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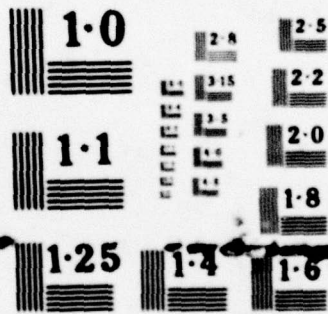
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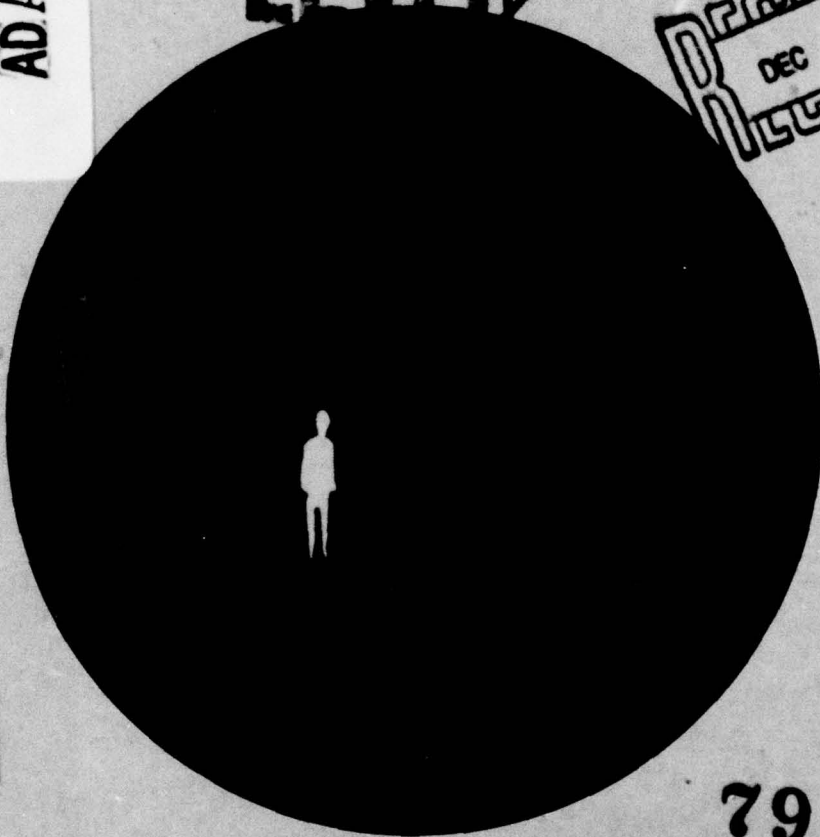
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TRAINING ANALYSIS AND EVALUATION GROUP

ORLANDO, FLORIDA 32814

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AN INCREMENTAL COSTING METHOD FOR RESOURCE
ALLOCATION IN NAVY TRAINING

James M. Corey
William M. Swope

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Training Analysis and Evaluation Group

November 1979

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SECTION I

INTRODUCTION

The Chief of Naval Education and Training (CNET)¹ directed the Training Analysis and Evaluation Group (TAEG) to conduct a series of studies addressing optimization of the recruit training program for the post-1980s. As a result of initial conclusions and recommendations by the TAEG,² the CNET³ expanded the effort to include an incremental cost analysis of recruit training at the Naval Training Center (NTC), Orlando. This task was generated in part by periodic requests from higher authority concerning the possible consolidation of the three recruit training commands (RTC) at Great Lakes, Illinois; San Diego, California; and Orlando, Florida.

A tabulation of these incremental costs in "life-cycle" terms would be the basis for any long-range decision concerning increases in recruit throughput at any RTC. Decisions involving where to train any new personnel resulting from a force expansion or how to redistribute the existing aggregate training throughput among the three commands are examples of where the use of incremental costs are appropriate.

BACKGROUND

Any decision concerning where an increase in recruit training throughput should take place would require a comparison of the costs of providing that training at the various alternative sites. The Navy currently conducts recruit training at three training activities--the NTCs in Orlando, Great Lakes, and San Diego. A proposed increase in throughput could be performed at any one or combination of these three activities. A decision of where to train the additional number would require an analysis of how resources would be affected. Given the change in resources, an estimate of the change in costs can be made; i.e., the incremental costs associated with alternative strategies for changing the amount of training at each site can be determined.

Most analysts recognize the need for incremental cost information for efficient management. However, existing data systems seldom provide the capability for extracting incremental costs. This deficiency in the existing data systems stems largely from the dynamic nature of the training systems. At any given site, the capital base used in support of training as well as the associated economic environment is in constant flux. This essentially invalidates the usefulness of a static cost data base for computing the

¹ CNET ltr Code 33 of 21 Apr 1975, Subj: Proposed POA&M for the Training Analysis and Evaluation Group.

² D. R. Copeland, J. M. Henry, Dorothy V. Mew, and C. C. Cordell. Navy Recruit Training Optimization, Post-1980: Current Assessment and Concept for the Future. TAEG Report No. 34. May 1976. Training Analysis and Evaluation Group, Orlando, FL 32813. (AD026528)

³ CNET ltr Code N-211 of 19 Jan 1978, Subj: Expansion of the Phase II Study for Navy Recruit Training, Post-1980 by the Training Analysis and Evaluation Group.

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incremental costs. A consequence is that each time a management decision arises requiring incremental costs the analysts must develop estimates based upon the unique resource characteristics of the site as they exist at that time and place.

PURPOSE

The purpose of this study is to examine the feasibility of collecting incremental costing information by surveying cost accounting centers. Three objectives were identified: (1) compare the alternative cost concepts of total, average, and incremental costs, (2) demonstrate that incremental cost is the appropriate one to use for managerial decision making, and (3) demonstrate the use of the method in a typical training environment. The cost gathering procedure was applied to recruit training at NTC Orlando.

SECTION II

COMPARISON OF TOTAL, AVERAGE, AND INCREMENTAL COSTS

Any cost analysis is ultimately an attempt to link a measurement of output with the costs of the resources required to produce that output. In the training environment, several measures of "output," or workload, are available. Number of graduates, number of student entrants, and other measurements are often used when various cost estimates concerning any one given course are being analyzed. Average-on-board (AOB) strength is more often used at higher organizational levels as a measure of training workload because it is a statistic which allows comparison between different courses. For example, if course A is 3 weeks long and course B is 6 weeks long and both produce 1,000 trained individuals per year, the "number of graduates" and "number of entrants" statistics do not allow a realistic comparison of real training effort. Both courses produce 1,000 graduates; however, since course B is twice as long as course A, the former will require twice the resources when all else is equal. The workload statistic "AOB" would account for this factor--the AOB for course A would be 58 and the AOB for course B would be 115. Although any of the workload statistics could have been used with equal effectiveness in this study, AOB was selected because of its general use and acceptance in programming and budgeting.

The kind of cost measures used to quantify the resources consumed in training a given AOB level can be classified as follows:

1. Total Cost. This is the annual cost of all the resources; e.g., personnel, supplies, equipment, and buildings, required to train and maintain a given total AOB in training. It is expressed in dollars (\$).
2. Average Cost. This is the annual cost of all the resources used divided by the AOB. It is expressed in dollars per unit of AOB (\$/AOB).
3. Incremental Cost. This is the cost of the additional resources required to train a specific increase (or increment) of AOB only. The incremental cost is also equal to the total cost at the higher level of AOB minus the total cost at the lower AOB level. Just like total costs, incremental costs are expressed in dollars (\$).

For example, consider the hypothetical cost schedule shown in table 1. Assume that the recruit training command was currently operating at the 6,000 AOB level with a total cost of \$10 million. If the AOB level were to increase to 7,000 then total cost would increase to \$10.20 million. The incremental cost of the additional 1,000 AOB would be \$.2 million (\$10.20 million - \$10 million); i.e., it would take \$.2 million worth of additional resources for the additional 1,000 AOB units. This \$.2 million estimate is the appropriate cost to use when comparing this command's costs with other command's costs in order to determine where training should take place.

As another example from table 1, assume the recruit training command was currently operating at the 7,000 AOB level with a total cost of \$10.20 million. If management was considering increasing the training to the 9,000 AOB level (where total costs would be \$10.56 million), the incremental costs of the

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2,000 AOB increase would be \$.36 million. Again, this \$.36 million estimate of incremental costs is the appropriate cost to use for deciding which command can perform the task most efficiently.

TABLE 1. COST SCHEDULE FOR ONE HYPOTHETICAL RECRUIT TRAINING COMMAND

| Training Level (AOB) | Average Costs (\$/AOB) | Total Annual Costs (\$) | Incremental Costs (\$) |
|----------------------|------------------------|-------------------------|------------------------|
| 6,000 | 1,667 | 10,000,000 | - |
| 7,000 | 1,457 | 10,200,000 | 200,000 |
| 8,000 | 1,299 | 10,390,000 | 190,000 |
| 9,000 | 1,173 | 10,560,000 | 170,000 |

Average costs are not appropriate when attempting to determine how much a proposed incremental level of training will cost. To illustrate, assume that the hypothetical command above is currently operating at the 6,000 AOB level. If a 1,000 AOB increase was to occur, the resulting additional cost would be the incremental cost of \$200,000. The analyst could have used average costs to estimate the cost of the 1,000 AOB increment using the average costing method; he would have multiplied the 1,000 AOB increment by \$1,667/AOB to obtain an estimate of \$1,667,000. Obviously, the \$1,667,000 estimate based on average costs differs significantly from the correct \$200,000 estimate based on incremental costing. In reality, the average cost could be greater, less than, or equal to the incremental cost.

The use of average costing methods in determining costs for incremental workloads is erroneous because the results will include costs which are fixed; i.e., costs which are equal for both the current AOB level and the proposed higher AOB level. For example, if the rank of a commander of an RTC would not change as a result of increasing the AOB, then the commander's wages would be an irrelevant cost in the decision of whether or not to increase the AOB. These fixed costs would not be included in the incremental costs. However, if the change in total costs was calculated using average costs then the commander's wages would be incorrectly included. In other circumstances, the use of average costs could conceivably result in estimates which would not include the cost of resources that should appropriately be included when AOB is increased. For example, an increase in AOB might require the purchase of an expensive block of property--this purchase would be included in incremental costing but neglected if the analyst were to use only the current average costs to predict the impact of the AOB increase.

The use of average costs for decisions concerning incremental workloads is common. For example, cost data derived from the CNET Cost Per Capita data base is average cost data. The average cost data is frequently misused or

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applied where incremental costs should be used. This frequent use of average cost data is probably due more to the unavailability of incremental cost data than to the ignorance of managers. An estimate of average cost is always available. The manager need only take the command's current budget and divide by the work units. Incremental costs, however, require the manager to know how the command's costs will change in going from one level of throughput to another; it requires detailed knowledge of how each of the command's many input costs react to different levels of training. The following section describes one method for estimating these incremental costs.

SECTION III

METHOD FOR OBTAINING INCREMENTAL COSTS

METHOD

The incremental costs measure the change in resource use occurring when the amount of training (AOB) is increased. Often these costs are estimated from time series cost data, and a prediction function is developed using various statistical methods. Future changes in costs which result from changing the training load are then estimated using the prediction function developed from these analyses. The inherent difficulty with this approach is that those prediction functions are based upon data that are unique as to time and place. The discrete nature of resources and the time period allowed for the management change impact significantly on determining the level of incremental costs. In addition, the incremental costs depend on the level of resources that are available at the time the anticipated change in AOB is to be implemented.

Due to the detailed operational knowledge required for developing incremental cost information, it was postulated that the best method for gathering this information was to directly query the lowest level managers who have responsibility for managing the resources. These individuals would have the most detailed knowledge of how operations would actually change in the event that the AOB was increased by any specific amount.

In order to demonstrate the usefulness of this approach estimates of the incremental costs were made for recruit training at NTC Orlando. Data collected was for the year 1978, and the range of training loads considered was from the existing AOB level of 6,000 through an AOB of 12,000.

There are two commands within NTC Orlando which experience a change in costs when recruit AOB changes. First is the Recruit Training Command (RTC) which has responsibility for conducting the basic training program for enlistees; second is the Naval Administrative Command (NAC) which has responsibility for providing ancillary support for the RTC; e.g., personnel, base operations, and comptroller services.

For accounting purposes, the NTC headquarters, RTC, and NAC are divided into administrative units or "cost centers." These cost centers are the smallest organizational elements for which cost accounts are maintained.

The cost center managers were selected as the candidates to be queried for the incremental costs. Appendix A is a list of the cost centers considered in this study. Each cost center supervisor was visited by a TAEG representative and given a survey form to complete. This survey form and a concise presentation of the theoretical background are provided in appendix B. These forms required that the managers estimate the changes in financial requirements for the following budget categories as AOB increased from 6,000 to 12,000:

Operation and Maintenance, Navy (O&MN)
Military Pay, Navy (MPN)
Other Procurement, Navy (OPN)
Other (subsistence, uniform issue).

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During the survey it became apparent that the cost center managers could not provide adequate estimates of military construction (MILCON) costs. The best MILCON cost estimates available were provided by the Public Works Department of NAC Orlando. Coincidentally, at the time of this study, the Public Works Department was formulating input data for a CNET study of the possible expansion of the Orlando Naval Training Center. CNET requested Public Works to submit requirements for several different scenarios involving different AOB levels at Orlando. Their input for that study was used to derive the MILCON incremental costs for this report.⁴

The next two subsections of this report discuss the data collected. The first is an "Analysis of One-Time Costs" and the second is an "Analysis of Recurring Costs."

ANALYSIS OF ONE-TIME COSTS

When increasing from the current 6,000 level to 7,800, it was determined that the Orlando NTC would require one new barrack, a special training division, a pool/field house, and new facilities for NAC recruit records.

If AOB levels increased from 7,800 to 10,000, the NTC Orlando would be required to expand the recruit in-processing facility, a galley, the Armory, the recruit reception center, the community center, and the fire fighting training facility. In addition, it would be necessary to construct one new barrack, a recruit in-processing barracks, a training building, and a drill deck. If the training center was required to further increase AOB from 10,000 to 12,500, the commander would have to construct two barracks and expand one additional galley.

Noticeable by their absence are any MILCON requirements for support functions; e.g., chapels, headquarters, security and fire departments, exchanges. This is due to the predictions by cost center managers and the Public Works Department that the projected doubling of the AOB could be handled by the existing support facilities.

The one-time incremental costs for the MILCON requirements are:

| <u>AOB</u> | <u>Incremental Costs (thousand \$)</u> |
|------------|--|
| 6,000 | -- |
| 7,000 | 3,000 |
| 8,000 | 3,100 |
| 9,000 | 8,900 |
| 10,000 | 9,400 |
| 11,000 | 2,600 |
| 12,000 | 4,900 |

⁴ NTC Orlando ltr of 8 Sep 1978, Subj: Feasibility Study for Shore Establishment Realignment of Recruit Training Command.

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Only two cost centers--the Recruit Training Command and the Communications Division, NAC--reported OPN requirements for an AOB increase from 6,000 to 12,000. RTC would require \$16.5K for miscellaneous items at the 9,000 AOB level, and the Communications Division would require \$8K at the 8,000 AOB level.

ANALYSIS OF RECURRING COSTS

Recurring annual incremental costs are summarized in table 2. These are the costs in O&MN, MPN (staff), MPN (recruit), subsistence, and clothing categories.

1. O&MN Costs. Table 3 shows how O&MN costs change by cost center. Note the significance of the costs for utilities. The exceptional increase at the 9,000 and 10,000 AOB levels is due to the corresponding increase in buildings required at that throughput.

2. MPN Costs. Table 4 summarizes how military personnel costs for staff vary as AOB changes. The MPN costs for students (see table 2), are noteworthy in that they are the most costly element of training--these expenses total \$6,624,000 per 1,000 AOB.

3. Food and Clothing Costs. The second and third most costly elements of expense revealed in this study are those for trainees' uniforms and subsistence (see table 2). Both these costs obviously vary directly with student loading--annual expenditures for subsistence total \$1,171,000 per 1,000 AOB units, and \$2,170,000 per 1,000 AOB units for clothing.

LIFE-CYCLE INCREMENTAL COSTS

The preceding two subsections outline the various costs--some recurring annually and others which are more of a one-time nature--that would be incurred at NTC Orlando.

In order to combine all these Orlando costs into a single estimate which could then be compared with single estimates for other training sites, discounting must be employed. For example, assume that the command is considering a 3,000 AOB increase in training and desires to consider NTC Orlando. Assuming further that MILCON projects have a life-span of 24 years and items of equipment last approximately 8 years, the incremental cost flow over a 24-year period is summarized in table 5.

In order to reduce the 24 annual total incremental cost figures into one life-cycle estimate, the analyst would discount the annual costs (col. 2, table 5) and sum according to the following formula:

$$\begin{array}{l} \text{Life Cycle} \\ \text{Incremental Cost} \end{array} = \sum_{i=1}^N \frac{C_i}{(1+r)^i}$$

TABLE 2. RECURRING INCREMENTAL COSTS--1978,
RTC ORLANDO (THOUSANDS \$)

| AOB | O&MN | MPN (Staff) | MPN (Recruit) | SUBSISTENCE | CLOTHING | TOTAL RECURRING INCREMENTAL COSTS |
|--------|-------|----------------|------------------|-------------|----------|--------------------------------------|
| 6,000 | -- | -- | -- | -- | -- | -- |
| 7,000 | \$279 | \$643 | \$6,624 | \$1,171 | \$2,170 | 11,166 |
| 8,000 | 295 | 770 | 6,624 | 1,171 | 2,170 | 12,830 |
| 9,000 | 447 | 684 | 6,624 | 1,171 | 2,170 | 9,296 |
| 10,000 | 401 | 663 | 6,624 | 1,171 | 2,170 | 11,109 |
| 11,000 | 262 | 684 | 6,624 | 1,171 | 2,170 | 10,911 |
| 12,000 | 429 | 730 | 6,624 | 1,171 | 2,170 | 11,124 |

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TABLE 3. OPERATION AND MAINTENANCE, NAVY (OMM) INCREMENTAL COSTS BY COST CENTER--1978
(THOUSANDS \$)

| Cost Center | Recruit Training Command | Dept. Personnel | Dept. MAC 70 | Clothing Division | Chaplain Dept. MAC 30 | Passenger Transportation Division MAC 25 | Photographic Division MAC 19 | Security Dept. MAC 08 | Food Service Division MAC 42 | Public Works Dept. MAC 50 (Utilities) | Communications MAC 13 | Postal Division MAC 12 | Logst. Division MAC 17 | Public Affairs Office NTC 05 | Safety Office NTC 09 | TOTAL OMM INCREMENTAL COSTS |
|-------------|--------------------------|-----------------|--------------|-------------------|-----------------------|--|------------------------------|-----------------------|------------------------------|---------------------------------------|-----------------------|------------------------|------------------------|------------------------------|----------------------|-----------------------------|
| AOB | 160 | 0 | 0 | 0 | 4 | 13 | 7 | 28 | 0 | 137 | 77 | 1 | 2 | 0 | 0 | 429 |
| 6,000 | 159 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 95 | 1 | 0 | 0 | 0 | 0 | 262 |
| 7,000 | 159 | 0 | 0 | 0 | 0 | 0 | 7 | 1 | 10 | 295 | 0 | 0 | 1 | 0 | 0 | 481 |
| 8,000 | 160 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 279 | 0 | 0 | 0 | 0 | 0 | 447 |
| 9,000 | 159 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 97 | 0 | 0 | 0 | 0 | 0 | 295 |
| 10,000 | 174 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 279 |
| 11,000 | 159 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 295 |
| 12,000 | 160 | 0 | 0 | 0 | 4 | 13 | 7 | 28 | 0 | 137 | 77 | 1 | 2 | 0 | 0 | 429 |

TABLE 4. STAFF MILITARY PAY (MPN) INCREMENTAL COSTS BY COST CENTER
(THOUSANDS \$)

| A08 | RTC | Security Dept. MAC 08 | Transient Personnel Dept. MAC 70 | Chaplain Dept. MAC 30 | Student Records Div. MAC 26 | Communi- cations Div. MAC 13 | Postal Div. MAC 12 | Legal Div. MAC 17 | Public Affairs Office NTC 05 | Comp- troller's Office NTC 04 | Total |
|--------|-----|-----------------------------|---|-----------------------------|--------------------------------------|---------------------------------------|--------------------------|-------------------------|---------------------------------------|--|-------|
| 6,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7,000 | 643 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 643 |
| 8,000 | 683 | 0 | 41 | 21 | 8 | 0 | 0 | 9 | 0 | 8 | 770 |
| 9,000 | 676 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 684 |
| 10,000 | 655 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 663 |
| 11,000 | 656 | 0 | 0 | 0 | 8 | 11 | 0 | 0 | 9 | 0 | 684 |
| 12,000 | 640 | 36 | 0 | 21 | 0 | 11 | 13 | 0 | 9 | 0 | 730 |

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TABLE 5. INCREMENTAL COST FLOW FOR A 3,000 AOB INCREASE AT THE NAVAL TRAINING CENTER, ORLANDO (THOUSANDS \$)

| Year | Total Incremental Cost | = | Recurring (Table 2, page 12) | + | Equipment (See page 11) | + | MILCON (See page 10) |
|------|------------------------|---|------------------------------|---|-------------------------|---|----------------------|
| 1 | 72,792 | | 33,292 | | 24,500 | | 15,000 |
| 2 | 33,292 | | 33,292 | | 0 | | 0 |
| 3 | 33,292 | | 33,292 | | 0 | | 0 |
| 4 | 33,292 | | 33,292 | | 0 | | 0 |
| 5 | 33,292 | | 33,292 | | 0 | | 0 |
| 6 | 33,292 | | 33,292 | | 0 | | 0 |
| 7 | 33,292 | | 33,292 | | 0 | | 0 |
| 8 | 33,292 | | 33,292 | | 0 | | 0 |
| 9 | 57,792 | | 33,292 | | 24,500 | | 0 |
| 10 | 33,292 | | 33,292 | | 0 | | 0 |
| 11 | 33,292 | | 33,292 | | 0 | | 0 |
| 12 | 33,292 | | 33,292 | | 0 | | 0 |
| 13 | 33,292 | | 33,292 | | 0 | | 0 |
| 14 | 33,292 | | 33,292 | | 0 | | 0 |
| 15 | 33,292 | | 33,292 | | 0 | | 0 |
| 16 | 33,292 | | 33,292 | | 0 | | 0 |
| 17 | 57,792 | | 33,292 | | 24,500 | | 0 |
| 18 | 33,292 | | 33,292 | | 0 | | 0 |
| 19 | 33,292 | | 33,292 | | 0 | | 0 |
| 20 | 33,292 | | 33,292 | | 0 | | 0 |
| 21 | 33,292 | | 33,292 | | 0 | | 0 |
| 22 | 33,292 | | 33,292 | | 0 | | 0 |
| 23 | 33,292 | | 33,292 | | 0 | | 0 |
| 24 | 33,292 | | 33,292 | | 0 | | 0 |

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where C_i are the annual incremental costs, r is the discount rate, and N is the life of the project in question. Assuming $r = 8\%$, the summed discounted costs for the preceding example, or the "life-cycle incremental costs," are \$403,106,000. If the analyst performs the same procedure at the other three training sites, the site with the lowest present value cost would be the most economical location to place the proposed 3,000 increase in AOB.

LIMITATIONS OF THE METHOD

The following constraints apply when using this method:

1. The AOB changes for which the costs are estimated must result from changes in the recruit entrance rate only. Changes in AOB resulting from other factors such as the setback rate, length of training, peak loading characteristics, and attrition rate, would require different survey questions.
2. Transportation costs for recruits from their homes to the training center were not included. These would be dependent upon the area of the country from where a center's AOB increase was coming from.
3. Bureau of Medicine (BUMED) expenditures were not included.
4. Peak and Off-Peak Costs. This cost analysis determined costs for average annual AOB levels. For example, the current AOB at RTC Orlando ranges from approximately 4,000 to 8,000, with an average of about 6,000. The tacit assumption in this study was that the distribution of the fluctuation would remain constant; i.e., a curve of the same shape as that in figure 1 would just move up and down, yielding various average AOB levels. This supposition enables avoiding the issue of how costs change as the peak load for any given average AOB level changes.

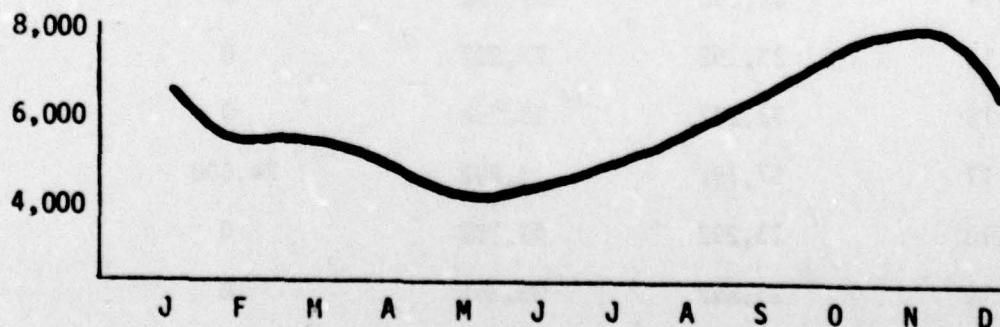


Figure 1. Recruit Loading at RTC Orlando (1978)

When facing a fluctuating workload such as the RTCs encounter in basic training, an economic trade off exists. With the maximum amount of fluctuation such as is experienced now, costs are incurred due to excess training capacity being carried during off-peak periods. On the other hand, to eliminate these

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excess capacity costs, the Navy would have to level-load and this procedure would be costly; e.g., perhaps bonuses would have to be paid to recruits in order to motivate them to join at a constant rate throughout the year. The trade off then is between excess capacity costs and load-leveling costs.

The costs of carrying the excess capacity versus the costs of inducing a constant and level input rate become the relevant economic issue. If the costs of leveling the load are less than the excess capacity costs, then the efficient course of action would be to level the load. For example, if it was determined that fluctuating enrollments caused a center to incur \$2 million in excess capacity costs and research revealed that \$1.8 million in enlistment bonuses would motivate sufficient numbers of recruits to change their habits so that level loading occurred, then the proper decision would be to pay the bonuses. However, if the recruits demanded \$2.6 million to change their habits, the efficient course of action would be to maintain the current fluctuating enrollment patterns.

SECTION IV

SUMMARY

When deciding where a proposed incremental level of recruit training should take place, the decision maker should ascertain the cost of the alternatives and select that site where the required training can be done most efficiently. The only relevant costs which should impact on the decision are the incremental costs at the various sites. The method used to collect the incremental cost information can identify those resource centers where management improvements can be made. Other procedures which compute the incremental costs from analysis of historical data would tend to obscure those individual areas where the discrete nature of resources tend to cause and/or contribute to excess capacity.

This study has demonstrated one procedure for collecting and analyzing the incremental cost information. It has demonstrated that in many of the cost centers excess capacity does in fact exist and that further expansion of the training loads can be easily handled with existing resources. In most of the cost centers where excess capacity exists, it occurs, not because of excess funding to those centers, but because of the discrete nature of the resources. If a function must be performed, then it often must be funded at some minimum level to be operationally effective. It would, therefore, be wrong to conclude that where excess capacity presently exists reductions in resources are feasible. Often, the only recourse management has to increase efficiency in the use of resources is to combine organization elements in such a way that functions can be combined.

There were a number of difficulties encountered with the use of this method for developing incremental costs. First, the method required an inordinate amount of coordinated effort to obtain the data from the various cost centers. Second, the cost center managers were involved primarily with short-run operationally oriented problems and could not provide estimates on any capital improvements which would be required to maintain the training capability. Third, difficulty was encountered when an attempt was made to collect cost information from the cost centers without specifying the management plan. Many of the functions for the cost centers are so highly interdependent that the requirements for capital funding depend upon the management plan adopted to handle any increased load. Several cost center managers could not determine changes in costs until they had a management plan available. Consequently, in this study it was necessary to ask RTC to provide a management plan for discrete levels of training loads between 6,000 and 12,000 AOB. Because this was an exploratory effort in the use of the incremental costing methodology, it became virtually impossible to obtain sufficient resources to develop totally acceptable implementation plans for the various AOB levels. It was fortuitous that CNET was involved in a realignment study at the same time and a management plan had been developed for that study. This management plan was adopted and used to complete this study.

CONCLUSION

It appears feasible to utilize the cost center survey methodology to determine reliable incremental cost estimates. In the application of this

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method to the RTC, it was apparent that excess capacity existed in a number of the cost centers and, consequently, a direct application of average costs to estimate the total incremental costs would result in erroneous estimates.

It does not appear economically feasible to utilize the method to develop a marginal cost function which could reliably be used to estimate the incremental costs over a specified range of training loads. However, it does appear feasible to utilize the method to develop a one-time incremental cost estimate for a given and specified change in the training load.

The success of the method requires that the command, with responsibility for the training, postulate the intended management plan for handling the changed load and that this management plan be available to the analysts before beginning the survey of the various cost centers. Since the development of these costs requires the commitment of resources at each cost center, the successful application of the method requires command emphasis and support.

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APPENDIX A

COST CENTERS

The following cost centers within the Naval Training Center (NTC), Orlando, were surveyed. Included were NTC staff, Naval Administrative Command (NAC), and the Recruit Training Command (RTC) cost centers. Cost centers funded by the Bureau of Medicine were not included in the study.

Only those cost centers preceded by an asterisk (*) reported that doubling the recruit training throughput would have an effect on the cost centers' costs. Managers of the remaining centers reported that costs would not increase if recruit AOB increased from 6,000 to 12,000.

| <u>Cost Center Code</u> | <u>Cost Center Title</u> |
|-------------------------|---|
| NTC OA0 | NTC Commander and staff. |
| NTC OA1 | Equal Employment Opportunity Office--advises and assists the Commander in all matters concerning employment discrimination at the center. |
| NTC OA2 | Management Assistance Office--performs managerial analyses and suggests ways to improve efficiency. |
| NTC OA3 | Training and Plans Office--assists the NTC Commander in training of recruits and school students. Functions include liaison with RTC and SSC, planning, and analyses of automated personnel management information. |
| *NTC OA4 | Comptroller Office--provides financial management services, including programming and budgeting, accounting, and reviews. Promotes efficiency within the command. |
| *NTC OA5 | Public Affairs Office--advises and assists the Commander on matters of public affairs. |
| NTC OA6 | Consolidated Civilian Personnel Office--provides CPO services to the center plus all tenant activities. |
| *NTC OA9 | Safety Office--provides safety engineering services to the center plus all tenants. |
| NAC 00 | Commanding Officer and Executive Officer. |
| *NAC 02 | Legal Department--provides legal services to the center and tenants. |
| NAC 07 | First Lieutenant Department--administers the BEQ management program, housekeeping supplies, light maintenance, and grounds keeping. |
| *NAC 08 | Security Department--directs and coordinates internal security and fire fighting for the base. |

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| <u>Cost Center Code</u> | <u>Cost Center Title</u> |
|-------------------------|---|
| NAC 087 | Fire Protection Division--provides fire fighting services for the base. |
| NAC 071 | BEQ Management Division--manages the berthing facilities for enlisted personnel assigned to the center and tenant activities. |
| *NAC 012 | Postal Division--administers postal services for the center. |
| *NAC 013 | Communications Division--administers communication support for the center. |
| NAC 018 | BOQ Management Division--manages the berthing facilities for officer personnel with the center and tenant activities. |
| *NAC 109 | Photographic Branch--the branch of the Audio-Visual Division which provides photographic services for the command. |
| NAC 020 | Military Personnel Department--maintains military records, processes personnel transactions, and arranges for commercial transportation for active duty personnel assigned to the center and its tenants. |
| NAC 022 | Staff Personnel Division--performs the personnel functions for assigned active duty staff. |
| *NAC 023 | Recruit Processing and Classification Division--performs the personnel functions for assigned recruits at the RTC and its tenants. |
| NAC 024 | Education Services Division--provides all education services for the assigned military personnel, including provision of the center library. |
| *NAC 025 | Passenger Transportation Division--operates base transportation facilities, including the center bus system. |
| *NAC 026 | Student Records Division--maintains military personnel records for students assigned to the center. |
| *NAC 030 | Chaplain Department--provides professional religious resources for all tenant commands and eligible personnel. |
| NAC 031-039 | Clubs, Open Messes, and the Package Store. (Only NAC 037, EM Club, reported that an AOB increase would affect costs.) |
| NAC 040 | Supply Department--manages supplies for the center and its tenants; provides for shipment of household goods for transferred personnel. |

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| <u>Cost Center Code</u> | <u>Cost Center Title</u> |
|-------------------------|--|
| *NAC 045 | Clothing Division--manages the supply of uniforms to recruits. |
| *NAC 042 | Food Services Division--provides messing services for individuals assigned to the center. |
| NAC 046 | Special Services--recreational and welfare services are provided for the center and its tenants. |
| NAC 070-073 | "Human Goals"--provides counseling and other assistance for drug and alcohol abuse related problems. |
| *NAC 080 | Transient Personnel Department--receives and accounts for all personnel who report to COMNTC, Orlando, in a status other than "for duty." |
| NAC 083 | Navy Band, Orlando. |
| *NAC 050 | Public Works Department--performs design, construction, maintenance, and repair of public works for the NAC and tenant activities. |
| SSC | Service School Command--provides initial skill, advanced, and specialized training for enlisted personnel of the Regular Navy, Naval Reserve, and the Coast Guard and also foreign officer and enlisted personnel. |
| *RTC | Recruit Training Command--conducts recruit and apprentice training. |

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APPENDIX B

SURVEY FORM

The survey form was delivered to the cost center supervisors by a representative of TAEG. The request in this survey for short-run cost data yielded results which were incomplete and unusable. Such short-run data would only be useful for short-run (less than a year) budget planning. The request for the more important long-run data yielded responses which were both more comprehensive and of higher quality.

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SURVEY OF NTC COST CENTERS TO COLLECT INCREMENTAL COST INFORMATION

BACKGROUND INFORMATION

Our objective in collecting the cost information on the following forms is to develop a cost function showing how the costs will change as the loading (or AOB) changes. We are most interested in determining incremental costs and accordingly will not ask you to make any cost allocations (of your existing budget) among the activities which your particular cost center might serve. We will, however, focus upon a particular training activity and ask you to determine how your costs might change as the AOB of that activity changes.

There are two forms for collecting the cost information. Form A requests estimates of the additional funding which would be required for short-term expansion of the existing training load. In completing form A assume a period of not more than 1 year and consider how the funding requirements should change if the identified changes in AOB were to take place within that period. Obviously within such a short period many resources cannot be adjusted to the changed training requirements. In such a short period one could not acquire or use additional MILCON funding, and funds for acquisition of capital equipment would be severely constrained. In the short-term any additional training can be accomplished only by a more intensive use of existing resources. Consequently the additional funding requirements will be largely in the area of O&MN and MPN funds.

Costs can increase in one of two ways as the training load increases. When costs are directly and proportionately related to the increase in training, then we are dealing with continuous cost relationships. If the cost relationships are continuous, then state how costs change by indicating the cost function. For example, if the cost function is continuous, an adequate response on the form would be to state the "dollars per AOB."

When costs are directly related but only increase in fixed increments as the training load increases, then the cost function is discrete. When the cost function is discrete then increments must be identified for the changes in AOB in the left two columns of the form. For example, the first increment for costing may be between the current loading of 6,000 AOB to 7,000 AOB. The second increment may be for 6,000 AOB and 10,000 AOB.

Form B requests incremental cost information which is to be based on the assumption that sufficient time is allowed to construct and acquire capital resources which are authorized and most efficient in meeting the training obligation. Accordingly, there may be additional requirements for MILCON and OPN funding. If you do not have the information to determine the cost of the additional facilities or equipment, then simply indicate the type and quantity of additional resources and the cost of those resources will be determined by TAEG.

The costing categories on form B should be selected on the basis of those most appropriate for the component being costed. For example, the DOD construction criteria manual specifies that barracks should not be constructed

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for less than 300 persons, so if the cost component being estimated were barracks then the increments would have to be in blocks of at least 300. Therefore, the increments would be at least 6,000 to 6,300; 6,000 to 6,600, etc.

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