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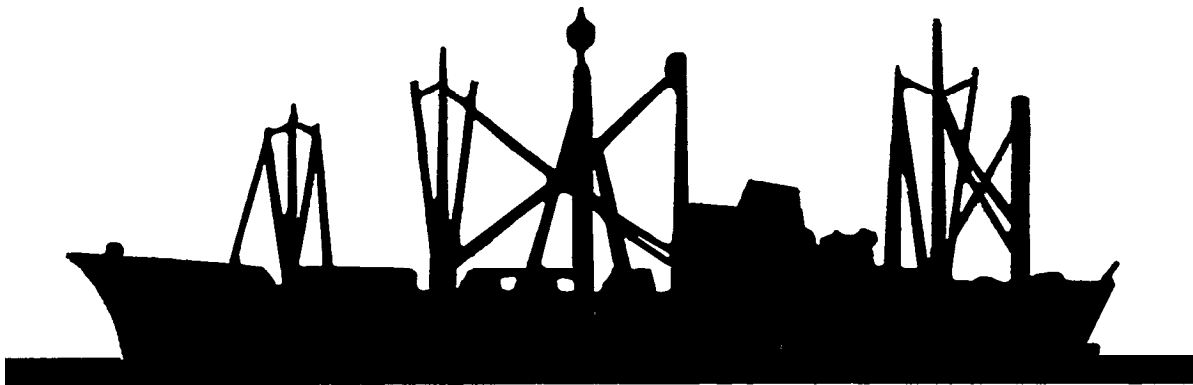
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IREAPS

PRODUCTIVITY NAVY STYLE

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ABSTRACT

Productivity improvement is a most difficult concept to come to grips with in the operations of a central, national government. The term "productivity improvement" is most generally considered to mean the beneficial results of acts of innovation or change which are undertaken for the purpose of producing a greater output from a given input of resources. To some, this concept represents the very antithesis of bureaucracy, since it is claimed that by nature bureaucracy is growth prone and resistant to change. This paper describes a productivity program which is being implemented within the Navy industrial base. Three years of successful experience have shed considerable light on the management of change in large military organizations with a rigid institutional structure. The paper draws attention to major dimensions of the Navy's program and to the process of managing for productivity improvement.

New technology, the rising cost of production, and expectations that work should be enriching as well as profitable are causing transformations in the Navy. Traditional tools of economic management are being reassessed as they demonstrate diminishing ability to promote long-term economic improvement.

Created in 1978, as a reflection of growing management concern, the Navy's Productivity Program establishes the framework for improvement. A network of productivity principals has been established in higher echelon Navy and Marine Corps commands with a Director of Productivity Management located in the Navy Secretariat.

Under the direction of the Chief of Naval Material, Admiral A. J. Whittle, Jr., the Naval Material Command (NMC) has established a Productivity Management Office with a cadre of professionals representing the various disciplines attendant to a functionally integrated Productivity Enhancement Program (see figure 1). Although the Navy Productivity Program encompasses all military and civilian organizations, the NMC organic industrial community is the focus of current planning. Corporately, this community employs over 100,000 civilians and involves a budget of more than \$6 billion.

Targets of Opportunity. The Navy Productivity Program, as presently structured, explores three major areas of opportunity. These are: technological advancement, organizational development, and process management.

Technology. Productivity improvements derive from changes in production, methods materials and machinery which in turn stem from the accumulation of scientific and technological knowledge. The technology factor has been credited with at least 40 percent of the growth in productivity over the past five decades of domestic industrial experience.

The thoughtful integration of beneficial technology to the Navy's industrial base represents a critical dimension of the Productivity Enhancement Program. To a very large degree the process is limited by the capacity of the organization to accommodate innovation and to handle uncertainty.

To create a climate which encourages technological venture and innovation, a number of funding mechanisms have been introduced; these include:

a. Cost of Ownership Reduction Investment (COORI) Program. Established as a part of Navy's FY-82 budget planning, this program creates a \$50M funding target to support high payback capital investment opportunities. Candidate projects are placed in competition by operating managers during budget planning (approximately two years before budget approval). Ultimately, the amount of funding (set at approximately \$50M for FY-82) is determined by the quality of candidate projects and a subjective comparative assessment of the relative merit of COORI vis-a-vis other programs in competition for budget funds.

b. Fast Payback Program. The Fast Payback Program is designed to create a funding mechanism through which managers can fund high payback projects with short lead time provided the projects satisfy the following criteria:

1. The project costs less than \$300,000 (\$100,000 non-NIF).
2. The project has a payback of less than 3 years (2 yrs. non-NIF).

Funds are made available to support the Fast Payback Program through two funding mechanisms. These are:

1. Naval Industrial Fund (NIF). Naval Shipyards, Air Rework Facilities (NARFs), Public Works Centers (PWCs) are among many of the Navy's industrial organizations which are NIF funded. Under this funding concept, "earnings" are credited to an industrially funded activity by charging fleet customers for goods and services rendered. Contractual relationships between these organizations and weapons systems custodians (fleet customers) involve fixed price bidding and cost accounting practices not uncommon to those found in the private sector. NIF managers deciding to invest in beneficial technology which qualifies under "fast payback" criteria do so using industrial funds. Costs associated with the investment are amortized by the stream of dollar savings which accrues from the investment. Additional savings, above and beyond the investment cost, are reapplied to enhance the productivity of the organization.

2. Procurement Funds (OPN). A \$3M per year fund is created as a part of the Navy budget to allow non-NIF activities (hospitals, training agencies, headquarters, etc.) to have access to the "fast payback" program. The modest funding level creates intense project competition and safeguards against speculative ("wish list") project submission.

c. Manufacturing Technology (MT) Program. This program explores the application of emerging technology to (1) reduce procurement and life cycle costs, and (2) increase productivity. The program reduces the risks associated with new technology exploration by providing "seed money" to MT program participants. The impact of technology on weapons system procurements costs is impressively demonstrated by a recently completed MT project involving search radomes which are in common use on ship-borne and land based radar systems. In this case, the MT project found that radomes fabricated from foam filled fiberglass may be substituted for search radomes conventionally manufactured from honeycomb structures. The use of foam filled fiberglass reduced the cost of the search radome from \$6,000 to \$450. Projected net savings from this project thru FY 1985 exceeds 5.2 million dollars. (The total cost of the MT project was \$116,000.)

d. OSD Sponsored Productivity Enhancing Capital Investment Program. In addition to the above Navy funded programs, OSD, starting in FY 1981, established a "grant" fund to underwrite the cost of certain productivity enhancing capital investments. To compete for these funds (FY 1981--\$105 Million; FY 1982--\$110 Million), services respond to an OSD PECI "project call" by submitting projects meeting the following basic criteria.

1. Minimum investment cost \$1 Million (modified to \$300,000 for FY 1982).

2. At least 50 percent of economic return of invested funds must accrue from labor savings.

3. Maximum Return on Investment--4 years.

4. Internal Rate of Return--at least 10%.

The Decision Model contained in figure 2 depicts the relationship which exists between the various funding mechanisms which provide access to productivity enhancing technology. It must be kept in mind that technology transfer differs from ordinary scientific information transfer in the fact that to be transferred, technology must be embodied in an actual operation of some kind. Decisions to adopt new technologies are basically investment decisions; they involve elements of risk and uncertainty. Organizations vary in their capability to accommodate uncertainty as a reflection of their value systems, social structures and/or culture. These elements are brought into focus in a second major target of opportunity of the Navy's Productivity Program.

Organizational Development (OD). The importance of the internal organizational environment for the success of any productivity enhancement endeavor is emphasized in the literature and attested to by successful managers. The Navy's OD program provides the structure to recognize and pursue opportunities to strengthen the organization and influence the quality of member behavior. A number of specific programmatic initiatives and accomplishments follow:

a. Performance Contingent Reward System. An incentive program designed to improve individual productivity was developed by the Naval Personnel Research and Development Center and implemented in the data entry section of a data processing center at the Long Beach Naval Shipyard. The employees participating in the study were Navy civilian key entry operators. Production standards were developed based upon keying speed and the amount of time spent working. A Performance Contingent Reward System (PCRS) was designed in accordance with sound behavioral principles and federal guidelines such that a monetary bonus was awarded for high individual productivity. The amount of the reward was directly proportional to the amount of work exceeding a production standard.

Production for the 12-month period improved substantially. Excessive overtime and a heretofore perpetual backlog were virtually eliminated (see figures 3 and 4). The workforce decreased in size but not in productivity as a few employees left the organization through natural attrition and were not replaced. A rigorous cost-effectiveness analysis showed that the set-up costs of the program were recovered in the first three months of operation. A similar follow-on study was conducted at the Mare Island Naval Shipyard with comparable results.

Implementation of PCRSs at other Naval Shipyards has shown that where the basic tenets of a PCRS exist (viz. regular performance feedback, timely reward, and reasonable time-on-the-job standards) significant increases in productivity may be expected.

b. Quality Circles. Quality circles are small groups of workers who get together voluntarily on a regular basis to solve everyday work problems that cause frustration, hurt quality and hinder productivity. Participation is voluntary and meetings take place on "company time." At the last count, there were more than sixty quality circles in the Naval Material Command; the number is growing weekly. Circles engage the talents of machinists, electricians, sheet metal mechanics, engineering technicians and others. They normally meet once a week for an hour, accomplishing their regular week's work in the remaining 39 hours.

The idea of soliciting worker expertise is, of course, not new: witness the suggestion boxes installed--and often covered with dust--at many work sites. What the quality circles offer is a structured means of combining workers' practical experience with the analytical approach of the manager, and a formal channel for proposing solutions of management.

A key to the success of circles in the Navy is that participation is voluntary for both managers and workers. The result is genuine enthusiasm, as well as growing appreciation and understanding among the people involved.

The quality circle concept has an added advantage in that it requires little or no change in existing organizational structures. The circle method is a relatively simple technique that can be used in any work situation. And both workers and management benefit when work-related problems are solved in the circle.

When the project was undertaken at Norfolk Naval Shipyard, whose 12,000 employees make it the second largest employer in Virginia, shipyard unions showed their support by filling positions on the steering committee that directs the program.

For every dollar invested, quality circles have saved the Norfolk Naval Shipyard \$3.75. The net savings, after deducting all costs of operating the program, including staff time and travel, were \$150,000 in the first year.

c. Productivity Awareness. The media today are responsible for a significant elevation in the level of social consciousness associated with productivity. Officials in labor, management, academia and government appear to agree that productivity must improve if our nation is to remain economically and socially sound. These factors when coupled with the many emerging productivity issues coming from the world of work plus ever-present changes in management methods, structures, priorities and personalities establish the basis for a productivity awareness program.

Under the sponsorship of the Director of Productivity Management and the Naval Material Command Productivity Management Office, the following initiatives are being pursued:

1. Prospective Commanding Officers (PCO) Course. Commanding Officers (COs) of naval field activities are subject to rotation at regular (nominally 3 year) intervals. The Prospective Commanding Officers Course is structured to equip all expectant COs with information on programs of contemporary interest prior to their assignment. The PCO Course curriculum includes segments providing the critical information which the PCO will need to effect

decisions and implement productivity programs at the field activity level. It is expected that by the end of calendar year 1981, eighty percent of naval industrial activity COs will have been indoctrinated in the Navy's Productivity Enhancement Program. By 1982, and thereafter, all industrial activity commanding officers should have a working knowledge of the program, its accomplishments and objectives.

2. Distinguished Lecture Series. This initiative, started in November 1980, involves a host of distinguished lecturers from government, academia, industry and labor. Attendance is by nomination, involving a select group of senior Navy line managers. These face-to-face encounter sessions with the leaders in the world of productivity provide for a continuing infusion of new ideas for Navy's senior managers.

3. FYI. FYI is published quarterly by the Naval Material Command as a mechanism to keep Navy personnel up-to-date on the status of programs, new initiatives and matters of general interest in the field of productivity.

4. Seminars and Workshops. The Naval Material Command and its constituent Systems Commands regularly host seminars and workshops in the field and at headquarters to keep managers at all levels involved in the dissemination of information and the formulation of plans for future action. During FY 1980, more than a dozen such seminars and workshops were hosted.

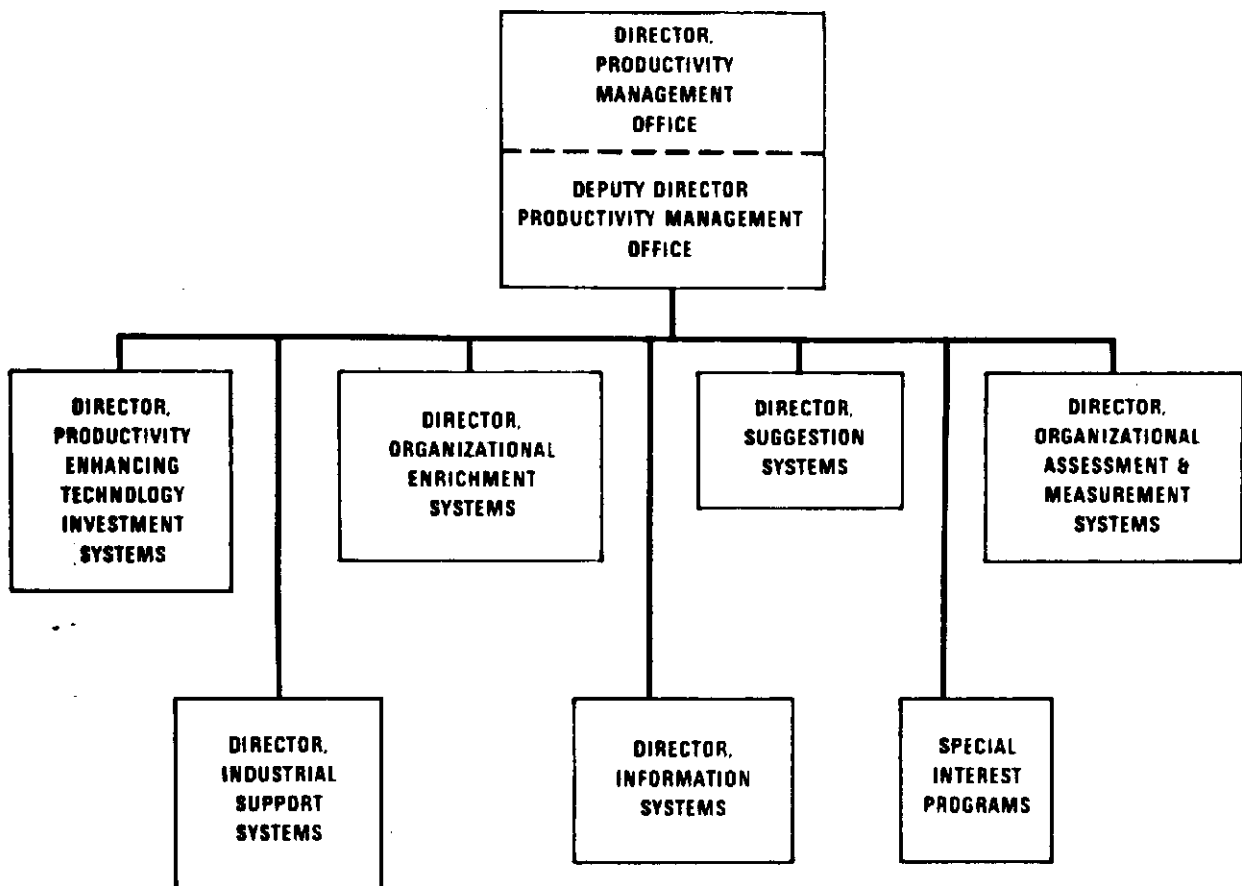
d. Disincentives to Productivity. In addition to the pursuit of programs to improve productivity by enhancing motivation, there exists a need to identify factors which may inhibit or discourage productivity. In January of 1980, the Naval Material Command sponsored a study to isolate impediments to productivity within the Navy's industrially funded logistics community (shipyards, naval air rework facilities, public works centers, supply centers and weapons stations). The purpose of the study was to identify factors which impede productivity and to recommend management actions to reduce their effect on productivity. The study was conducted by the Naval Personnel Research and Development Center (NPRDC) with technical assistance provided by the Office of Personnel Management.

The study was completed in October 1980. A detailed report of findings now serves to provide direction to a corporate team which is chaired by the Director of Productivity Management with membership from each major headquarters command representing the study participants.

Process Management. The ultimate objective of the Navy's Productivity Program is to improve military preparedness. Within the industrial segment of the Navy, military preparedness equates to the delivery of goods and services as required by fleet operators. To accomplish this objective requires a reasonable level of statistical control of major operations. Statistical methods are the only basis to forecast production capability, output, quality and cost. Measures of productivity must describe the extent to which management eliminates barriers to productivity (common causes of statistical variations), improves process efficiency (use of improved methods) and reduce product defectiveness.

The Navy is devoting considerable attention toward the development of statistically supportable measures of productivity. These measures involve headquarters and field activities and at this point focus on the individual, a group of individuals, and a major command (aggregate measures). Work toward the development of aggregate measures of productivity is in progress. These measures are expected to provide a useful tool to restructure systems of incentives and, for the first time, provide a realistic portrait of productivity in a military industrial work setting.

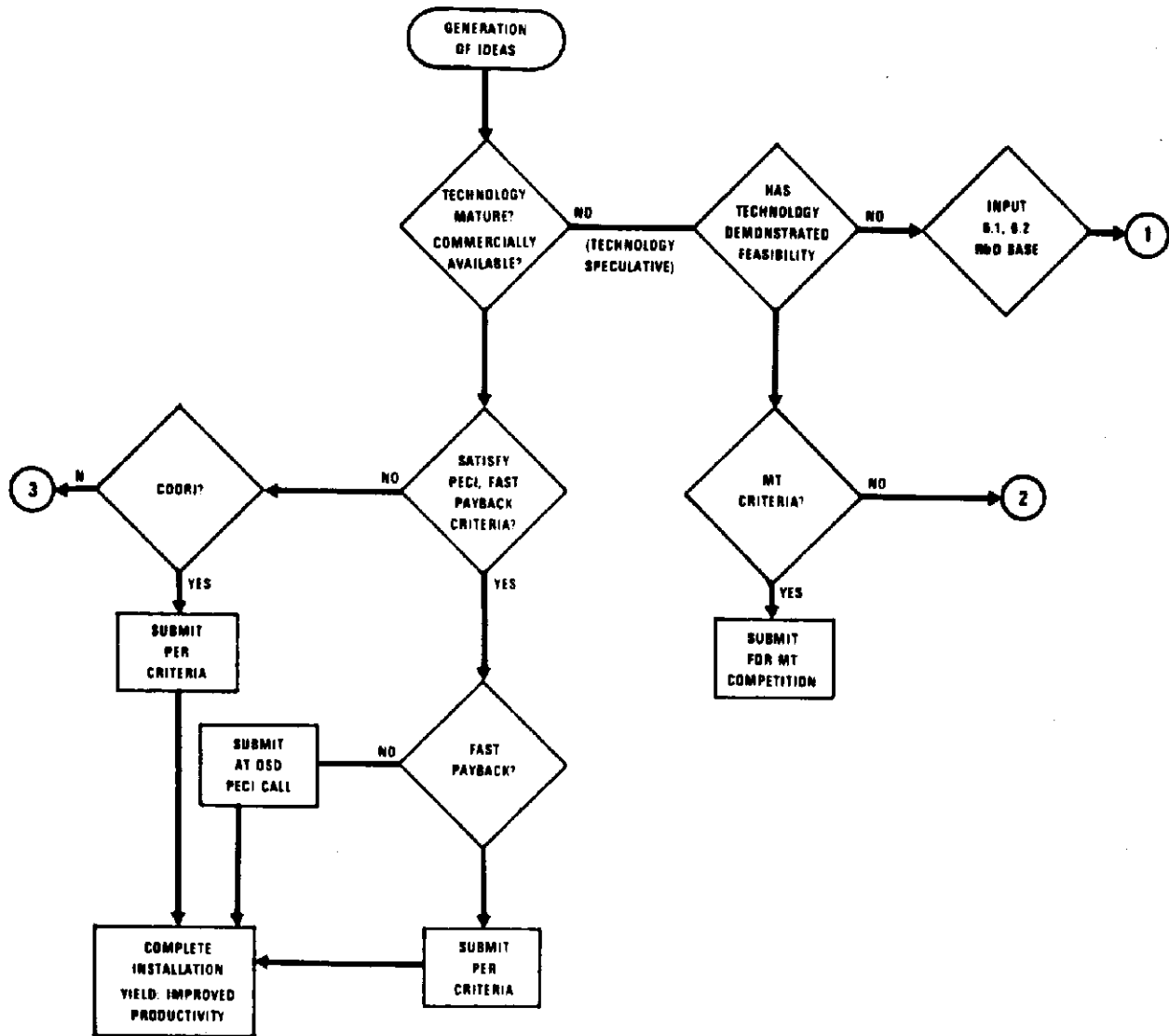
NAVAL MATERIAL COMMAND PRODUCTIVITY MANAGEMENT OFFICE



*THE DIRECTOR OF PRODUCTIVITY MANAGEMENT SERVES COLLATERAL DUTY IN THE OFFICE OF THE ASSISTANT SECRETARY OF THE NAVY (MANPOWER, RESERVE AFFAIRS, AND LOGISTICS) AND THE NAVAL MATERIAL COMMAND.

FIG. 1

CAPITAL INVESTMENT TECHNOLOGY DECISION MODEL



- 1 HOLD IN BACKLOG FOR FUTURE CONSIDERATION IN APPLIED SCIENCES OR ABANDON
- 2 EXPLORE ALTERNATIVE SUPPORT, NEED ASSESSMENT, ETC.
- 3 CONSIDER OTHER FUNDING MECHANISMS (ENERGY, OSHA, ETC.)

FIG. 2

PRODUCTIVITY AND MOTIVATION - II

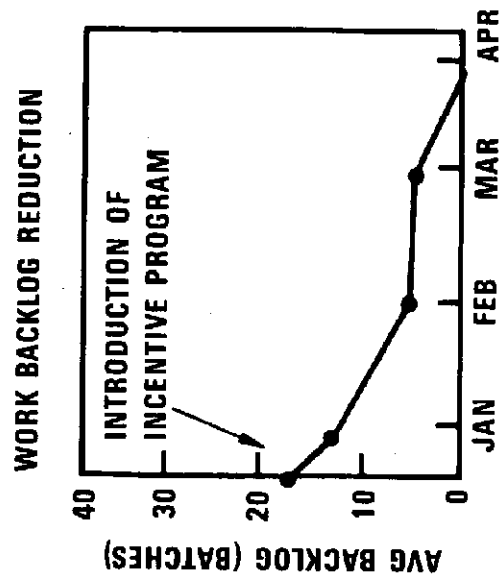


FIG. 3

PRODUCTIVITY AND MOTIVATION - II

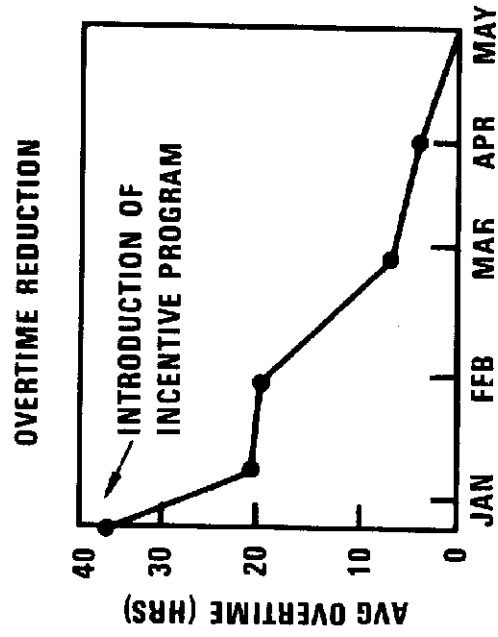


FIG. 4

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