

Japanese conglomerates, which allows for cross-fertilization in nondefense areas as well as defense areas.

Facility Level

At the facility level, Japanese integration is often far beyond that exhibited within the United States. Japanese firms are encouraged to use a facility for both defense and commercial production. In the case of aircraft parts, for example, Fuji Heavy Industries manufactures F-15 landing gear, P-3 main wing spars, Boeing 767 main wing cowlings, and the whole UH-1B helicopter in the same facility.⁹⁷

In some cases, integration is the result of limited defense demand. At MHI's tank-production facility, for example, the Type 90 tank's production equipment is shared with the manufacture of forklift trucks and heavy-construction equipment. The same test and measuring equipment and tools, including jigs, are used on the commercial and military sides.⁹⁸ This approach is to be expected, however, in light of the limited orders for the Type 90. Such integration allows MHI to leverage its investments in heavy equipment. The result is a much more integrated production line.

Some Japanese high-technology military items are also purportedly obtained from dual-use production lines. This is, to a certain extent, facilitated by the absence of military specifications that impose different manufacturing processes. Thus, the active phased-array radar developed by Mitsubishi Electric (MELCO) for JASDF is "made entirely of commercial components."⁹⁹ In the absence of military specifications, there was never a separation of the commercial and military production processes. The radar components were, there-

fore, of commercial origin. Similarly, MHI's Nagoya facility contains a giant autoclave designed to cure composite materials that works on both military and commercial projects. Mitsubishi's MU-300 aircraft apparently uses many of the same component-fabrication methods and lines as does the company's F-15Js. Only the final assembly lines are separated.¹⁰⁰

In this regard, the Japanese fully recognize that integration is a bottom-up, rather than a top-down, process. Dual-use technology, as the chief engineer for MELCO noted, occurs primarily at the component level, rather than at the system level. It is more likely that opportunities for dual-use technology will "share much commonality at the component level but that at the system level, the interflow between the civilian and defense sectors is not easy."¹⁰¹ This will, of course, vary by technology. As one Japanese observer noted, "In the field of electronics technology, the wall of military and civilian conversion is comparatively low, and the development of various civilian operations is also possible."¹⁰² Nonetheless, the Japanese emphasize cross-fertilization at the component level first and foremost. Japanese designers, regardless of the nature of their projects, are interested in applying technology to the issue at hand, without paying undue attention to whether the technology is "commercial" or "military." This, in turn, facilitates facility-level integration.

COMPARISON OF THE PRC AND JAPAN WITH THE UNITED STATES

Having examined the Chinese and Japanese cases, what lessons, if any, can the United States draw from them for the integration of its own DTIB and CTIB? Both the Chinese and Japanese cases clear-

⁹⁷R. Samuels, op. cit., footnote 59, p. 295.

⁹⁸Ibid., p. 296.

⁹⁹Ibid., p. 195.

¹⁰⁰Drifte, p. 62.

¹⁰¹T. Tamama, *Defense Research Center* (III, 2, August 1, 1993), in JPRS-JST-93-083L, Oct. 29, 1993, p. 34.

¹⁰²*Nikkei Sangyo Shimbun* (August 14, 1993), p. 1, in JPRS-JST-93-071L, Sept. 21, 1993, p. 35.

ly differ greatly from the American one; in particular, both Asian states have a history of very intimate relations between their commercial and governmental sectors, to a degree that is not generally present in the American economy. In the PRC, this is due, at least in part, to the state ownership of the means of heavy-industrial production, whereas in Japan, this is primarily a matter of policy and history, rather than ideology.

Both states' assessment of their security situations differ from that of the United States. Both Beijing and Tokyo believe that they currently face a relatively benign security situation, especially in the wake of the collapse of the Soviet Union. At the same time, there has been less pressure on either state to emphasize the development of militarily unique capabilities over either dual-use capabilities or the application of commercial technologies and processes to military products. Indeed, development of indigenous defense industries in both Asian states is much more the result of conscious, planned choices on the part of central authorities to develop a DTIB for explicit defense and commercial purposes, rather than the evolution of DTIBs in response to external security developments.

Both states also have a very different perspective on the public good from that of the United States. There are few signs that socioeconomic goals, as understood in the American context (e.g., assisting small or minority-owned businesses), exert influence on the structure of the Chinese or Japanese acquisition processes. In the PRC, the focus is primarily on raising the level of technological sophistication within the overall Chinese economy. In Japan, a higher priority is placed on furthering technological goals than on ensuring equal access for corporations to JDA's budgets.

This combination of considerations has produced in both China and Japan relations between their respective DTIBs and CTIBs that are very different from the American situation. That, in turn, has affected the development of integration policies. In China, for example, the emphasis, until the advent of Deng Xiaoping, was so heavily weighted toward development of their DTIB that

the Chinese CTIB was neglected. Indeed, the Chinese DTIB and CTIB were almost completely segregated until the Four Modernizations shifted human and material resources from defense to commercial and civilian economic development.

As a result, however, Chinese efforts at integration are distinct from those occurring in the Japanese or American economies. In particular, the PRC's efforts are taking place in the context of state-run industrial sectors that are moving into an impoverished commercial sector. The Chinese defense industrial sectors thus have a "captive audience" of consumers, as well as financial and political support from the state, to facilitate the process of integration. Both of these considerations limit the applicability of Chinese experiences to the American case, although some lessons might be drawn for public sector facilities.

Although the Japanese case is more akin to the American situation, there are also significant differences between the Japanese and American DTIBs and, therefore, between their respective integration policies. The Japanese DTIB developed in the shadow of the American security commitment and thus was never expected to be the sole source of military equipment and resources. Indeed, throughout the postwar period, the Japanese have relied upon the United States not only for military support but also for provision of many weapons and component designs.

As with the Chinese DTIB, therefore, the Japanese DTIB is the product of explicit government efforts to create a domestic defense industrial and technological capability. In the Japanese case, however, the primary emphasis was on developing high-technology industrial capabilities in certain sectors, rather than on the supply of weapons per se to the Japanese SDF. Thus, while the Japanese have a very robust DTIB and domestic arms industry, it is uneven; in some areas, the Japanese have pursued *kokusanka*, while in others they have been satisfied with licensed production of foreign (primarily American) designs.

This selective approach, wherein the Japanese chose to focus on only certain defense technologies and capabilities, has facilitated the Japanese effort at integrating their DTIB and CTIB. By

picking and choosing which products and processes to pursue, the Japanese could, from the outset, design for dual-use. This process was further encouraged by the Japanese decisions to limit the size of their armed forces and to prohibit arms sales. These factors constrained the development of any economies of scale for the Japanese arms industry and gave further incentive to development of dual-use, rather than militarily unique, technologies and processes. MITI and JDA could, and did, agree to seek weapons that would utilize commercial technologies, as well as promote commercial processes that would have defense benefits (i.e., both spin-on and spin-off technologies). Japanese corporations, recognizing the lucrative potential of high technology and the limits of the restricted Japanese defense market, in turn, learned to pursue *de facto* integration, particularly at the firm and facility level. They extended this not only to components and subcomponents, but also to personnel training and quality control.

In the course of developing its DTIB, the United States responded to very different pressures and policies. The result was the creation or development of practices that have tended to promote segregation and the development of weapons that are more specialized and, in most cases, more advanced than those fielded by either the PLA or the SDF. These practices include acquisition laws, militarily unique technologies, and military specifications and standards.

■ Acquisition Laws and Regulations

Acquisition laws, regulations, and culture are a major contributing factor in the segregation of the American DTIB from the CTIB. In both Japan and the PRC, integration appears to have been facilitated by the absence of a discrete acquisition culture of the extent developed in the United States. The absence of a more bureaucratized acquisition structure allows for greater common use of facilities and personnel, that is, sector-level integration.

In both the PRC and Japan, the history of corporate-government relations has been less adversarial than it has been in the United States. In both Asian states, there is a willingness to accept great

er commingling of defense and commercial business, at sector, firm, and facility levels. The consequent blurring of the lines between private and public use of facilities and resources is accepted as an acceptable price, if not a subsidy, for technological innovation and economic development.

■ Military Specifications

If the Chinese and Japanese are somewhat less concerned with tracking every renminbi and yen, they are apparently also somewhat less concerned with specialized specifications and standards. Indeed, the evidence is unclear as to whether either state has imposed a set of military specifications and standards—dictating not only operational parameters but also methods of manufacture—as extensive as those of the United States.

In Japan, the objective appears to be to meld the commercial and military segments of a whole market for a given technology or item. Thus, Japanese quality control is structured to fulfill very high standards, standards sufficiently stringent to satisfy military as well as commercial requirements. In some cases, there may be additional checks and inspections for certain items intended for military end-users. These additional quality-control measures are more easily accommodated in the context of integration, however, than in an entirely separate system of military specifications and standards.

The same approach applies to Japanese personnel policies. Japanese designers are familiarized with the entire spectrum of applications within their specialty, ensuring that those processes that are successful in the defense realm will be applied to the commercial side and vice versa. A single baseline of standards is applied to many technologies, products, and processes, further facilitating cross-fertilization and integration.

■ Militarily Unique Technologies

Militarily unique technologies exist in the arsenals of both Japan and the PRC. Neither the PLA nor the SDF, however, has the same requirements for, or the ability to provide, the unique military capabilities that the American Armed Forces do.