shipbuilding acquisitions in the United States and Europe as a way to meet the company's 20-25 percent annual earnings per share growth targeted by the company. Singapore's national security requirements would preclude selling ST outright to a foreign partner, but equity exchanges are possible.<sup>67</sup>

## **VI. Risks and Concerns**

- Singapore is concerned that internal instabilities in the region will develop into armed conflict that threaten Singapore's economic assets before Singapore has time to develop and train an armed force capable of defeating that conflict.
- Singapore is concerned that her declining birth rate, and shortage of trained personnel, will result in insufficient manpower for her armed forces. To compensate, she has invested heavily in the education of human capital, and has developed a military strategy predicated on technological superiority and efficiency.
- Singapore is concerned about the ability of her defense establishment to be able to compete with commercial industry for scientific and technical talent. She has created special incentives to make it attractive for top quality managers to work in the armaments process.

## **VII. Important Observations**

- Counter to many Asian-Pacific countries, Singapore, constrained by both population and resource base, has never sought complete defense-industrial sovereignty. Indigenous capabilities are focused on the ability to assure supply of essential items and technical expertise during wartime.
- Singapore believes that her highly educated personnel, coupled with advanced technology training systems, will allow her to rapidly assimilate advanced technology weaponry, whether imported from abroad or developed indigenously.
- Singapore has heavily invested in niche indigenous capabilities to retrofit and upgrade weapons platforms with advanced systems. This has also resulted in modern systems integration capabilities for some classes of air and naval platforms.
- Singapore's ability to assimilate foreign technologies into armament systems has been significantly facilitated by her investments in human capital, and by her commercial industrial base focused on knowledge-intensive, dual-use, high-technology products and processes.

- After diversification and public stock offerings, Singapore Technologies cannot meet the growth objectives via concentration on the Singapore defense market, which is growing at 5 percent annually. ST is turning to acquisitions and market expansion in the United States and Europe as a new growth strategy.
- Singapore Technologies is a “government linked” company, with shares traded publicly, but with the government in firm control.

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#### ENDNOTES

<sup>1</sup> Singapore is the busiest port in the world and the top bunkering port. It is the third largest oil refining center in the world and also a leading financial and business center.

<sup>2</sup> Dr. Tony Tan Keng Yam, Singapore Deputy Prime Minister and Minister for Defence, Interview, *Asian-Defence Journal*, 1&2/2000, p. 25.

<sup>3</sup> M. Farrer, “The Poison Shrimp Matures,” *Asia-Pacific Defence Reporter*, December 1999, p. 16.

<sup>4</sup> R. Matthews, “Singapore Buys Longbows and Grows Its Defence Industry,” *Asia-Pacific Defence Reporter*, December 1999, p. 20.

<sup>5</sup> Rear Admiral Richard Lim, Chief of Navy, Republic of Singapore, interview, *Naval Forces*, February 1999, p. 18.

<sup>6</sup> Farrer, op. cit., p. 16.

<sup>7</sup> Prasun K. Sengupta, “RSAF - Guardians of Singapore’s Skies,” *Asian Defence Journal*, 1&2/2000, p. 14.

<sup>8</sup> Farrer, op. cit., p. 16.

<sup>9</sup> *Ibid.*, p. 17.

<sup>10</sup> Defence Addenda to President S. R. Nathan’s Address to Parliament, cited in “Strong SAF the Best Deterrent,” *Times of India*, October 10, 1999.

<sup>11</sup> R. Matthews’s, “Singapore’s Defence-Industrial Model,” *Asia-Pacific Defence Reporter*, April/May 1999, p. 22.

<sup>12</sup> Farrer, op. cit., p. 16.

<sup>13</sup> *Worldwide Military Expenditures and Arms Transfers 1998*, State Department Bureau of Arms Control, Washington DC, January 2000.

<sup>14</sup> “Defense Implications of East Asia’s Crisis,” *IISS Strategic Comments*, London, July 1998.

<sup>15</sup> Matthews, op. cit., p. 20.

<sup>16</sup> Matthews, April/May 1999, op. cit., p. 22.

<sup>17</sup> Sengupta, op. cit., p. 14.

<sup>18</sup> *Asian Defence Journal Yearbook 1998-1999*, pp. 175-176.

<sup>19</sup> Dr. Tony Tam, Deputy Prime Minister and Defense Minister, cited in “Mindef To Revamp Its Technology Arm,” *The Straits Times*, July 1, 1999.

<sup>20</sup> Dr. Tony Tam, Deputy Prime Minister and Defense Minister, cited in “Singapore Defense Ministry Reforms Technology Arm,” *Xinhua*, October 9, 1999.

<sup>21</sup> Robert Karnoil, “Singapore Launches DSTA,” *Jane’s Defence Weekly*, April 5, 2000, p. 13.

<sup>22</sup> Philip Finnegan, “Singapore Agency to Direct Development of Technology,” *Defense News*, May 1, 2000.

<sup>23</sup> Matthews, April/May, 1999, op. cit., p. 23.

<sup>24</sup> Matthews, December 1999, op. cit., p. 20.

<sup>25</sup> “The Defence Industry of Singapore,” *Military Technology*, July 1998.

<sup>26</sup> Unattributed, “Worldwide Defense Companies Ranked by Estimated Defense Sales for 1991,” *International Defense Review*, Defense’93, pp. 33-55.

<sup>27</sup> Unattributed, “Defense News Top 100,” *Defense News*, August 7, 2000, p. 14.

<sup>28</sup> Matthews, December 1999, op. cit., p. 21.

<sup>29</sup> Sengupta, op. cit., p. 14.

<sup>30</sup> “Pacific Rim Diversification and Defense Marketing Guide,” Office of Strategic Industries and Economic Security, U.S. Department of Commerce, 1997.

<sup>31</sup> Matthews, December 1999, op. cit., p. 21.

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- <sup>32</sup> Sengupta, op. cit., p. 20.
- <sup>33</sup> Matthews, December 1999, op. cit., p. 21.
- <sup>34</sup> Ibid., p. 21.
- <sup>35</sup> Matthews, April/May 1999, op. cit., p. 23.
- <sup>36</sup> R. Bitzinger, "The Next Proliferation Challenge," *International Security*, Vol. 19, No. 2, Fall, 1994. pp. 170-198.
- <sup>37</sup> Farrer, op. cit., p. 17.
- <sup>38</sup> Lim, op. cit., p. 20.
- <sup>39</sup> Ibid., p. 24.
- <sup>40</sup> "Singapore Orders Lafayette Frigates," *Asia-Pacific Defence Reporter*, April/May 2000, p. 39.
- <sup>41</sup> Matthews, December 1999, op. cit., p. 21.
- <sup>42</sup> Sengupta, op. cit., p.22.
- <sup>43</sup> Philip Finnegan and Theresa Hitchens, "U.S., Singapore Seek Compromise on AMRAAM Sale," *Defense News*, March 26, 2000, p. 25-26.
- <sup>44</sup> Matthews, April/May 1999, op. cit., p. 24.
- <sup>45</sup> "Singapore's Israeli Missiles Upset Kuala Lumpur," *The Straits Times*, July 19, 1999.
- <sup>46</sup> Philip Finnegan, "Leading Singapore Firm Aims for US Expansion," *Defense News*, March 20, 2000, p. 24.
- <sup>47</sup> Phillip Finnegan and Theresa Hitchens, "German-Singapore Accord Could Boost Mako," *Defense News*, March 6, 2000, p. 4.
- <sup>48</sup> Tam, October 1999, op. cit.
- <sup>49</sup> Defence Addenda to President S.R. Nathan..., op. cit.
- <sup>50</sup> Sengupta, op. cit., p.22.
- <sup>51</sup> Matthews, April/May 1999, op. cit., p. 23.
- <sup>52</sup> *Worldwide Military Expenditures and Arms Transfers 1998*, op. cit.
- <sup>53</sup> "Defense Implications of East Asia's Crisis," *IISS Strategic Comments*, London, July 1998.
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- <sup>55</sup> "Army Offers a Look at New Rifle," *The Straits Times*, August 10, 1999.
- <sup>56</sup> Matthews, December 1999, op. cit., p. 21.
- <sup>57</sup> Ibid.
- <sup>58</sup> Finnegan and Hitchens, March 6, 2000, op. cit., p. 4.
- <sup>59</sup> Finnegan, March 2000, op. cit., p. 24.
- <sup>60</sup> Christopher Foss, "Singapore Launches New Tracked Vehicle," *Jane's Defense Weekly*, April 5, 2000.
- <sup>61</sup> *Worldwide Military Expenditures and Arms Transfers 1998*, op. cit.
- <sup>62</sup> Matthews, April/May 1999, op. cit., p. 23.
- <sup>63</sup> Matthews, December 1999, op. cit., p. 21.
- <sup>64</sup> Ibid.
- <sup>65</sup> Susan Willett, "East Asia's Changing Defense Industry," *Survival*, Vol. 39, No. 3, Autumn 1997, pp. 107-134.
- <sup>66</sup> Matthews, April/May 1999, op. cit., p. 23.
- <sup>67</sup> Finnegan, March 2000, op. cit., p. 24.