

RAND

Issue Paper

Exploring Topics of Interest to the Policy Community

MARCH 1993

Is Consolidation Being Overemphasized for Military Logistics?

Marygail K. Brauner and Jean R. Gebman

While the Department of Defense (DoD) continues to consolidate the businesses of logistics and related support activities, many successful companies in the private sector are making revolutionary changes in the way they conduct their businesses. Because many of the new practices being implemented by these companies are such a drastic departure from the old practices of both the private and military sectors, and because many activities within military logistics have counterparts in the private sector, it may be appropriate for the DoD to take a close look at these innovative approaches to see whether its current emphasis on consolidation should be continued.

The DoD has been consolidating logistics and related support functions for many years in an effort to reduce costs. Recently, the pace of this effort has increased as the collapse of the Soviet Union and the growing U.S. budget deficit have led to an accelerated drawing down of defense forces and their needs for logistics. Even before the drawdown, however, logistics needs had been declining in many areas because of improvements in systems reliability. The cumulative effect has been a growing excess capacity and a declining tolerance for across-service duplication of logistics functions, creating a powerful argument for consolidation as a good way to reduce costs.

In the private sector, however, the emphasis in successful companies has not been on consolidation. Many private-sector companies are providing good customer

responsiveness at acceptable costs by adopting practices tailored specifically to their individual situations. Rather than staying with a static set of business practices and conforming to generally held beliefs (such as that large operations are essential for achieving economies and that redundancy is intrinsically uneconomic), these companies are implementing the mix of practices that best serves their purposes. Consolidation is sometimes among the practices included, but often it is not.

This paper takes a look at the issue of whether the DoD may be overemphasizing consolidation and, as a result, missing the opportunity to take advantage of the benefits associated with making a fundamental change in how the business of logistics is conducted. We first describe the forms of consolidation relevant to the discussion. We then examine some recent DoD experience with consolidation, after which we explore the private sector's experience with new business practices and their potential relevance to military logistics.

Forms of DoD Consolidation

In military logistics, consolidation has taken such forms as consolidation of activities, material, management, and control.

Activity Consolidation. The economic gains associated with activity consolidation were first seen during the Industrial Revolution as production moved from in-

dividual craftsmen to a factory system capable of manufacturing large quantities of goods in one place. The move to consolidate was spurred by the observation that the average cost of a unit of output decreases as output increases. In other words, one large factory with the same output as two smaller factories will have lower average costs—or greater “economies of scale”—and therefore will be more profitable.

The enormous success of mass production, as pioneered by Henry Ford, demonstrated that large-scale production can be achieved economically if activities are consolidated. Ford understood that some costs are relatively insensitive to the level of output: a manufacturer will have certain fixed overhead expenses whether producing one hundred or one thousand items. With the introduction of moving assembly lines and greater specialization of labor, the total labor hours to assemble the major components of the Ford Model T were cut from 750 to 93 minutes. Other examples of how consolidation can decrease total average cost per unit of output abound—in steel manufacturing, textile production, farming, and petroleum refining, to name but a few.

When operations are consolidated, equipment can be used more hours per day, thereby reducing excess capacity. And when large scales of operation are used, labor can be specialized. Thus, for example, one person can become expert at installing electrical cable and another at loading memory into the computer, each doing his/her job more efficiently because each needs to be expert in only one task. For most military equipment, there are differences between production and repair activities. Nonetheless, concepts such as combining similar activities and specializing the work force still pertain.

Material Consolidation. Another form of consolidation in military logistics is the pooling of material. Such pooling is seen as a way to minimize costs by dealing with material in large batches, whether it be for purposes of procurement, handling, or storage.

Management Consolidation. This form of consolidation is based on the premise that a single management organization can accomplish the same functions as multiple organizations at less cost. The accuracy of the premise depends on the situation, as our subsequent example illustrates.

Control Consolidation. As used in the DoD, this last form of consolidation is an attempt to minimize costs by centralizing key decisionmaking about the application of resources and the operation of processes. Consolidation of control seems to underlie many of the consolidation initiatives recently set forth by the DoD. For decades, the services individually controlled most of the logistics that their forces needed to execute assigned roles and missions. However, because the services have been slow to reform their logistics processes, and

because the logistics processes are major consumers of the defense budget, a growing constituency believes the DoD should assume control.

DoD Experience with Consolidation

We next give several examples of the kinds of outcomes produced by DoD’s use of the four forms of consolidation just defined. These examples illustrate some of the facets of consolidation that affect cost savings.

Activity Consolidation. The Air Force’s moving of airbase-level maintenance for F-16 avionics to the depot is an example of activity consolidation. An Air Force test (Coronet Deuce) of this consolidation of three levels of maintenance into two has shown that this organizational change promises to dramatically lower avionics repair costs. By moving test stands from the individual bases to the depot, the Air Force has been able to provide far greater availability and utilization of the test stands; the number of stands needed to produce the work has been reduced by more than two-thirds. In other words, consolidation has radically reduced expensive duplication.

One factor that contributed to the success of this consolidation effort was the decision to address a problem that can accompany consolidation of activities and can undermine its potential gains: increased costs for additional spares needed to compensate for lengthened transportation times.¹ To avoid having to buy more spares, the Air Force reduced the depot pipeline (the time for movement between the aircraft and test stands, plus the time for repair) by an order of magnitude, from seventy to seven days. It did so by establishing process action teams—an innovative business practice from the private sector—whose goal was to shorten each of the half-dozen major segments of the pipeline.

Material Consolidation. The consolidation of supply depots in the San Francisco Bay area is an example of consolidating material to reduce costs.² In connection

¹Another problem often seen with this form of consolidation is increased transportation costs. These did not play a part in this consolidation effort, however, because avionics parts are relatively small and easy to transport.

²Industry measures warehouse efficiency in slightly different terms than those discussed in this paragraph. It tries to minimize overall inventory and measure its movement through the warehouse. Also measured are the associated material-handling equipment and administrative procedures that facilitate the “flow” through the warehouse. DoD’s directive for the consolidation of the supply depots in a single service or agency cited significantly better utilization of the existing capacity as the basis for increased efficiency, as well as a reduction in overhead costs. Thus, those are the only motivations for consolidation discussed here.

with this consolidation effort, the General Accounting Office (GAO) stated that "DLA [Defense Logistics Agency] anticipates significant savings by consolidating stock at primary sites."³ Official documents show, however, that the San Francisco area supply depots were already close to capacity (70 to 98 percent occupied), allowing little room for savings from more efficient use of excess capacity or closure of installations.⁴ In addition, whereas management studies have shown that warehouses function most efficiently when near 85 percent capacity, another GAO report noted that "in a September 1989 report on supply facilities, DoD pointed out that overcrowded warehouses affect how efficiently a depot can be run. This report says DoD's warehouses are about 91 percent full."⁵ Material consolidation has not produced the expected results, including the savings in personnel and overhead costs that were originally projected.⁶

Management Consolidation. The formation of the San Antonio Real Property Maintenance Agency (SARPMA) is an example of the consolidation of management activities. Formed in 1978 to coordinate property maintenance for the military installations in the San Antonio area, SARPMA was an Air Force response to GAO and DoD pressure to consolidate activities within and across services to reduce duplication of processes. It was thought that cost savings from reductions in both scale and scope would be possible because the San Antonio area has four large Air Force installations and one large Army installation within a twenty-mile radius. And, since all units stationed at these installations have noncombat missions, consolidation would not directly affect the nation's warfighting capabilities.

Massey found that SARPMA was not achieving its primary purpose of providing maintenance at a lower cost.⁷ He attributed this outcome to four causes: (1) the bases were very large and had probably already benefited from the economies of scale that result from bulk purchases; (2) the flexibility that a base civil engineering

unit has to assign personnel to small tasks as time permits was lost in the larger organization; (3) the sustainment of previous quality levels required increasingly more management personnel to respond to user demands; and (4) SARPMA was guaranteed to recover its costs, which removed incentives to accomplish work more economically.⁸ SARPMA has now been dissolved.

Control Consolidation. The consolidation of printing across the services is an example of consolidating the control of activities. In November 1990, the DoD directed that all printing and duplicating for DoD organizations be consolidated in an industrially funded operation under the Navy Printing and Publishing Service (NPPS). Previously, services chose between printing in house or contracting with the Government Printing Office (GPO), which added a 6 percent surcharge to the contract price for overhead. It is still too early to make a final judgment on this consolidation effort, but users complain that NPPS does not provide responsive service and should not have complete decisionmaking authority. Users go through just as much effort in submitting a printing requisition through NPPS as they did when they went directly to GPO, but now they must pay a 1.5 percent surcharge to NPPS in addition to the 6 percent GPO charge *and* the work takes longer. All work is lodged in NPPS, which is motivated to keep as much work as possible in house in order to keep its equipment fully utilized and to spread out its overhead costs. Industrial funding is supposed to give the users incentives to be more prudent in their spending by making their costs explicit, but the consolidation has removed the benefits of competitive shopping by the services.

A second example of control consolidation is the establishment of the Joint Logistics Systems Center (JLSC). The JLSC has the job of consolidating the services' logistics information systems to provide a single common system capable of supporting the standardization of resource allocation decisionmaking across the services. Once such a system exists, all services would, in theory, be able to calculate their requirements for, say, spares on a common basis using identical assumptions.

The JLSC has three alternatives: (1) choose the best subsystem from each service's information system and construct a new system comprising these best building blocks, (2) adopt one service's information system and underlying logistics processes for all the services, and (3) develop a new cross-service system flexible enough to fit all the services' needs. The problems with the first two alternatives are that integrating disjoint information systems is extraordinarily difficult and one service's logistics system is unlikely to fill the needs of all services.

⁸This guarantee to recover costs also plays a part in the implementation of printing consolidation across DoD.

³U.S. General Accounting Office, "Defense Inventory: DoD Actions Needed to Ensure Benefits from Supply Depot Consolidation Efforts," GAO/NSIAD-92-136, May 1992, p. 8.

⁴See Handy, John B., Samuel J. Mallette, Robert L. Crosslin, William T. James, and Craig D. Sherbrooke, *Independent Evaluation of the Bay Area Supply Depot Consolidation Prototype*, Logistics Management Institute (LMI), PL101R1, December 1991; U.S. General Accounting Office, "Defense Inventory: Top Management Attention Is Crucial," GAO/NSIAD-90-145, March 1990; and U.S. General Accounting Office, "Defense Logistics Agency: Why Retention of Unneeded Supplies Persists," GAO/NSIAD-93-29, November 1992.

⁵See GAO/NSIAD-90-145, pp. 17-18.

⁶See Handy, Mallette, Crosslin, James, and Sherbrooke, p. iv.

⁷Massey, H. G., *San Antonio Real Property Maintenance Agency: Overview of a Regional Consolidation of Base Support Services*, RAND, N-2002-AF, May 1983.

Logistics for a tank, after all, is quite different from logistics for an aircraft carrier or a land-based bomber. The third alternative, developing a new information system, is prohibitively expensive, and such a system would take many years to fully implement.

At present, the JLSC is continuing its search for an approach that is timely, affordable, and sufficient to meet the diverse needs of the services. In satisfying those needs, which evolve as the services' logistics processes improve, the JLSC must design an adaptable system that will not be overwhelmed by either its own complexity or the altered environment.

Problems That Consolidation Can Create

Some of the examples just given touched on how the benefits of consolidation may be undermined by problems that consolidation itself can create. The literature on consolidation points to various such problems.

Reduction of Incentives and Responsiveness.

Hierarchy increases with organizational size. And as it increases, it rapidly dissipates the sense of identity linking the center and the work station, and it can reduce or slow the information that flows back and forth between them. Hierarchy also reduces the worker's identification with the final product. Management economist Oliver Williamson argues that impairment of incentives is a major downside of consolidation when he attempts to answer the question, "Why can't a large firm do everything that a collection of small firms can do and more?"⁹

Consolidation that involves removing logistics decisionmaking from the military services to the Office of the Secretary of Defense could affect responsiveness. By lengthening the lines of authority between provider and user, consolidation puts an increased strain on communication and coordination and runs the risk of degrading performance. Moreover, it may not adequately account for the fact that each service's resource allocation decisions are affected by different constraints—for example, the Navy's environment makes it more dependent than the other services on corrosion control for its aircraft. The DoD needs to consider such effects of consolidation when choosing the best direction for logistics reform. There is more here than merely how to save money. The broader question is, What effect would consolidation have on the users' warfighting capability?

Increased Command and Control Needs. Nobel economist Gary Becker has noted that "a variable of great importance is the cost of combining specialized

workers. Modern work on principal-agent conflicts, free-riding, and the difficulties of communication implies that the cost of coordinating a group of complementary specialized workers grows as the number of specialists increases."¹⁰ Thus, as the size of the hierarchy increases, coordination becomes more difficult and management more costly.

Increased Layers of Management. As James Womack emphasizes in *The Machine That Changed the World*, by narrowly specializing each worker's job, the auto industry forced itself to become a massive, centralized structure requiring many additional layers of management that contributed little direct benefit to the economic production of quality cars. Moreover, "total vertical integration introduced bureaucracy on such a vast scale that it brought its own problems, with no obvious solutions."¹¹ The auto industry's experience with increased management costs is not unique; others have also written about increases in managerial positions as workers are centralized and specialized.¹² These workers are then left with no effective way to provide feedback to management, which means their knowledge of effective process improvements is not communicated.

Increased Transportation Costs. When functions are consolidated at one location, transportation costs can become large relative to the effects of scale economies. In such a case, smaller, geographically dispersed facilities may make more sense than larger, centralized ones.

Given the problems that consolidation can create, it is important to ensure that the payoffs from consolidation are great enough to outweigh the disadvantages. One of the challenges is knowing when consolidation has gone far enough. For instance, as economies of scale in a production process are exhausted, average costs level off. The curves flatten out when the opportunities contributing to lower average costs have been fully exploited—for example, when increased specialization causes worker boredom and decreased productivity, when the cost of additional overhead to manage increased operations offsets declines in other costs, or when the cost of passing information and monitoring performance overtakes the savings from increased scale.

¹⁰Becker, Gary S., and Kevin M. Murphy, "The Division of Labor, Coordination Costs, and Knowledge," *The Quarterly Journal of Economics*, November 1992, p. 1138.

¹¹Womack, James P., Daniel T. Jones, and Daniel Roos, *The Machine That Changed the World*, Harper Perennial, 1991, p. 34.

¹²See Massey.

⁹Williamson, Oliver E., *The Economic Institutions of Capitalism*, The Free Press, 1985, p. 161.

Private Sector Experience with Innovative Practices

Today's successful, large, consolidated organizations, such as Johnson & Johnson and Microsoft, are really composed of many independent, small, self-governing units. Microsoft, whose dynamic market makes its experience seem particularly pertinent to wartime military logistics with its uncertain demands, calls these units teams and limits them to 400 members. The belief is that because decentralization of authority encourages entrepreneurial practices, smaller organizations are better able to respond quickly to the market and are more accountable for their actions. In these organizations, headquarters' functions are small, there is little vertical integration, and the units focus on customer needs and products. In describing the business organization of the future, *FORTUNE* magazine states that "many management experts see a vastly altered world economy in which the traditional attributes of size—economies of scale and stability—are not nearly as crucial to competing in fast-changing markets as flexibility and agility."¹³

Many manufacturing companies face challenges similar to those confronting the services and DoD. Xerox, for example, has restructured in an effort to "cut cost, reduce excessive inventory, and speed up product delivery."¹⁴ Rather than "go backward to complete centralization of manufacturing," however, Xerox has pursued a course of global integration. Some functions have been consolidated—the supplier base has shrunk from 5,000 to a little more than 400. And other functions have been closely integrated and coordinated—for example, Xerox mass produces components in low-wage areas and assembles the final product in high-cost areas near to customers, all the while closely linking world production to customer orders.

Xerox has integrated the best from the mass production age with the technologies of the information age to produce a globally dynamic company. General Motors, Sears, IBM, and other companies that have been slower in adopting innovative practices are now facing painful contractions as they attempt to adjust to shrinking market shares.

What experience in the private sector has shown is that business practices should not be viewed as a static set of options from which the implementor can pick a favorite one or two and expect to achieve dramatic improvements. Rather, the lesson is that improvement requires a fundamental change in the "mind-set" of the entire company and that the implementation of new

practices is not a "one-shot deal." The marketplace is a dynamic environment requiring customized, continuing reforms for each segment. Some of the practices being emphasized in the private sector to help companies compete in this environment are as follows.

Know the customer and know what is needed better than the competitors—a practice that requires continual effort. *Key activities to customer's needs*, not to internal measures such as batch sizes. *Move from fixed standards to evolving goals* and never relax the pressure to improve. *Promote horizontal and informal information sharing*, thus facilitating the worker interaction that is essential for meeting customer needs. *Use world-class capabilities as the benchmark for your capabilities* to avoid falling behind competitors in this fast-paced environment. *Exploit core competencies*: decide what can and cannot best be done in house; then set up long-term relationships with other companies to take advantage of their capabilities while preserving in-house expertise. *Exploit technology*—especially information technology—to provide greater flexibility and greater responsiveness to customer needs. *Redesign processes*, starting with a clean sheet of paper rather than attempting to patch processes that have outlived their usefulness. *Reduce inventories* to stress the system and thus force it to be responsive and adaptive. *Delegate decision authority* so as to make the best use of employees' knowledge, keeping in mind that employees possess local knowledge of problems and potential gains.

Experience in the private sector has also shown that identifying successful reforms requires intimate knowledge of the organization's products and processes. Since the people who are closely involved in the organization are the ones who have this knowledge, reform must start with them. Only people within the organization can change the mind-set, break rice bowls, and build new ways to conduct business.

Relevance of Innovative Practices to the DoD

The four examples here illustrate the potential relevance of the private sector's innovative business practices to military logistics.

Exploitation of Technology. New technologies are making smaller scales of operation more economical. For example, new technologies have made equipment switch-overs quick and efficient, so that the practice of producing smaller batches of items—rather than the old practice of producing enormous batches of one item before moving on to another item—can prove economical. When smaller batches are produced, inventories of finished goods are reduced, leading to reduced unit costs. Further, if the demand for the product turns out to be

¹³Dumaine, Brian, "Is Big Still Good?" *FORTUNE*, April 20, 1992, p. 52.

¹⁴McGrath, Michael E., and Richard W. Hoole, "Manufacturing's New Economies of Scale," *Harvard Business Review*, May-June 1992, p. 95.

less than forecast, smaller batches mean fewer surplus goods. And defects in material and production setups tend to be more readily caught before vast quantities of unusable goods are produced.

New technologies also enable organizations that once had to be closely located for coordination of operations to be more spread out, since they can now be linked by computer, telephone, and fax. At Hewlett-Packard, each of the more than fifty manufacturing divisions located in different geographic areas has its own purchasing department to furnish the responsiveness and service necessary for the marketplace. Corporate purchasing negotiates contracts, monitors service, and maintains a shared database for all items purchased, but each division issues its own purchase orders through the shared database. Economies have come through reduced lead times, lower purchasing costs, and increased on-time deliveries. It is no longer always necessary to have geographic proximity or physical consolidation to achieve economies of scale.

It certainly seems possible that the military services would have many opportunities to apply innovative approaches along these lines. Many of the services' repair processes are intrinsically different from the processes of manufacturing, and wartime needs obviously differ from those of peacetime, but it still seems appropriate to question whether consolidation should be emphasized in areas in which process and technology alternatives have not been seriously explored, at least as adjuncts to consolidation.

Redesign of Processes. At one time, industry sought to consolidate and automate existing systems without exploring ways of redesigning business practices to achieve dramatic improvements. *Business Week* reported that "despite consuming one-third of all capital expenditures during the past 10 years, corporate information-processing investments actually increased office productivity less than 0.2 percent per year."¹⁵ Further corroboration comes from the *Harvard Business Review*: "Our work structures and processes have not kept pace with the changes in technology, demographics, and business objectives."¹⁶

Two commercial examples demonstrate the importance of redesigning processes rather than solely consolidating or automating existing processes. When Xerox needed to improve quality and reduce costs, it "invested in massive training efforts, organizational changes, and technology changes."¹⁷ These efforts reduced manufac-

turing costs by more than 20 percent and inventory costs by 45 percent. Quality also improved dramatically.

The Ford Motor Company made a similar decision in the early 1980s. By reengineering purchasing, receiving, and accounts payable, Ford was able to reduce the number of personnel involved in these functions by 75 percent. Previous to this change, Ford's accounts payable department had employed 500 people (in contrast to Mazda's staff of *five* for the same function) who were dealing with mounds of paperwork. Three invoices were generated for each purchase—one each by purchasing, receiving, and the vendor. Personnel in accounts receivable spent most of their time reconciling errors on invoices. Rather than installing a system that would allow personnel to investigate errors more efficiently, Ford scrapped the entire system and instituted a paperless process. The purchasing office now orders through an on-line database. When material arrives, the receiving office checks the part number, units, and supplier code against the outstanding orders. If there is a match, the material is sent; if not, the material is returned. All checking is done by the computer, which also prints the check for the vendor. Discrepancies between the accounting record and material control are no longer possible, now that this one-record system is in place.¹⁸

The GAO has noted in many reports that inventory records in all the services and at DLA are inaccurate. On-hand inventory and computer records do not agree. Further, GAO found a disconnect between procurement and user needs. Procurement is notified when a part is needed, but it frequently is not notified when other actions have satisfied the requirement and made the purchase no longer necessary. Many of these problems can be attributed to multiple collections of data. Each organization's old methods of maintaining data are still in place and are frequently automated, but one on-line database that is accessible to all users has not become a reality, despite its feasibility.

The DoD's enormously large and diverse inventories set it apart from the private sector. Even so, some processes that are in serious need of improvement may require fundamental redesign, just as processes in the private sector have. In considering further consolidation, the DoD should pay serious attention to the fundamental design of its current processes.

Reduction of Inventories. In service organizations, cost-saving measures must be judged by how they affect the services being provided. Examples abound to demonstrate how increasing responsiveness to the customer can reduce costs. One way to increase respon-

¹⁵As quoted in Horner, Peter, "Startling Statistics," *OR/MS TODAY*, February 1993, p. 4.

¹⁶Hammer, Michael, "Reengineering Work: Don't Automate, Obliterate," *Harvard Business Review*, July-August 1990, pp. 104-112.

¹⁷Flynn, Barbara B., "Managing for Quality in the U.S. and in Japan," *INTERFACES*, 22:5, September-October 1992, p. 71.

¹⁸See Hammer, pp. 105-106.

siveness, which may at first seem counterintuitive, is to decrease inventories.

An MIT study of the automotive industry coined the term "lean manufacturing" to describe the Japanese method of manufacturing automobiles and to distinguish it from the American mass production method. Lean manufacturing produces items in small batches, carries little inventory, eliminates intermediate buffers, stresses prevention of defects, decreases response time to uncertain events, and increases worker involvement and cooperation.

According to Willard Zangwill, there are "two opposing views—the new and the old—about being responsive to the customer. Old viewpoint: Increase inventory, hold a lot in stock, and then you are ready for anything. New viewpoint: Reduce inventory, cut the production lead time, and you can respond fast to anything."¹⁹ The DoD subscribes to the old point of view.²⁰

An intrinsic difference between the DoD and private industry is the DoD's need to support a major war effort at any time. Since war efforts require higher levels of supplies than are needed in peacetime, the military has long been attracted to buying large stocks of spares. Excessively long pipelines have been tolerated (such as the seventy-day example cited earlier), and these long pipelines are then used to justify the procurement of even larger stocks of spares. The presumption is that these pipelines can be collapsed during wartime. But the collapsing does not readily occur, because long sluggish pipelines are ill prepared for quick performance during war. The DoD could substantially reduce its wartime stockpile by using information technology and speeding the movement of material.

Delegation of Decision Authority. The worker's involvement in production decisionmaking is greater in the lean production environment than in mass production. In the classic assembly line operation, labor specialization is often equated with boredom, lack of initiative, and increased defects. "Holding back knowledge and effort [has been] repeatedly noted by industrial sociologists as a salient feature of all mass-production systems."²¹ Lean manufacturing, in contrast, cannot succeed if employees are not intimately involved in the effort to improve output and decrease defects.

¹⁹Zangwill, Willard I., "The Limits of Japanese Production Theory," *INTERFACES*, 22:5, September–October 1992, p. 20.

²⁰Compared to industry, the DoD maintains large inventories—probably the largest in the world—a stockpile that grew by 138 percent between 1980 and 1987. "Nearly five million items comprise the approximately \$88 billion of materiel." Assistant Secretary of Defense (Production and Logistics), *Corporate Information Management: Functional Logistics Plan*, p. 7.

²¹Womack, Jones, and Roos, p. 53.

Empowering the worker increases productivity and decreases the need for bureaucracy.

In lean production, the worker monitors the work—i.e., the worker can "stop the line." Decision authority is moved to the work force, giving the worker more control. Ironically, in lean production, where anyone can stop the production line, lines rarely stop; whereas in mass production facilities, where only the line manager can stop the line, interruptions are a way of life (as is massive rework to remove built-in defects).

Another method, one used in both Japan and the U.S. to increase worker productivity and responsiveness, is to group workers into teams, giving them the responsibility for quality control and for responding to worker suggestions. At a Kodak assembly plant, the increased productivity of workers now formed into a team has cut costs: the team is able "to do nearly the same amount of work in one shift that used to require three."²²

Obviously, its chain-of-command orientation makes the military intrinsically different from the private sector. That difference does not necessarily mean, however, that the DoD cannot benefit from adopting the team approach emerging in the private sector.

Conclusions

The consolidation of service activities is most cost-effective when equipment and/or personnel are being seriously underutilized. Without these circumstances, consolidation may not reduce costs. In fact, when implemented in operations that are already vast, consolidation can create a system that is less responsive to the customer and therefore—in the case of military logistics and support functions—less sufficient for sustaining warfighting capabilities. "Too often senior managers assume that by mechanically eliminating chunks of business or consolidating operations, they will improve the company's position. In fact, only by designing controllable and highly integrated manufacturing processes—something we call 'robust'—can companies lower overhead permanently."²³

Industry experience has already demonstrated that innovative business practices can be used to achieve economies in an uncertain market. Some of these practices—most notably technology exploitation, process redesign, inventory reduction, and delegation of decision authority—have a proven track record in reducing costs and improving service. Practices such as these, when used as alternatives or as adjuncts to consolidation, may

²²GAO/NSIAD-92-136, p. 48.

²³Blaxill, Mark F., and Thomas M. Hout, "The Fallacy of the Overhead Quick Fix," *Harvard Business Review*, July–August 1992, p. 94.

be what the DoD needs to deliver responsive logistics at the least cost. The benefits they can provide may far outstrip what can be achieved by continuing to emphasize consolidation as the most cost-effective direction.

Marygail Brauner and Jean Gebman are senior members of the RAND research staff. Since joining RAND in 1984,

Dr. Brauner has researched issues of manpower and logistics for the Navy, Air Force, and DoD. Since he joined RAND in 1968, Dr. Gebman has researched issues of weapon system acquisition, support, maintainability, and reliability.

Both authors wish to thank RAND colleagues Frank Camm, Jeffrey Luck, and Dennis Smallwood for their contributions to this paper.

*RAND is a nonprofit institution that seeks to improve public policy through research and analysis.
Results of specific studies are documented in other RAND publications and in professional journal articles and books.
To obtain information about RAND studies or to order documents, call Distribution Services, (310) 393-0411, extension 6686.*

RAND

1700 Main Street, P.O. Box 2138, Santa Monica, California 90407-2138 • Telephone 310-393-0411 • FAX 310-393-4818
2100 M St., N.W., Washington, D.C. 20037-1270 • Telephone 202-296-5000 • FAX 202-296-7960