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This report describes the development of an heuristic approach for automating the personnel allocation system for enlisted personnel. The automated personnel allocation process makes the computational procedure efficient and provides a basis that can eventually be used to develop an integrated personnel distribution system.

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AUTOMATED ENLISTED PERSONNEL ALLOCATION PROCESS: DEVELOPMENT AND TESTING

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AUTOMATED ENLISTED PERSONNEL ALLOCATION PROCESS: DEVELOPMENT AND TESTING

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FOREWORD

This research and development effort was conducted in support of Navy decision coordinating paper Z0011-PN (Personnel Assignment Systems) and was sponsored by the Deputy Chief of Naval Operations (Manpower, Personnel, and Training) (DCNO (MPT)). The objective of this project is to develop computer support systems to distribute persons to jobs more accurately and efficiently.

This report describes the development of an automated personnel allocation process for enlisted personnel. This system not only makes the computational procedure efficient but also makes execution of multiple allocation policies feasible. It provides a basis that can eventually be used to develop an optimization technique for an integrated personnel distribution system.

Acknowledgements are due to LCDR J. C. Varley, PNCM L. R. O'Quinn, and PNCM J. A. Pridgen of the Enlisted Personnel Management Center (EPMAC) for their guidance and assistance in providing an overview of the existing system, direction for improvement, and data inputs, and to Mr. Mercer Harz of EPMAC for systems adaptation of the new allocation system at EPMAC.

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SUMMARY

Problem

One of the main functions of the Navy's personnel distribution system is the allocation of personnel assets to fleet sectors or "composites." The major task of the allocation function is to estimate a set of numerical quotas on how a composite's jobs are to be filled quantitatively. This set of numerical quotas results from consideration of various allocation policy criteria and is used as one of the most important guidelines for making personnel assignments. Basically, the current allocation process is a manual process, requiring routine and frequent computations to estimate the numerical quotas. It is a time-consuming and cumbersome process that is problematic in estimating allocations correctly when all criteria must be considered simultaneously.

Objective

The objective of this effort was to develop an automated enlisted personnel allocation process.

Approach

A heuristic iteration process was developed to automate personnel allocation. The numerical allocations can be obtained by sequentially iterating the number of available personnel in the order of the relative importance of the allocation criteria.

Results

The allocation process was tested not only by using the existing criteria such as for sea/shore balance, manning control authority (MCA) balance, and billet priority, but also by using the proposed male-female balance criterion. Results seem encouraging. A numerical example is included for the fireman (FN) rating to show how the available personnel can be allocated to 36 composites to meet the multiple allocation criteria.

Conclusion

From an operational viewpoint, the allocation process developed in this effort provides a simpler and faster process for detailers and allocation managers than does the existing process. Since all the criteria are implicitly included, detailers need only to input the total number of available personnel. The computer will automatically estimate a set of allocation goals for various composites. From a policy planning viewpoint, the new process could be used to (1) evaluate the impact of the changes in any or all of the multiple allocation critieria and the order of the relative importance of the criteria, and (2) to assess the impact of new allocation policies.

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INTRODUCTION

Background

The purpose of the Navy personnel distribution system is "to provide personnel, in quantity and quality, to meet the Chief of Naval Operations stated manpower needed for each naval unit to accomplish its mission, and to simultaneously satisfy the personal desires and professional needs of the individual."[1] The distribution system is made more complex by inventory/job mismatches, permanent change of station (PCS) budgets, and personnel management policies pertaining to assignments, job priorities, career enhancement, and career motivation. To cope with these multiple goals and constraints, quantitiative techniques are needed to best obtain personnel distribution goals with limited resources.

The major functions of the Navy's personnel distribution system are allocation control, manning control, and assignment control. Within the enlisted personnel distribution system, these functions are performed by three different activities. These functions are described below.

1. Allocation control. The Naval Military Personnel Command (NMPC) projects composite manning levels to provide a numeric allocation to each composite of personnel who are available for assignment. In the allocation process, Navy jobs are divided into skill groups known as distribution communities. Within each distribution community, jobs are further subdivided into composites comprised of jobs of like credit for rotation (e.g., sea duty, shore duty) and/or broad warfare qualifications (e.g., submarine qualification). Within each composite, jobs are identified by the manning control authority (MCA) (CINCLANTFLT, CINCPACFLT, or COMNAVMILPERSCOM) to which the unit is assigned and whether or not the unit has been authorized a directed manning level by the Chief of Navy Operations (CNO priority manning). In-place personnel assets are identified by distribution community, composite, MCA, and CNO priority in the same manner as are jobs. Personnel assets that are available for assignment are allocated to composites, distribution communities, CNO priority jobs, and then to MCAs based on skills, rotational eligibility, special qualifications, and relative manning levels. Since the number of in-place personnel assets and the number of personnel assets available for assignment are in a continual state of flux due to the dynamics of accession, training, assignment, attrition, and retention, the allocation plan must be periodically remeasured and recomputed. This allocation process provides each MCA with a projected level of manning by distribution community and composite for all the jobs in all the units assigned to that MCA. More importantly, it provides to the assignment control authority (ACA) an allocation plan that must be followed if projected manning levels are to be achieved.

2. Manning control. The Enlisted Personnel Managment Center (EPMAC) apportions a composite's projected strength to each unit within the composite to establish a quantitative and qualitative definition of jobs to be filled. The three MCAs all establish their own manning policies and priorities within the constraints of standardized support systems that are maintained and operated by EPMAC. The manning control function has two major processes:

a. The manning process, which consists of apportioning the projected strength of a distribution community for an MCA's composite to all the units within that

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[1] A Functional Description of the U.S. Navy Personnel Distribution System, Department of the Navy, October 1979, p. 1-1.

composite. This process results in the establishment of a manning plan for each unit by distribution community.

b. The placement process, which consists of (1) measuring vacancies and excesses to the manning plan within each distribution community for each unit, (2) prioritizing the job vacancies for a distribution community within the MCA's composite, and (3) communicating to the ACA a prioritized listing of jobs to be filled. Vacancies to the plan are called requisitions and an MCA's entire prioritized listing of vacancies for a distribution community is known as an enlisted personnel requisition listing. The requisition listing developed by an MCA for a composite represents a detailed description of jobs to be filled by that MCA's numeric allocation of personnel available for assignment.

3. Assignment control. The staffs of the fleet commanders in chief (FLTCINC) are responsible for identifying and assigning individuals to jobs. This involves matching an individual's skills, professional needs, and personal desires to a job vacancy. The matching process may be constrained by (a) higher authority directing that an individual be assigned to a specific job, (b) budgets that are insufficient to move an individual to the most urgent need for his or her skill or to the area of his or her preference, (c) insufficient inventory of a specialized skill or a limited training facility, which result in some jobs being filled with individuals of less than the required qualification level, or (d) humanitarian consideration of a dependent's inability to accommodate an assignment successfully. The matching process results in the assignment of an individual to a job.

Two organizations manage the enlisted personnel allocation and assignment functions. COMNAVMILPERSCOM (N-4) is responsible for the allocation and assignment of all rated and designated enlisted persons; and CO, EPMAC, for the allocation and assignment of all nonrated undesignated apprenticeships. The methods used to estimate allocation quotas by NAVMILPERSCOM and EPMAC are similar. A set of snapshot estimates of allocation goals are made once a month. The goals are fixed for the entire ensuing month, since there is no way to account for daily changes in the status of individuals and jobs. Detailers in the assignment offices use these allocation goals as a set of guidelines to make "wholesale," composite-level decisions regarding groups of individuals available for assignment. When large groups of individuals become available for assignment late in the month, credibility in the established goals is shaky and attempts are made to hand-calculate new estimates of allocation quotas.

The general rule for determining allocations is to strike a balance, whether it be among communities, among MCAs, or between sea and shore duty. However, Navy policy requires that available personnel be allocated and assigned to those jobs authorized CNO-priority manning before any allocation or assignment is made to other jobs. Each of the four types of allocations can be subject to management controls expressed as minimum manning percentages, maximum manning percentages, or fixed directed levels. Detailed procedures for each type of allocation are presented as follows.

1. Sea/shore Balance. Normally, individuals are identified as sea-eligible or shore-eligible, based on their duty history and the rotation policy established for their community. In the case of personnel with no duty history, assignment to sea or shore duty is based on numeric allocations that have been computed to achieve specific distribution goals. Currently, the ACA may establish a minimum manning level at sea and a maximum manning level at sea. If a minimum or maximum level has not been established for a community, personnel are allocated to achieve and maintain balance. If a minimum sea manning level has been established, that level must be reached before balance can be

considered. When an established maximum sea manning level has been reached, all remaining available personnel are allocated ashore.

NAVMILPERSCOM and EPMAC use minimum and maximum manning levels for each community and the number of personnel projected to be on board versus billets authorized for a given future month on the day a snapshot of the files is taken to calculate the numeric allocation quotas required to (a) achieve the minimum manning level, (b) achieve balance, and (c) maintain balance until the maximum level is achieved. Detailers then use these gross numeric quotas as guidelines for assigning personnel who have no predetermined sea or shore eligibility. Whenever a group of people is available for assignment, detailers must manually calculate the actual allocation for this group of available personnel based on the gross numeric goals as well as all the previous assignments made during the month.

2. Community balance. While Navy jobs and in-place personnel assets belong to well-defined distribution communitites, some personnel who are available for assignment are eligible for jobs in more than one community. In normal circumstances, the allocation of such individuals is governed by an established hierarchy of previously earned skills. Some distribution communities, however, are transitory in nature and do not require a specific previously identified skill as a measure of eligibility for assignment into the community. Allocation managers would like to automate the establishment of allocation quotas for these communities based on the relative strength of all contributing distribution communities. At present, however, they rely primarily on primitive manual calculations to correct problems that have arisen due to the absence of a formal community allocation precedure.

3. CNO-priority manning levels. All jobs and in-place personnel assets falling in the CNO-priority manning category are excluded from calculations made to determine quotas for sea/shore balance or balance among MCAs. ACA is obligated to commit personnel assets to fill jobs in the MCA's requisition listing identified as being CNO-priority jobs before consulting allocation quotas for the remaining assets. Allocation managers account for the demand of CNO-priority manning when projecting composite strength within a community but rely soley on the MCAs to communicate the demand to the ACA through the requisition listing.

4. MCA balance. The two steps used to achieve MCA balance within a composite are to (1) allocate people to the MCA with the lowest manning until its manning is raised to a level that matches the manning of another MCA, and (2) allocate people to equalize the manning for all three MCAs. After all three MCAs are at equal manning levels, all further allocations are made to maintain the balance.

Based on these criteria for each skill group, NAVMILPERSCOM and EPMAC calculate a number called the first need, two numbers called the second need, and three percentages called the third need. The first need is the number of people that must be allocated in a month to raise the lowest-manned MCA to the same level as the next lowest-manned MCA. The second need is the number of additional people that must be allocated to the two lowest-manned MCAs to raise their manning to match the manning of the third MCA. After manning has been equalized among all three MCAs, the third need represents a percentage for each MCA of any additional personnel available for assignment. These numbers and percentages are used as guidelines for detailers. As was the case with sea/shore balance, whenever personnel are available for assignment, the detailers must manually calculate how they should be allocated. The actual allocations

are determined based on the general allocation goals as well as cumulative assignments from the time the goals were determined.

Problem

Currently, a two-stage procedure is used to estimate personnel allocations to achieve sea/shore or MCA balance. The first stage estimates the total number of personnel required to meet a set of goals, and the second determines how a given set of available personnel should be allocated to approach those goals. There is no automated procedure involved in estimating the allocation of available personnel or in establishing goals for community balance and CNO-priority manning. The current manual procedure of estimating the allocation of available personnel for each to the skill groups several times a month is cumbersome and time-consuming.

Community balance, CNO-priority manning levels, sea/shore balance, and MCA balance are not separate issues. When a person is selected to do a job, he or she is going to be assigned to a distribution community, to a composite, to a unit that may or may not be authorized CNO-priority manning, and to one of the MCAs. The assignment of persons to jobs affects community balance, sea/shore balance, MCA balance, and compliance with CNO-directed manning levels. Serious questions have been raised about whether the manual process is capable of estimating accurate numeric allocations to achieve directed manning levels, community balance, sea/shore balance, and MCA balance simultaneously.

NAVMILPERSCOM and EPMAC are considering the addition of more criteria to the allocation process (e.g., male-female balance). If more criteria were involved in personnel allocation, it would be increasingly difficult or even impossible to use the existing manual process.

The enlisted distribution projection system (EDPROJ), which projects the Navy's distributable inventory 7 months in the future based on a snapshot of personnel statistics at the end of each month and computes fixed allocation goals for the projection month, is the cornerstone of the current allocation process. EDPROJ is updated every month and cannot account for daily fluctuations in personnel levels that change the actual allocation needs among communities, composites, MCAs, and CNO-priority jobs. An automated system is needed that can incorporate existing and new allocation criteria and be updated frequently (i.e., two or three times a week) to reflect personnel dynamics and the cumulative affect of actual personnel assignments.

Objective

The objective of this effort was to develop an automated enlisted personnel allocation process. This process should be capable of:

1. Consolidating the current two-stage allocation procedure into a one-stage procedure using available personnel as direct input.

2. Providing faster and more acurate estimates for allocation.

3. Including all the existing allocation criteria and providing a means for adding new allocation criteria.

4. Incorporating daily personnel flows.

APPROACH

An heuristic iteration process was developed to estimate the allocation of seaman (SN), fireman (FN), and airman (AN) personnel. The major input is the total number of available personnel; the output is a set of numerical quotas to various composites, as defined by male/female community groups, billet priority groups, sea/shore duties, and MCAs.

Allocation for Community Balance

Many billets in the Navy are restricted to male personnel and others, to female personnel. Billets that do not have special sex restrictions are called "mixed" billets. The allocation among these three community groups--male, female, and mixed--is becoming increasingly important to the Navy. In this research, a method was developed to allocate personnel to the three groups. A set of minimum and maximum requirements was used to guide allocations to the three groups in terms of lower and upper bounds; and a balance goal, to guide allocations within these bounds. The final allocation satisfies both the requirements and the goals.

Figure 1 shows how the available personnel should be allocated to the three community groups. The method derived in this effort used a general allocation criterion to "balance" manning among the three groups as follows:

1. Allocate male personnel to the male group and female personnel to the female group until the manning levels of these groups meet minimum manning requirements.

2. Allocate the remaining personnel to the three groups such that the differential between the largest and the smallest mannings is minimized.

3. Allocate male or female personnel to the mixed group when male or female manning reaches the maximum manning level.

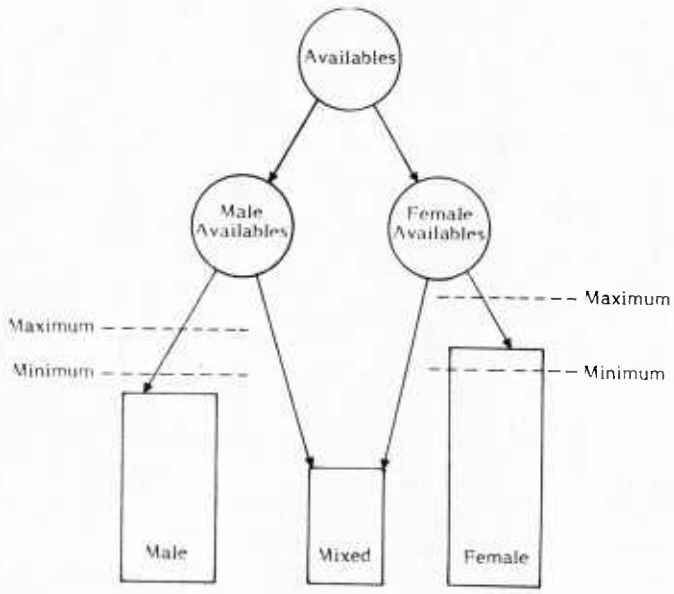

Figure 1. Personnel allocation among community groups.

The rationale of "balancing" the three community groups by minimizing the manning differential is based on the fact that the three groups are not mutually exclusive. It is unlikely that the three mannings can always be equalized. The Navy cannot allocate a person to any one of the groups. A male can be allocated only to the male and mixed groups; and a female, only to the female and mixed groups. Under this condition, the best way to "equalize" the three mannings is to allocate a person to the group that could reduce the differential between the largest and the smallest mannings, using an iteration process. To make the iteration process work well, the method noted above was modified as follows:

1. Allocate all male personnel to the male group and all female personnel to the female group.

2. If the male or female manning exceeds the maximum manning limit, shift excess males and females to the mixed group.

3. Determine which group has the largest manning.

4. Stop the process if the manning for the mixed group is the largest. Otherwise, allocate one person from the group with the largest manning to the mixed group, if this allocation would not make the manning of the largest group drop below the minimum manning requirement and the manning of the mixed group become the largest manning.

5. Repeat step 4 until a shift of any person from the male group or the female group violates its minimum requiremnt or makes the manning differential bigger.

Allocation for CNO-priority Manning Levels

The two groups of job priorities of concern to enlisted allocation are (1) CNO-priority 1 and 2 billets for high priority jobs that require a 100 percent fill and (2) all the rest of the jobs. Allocating personnel to billet priority groups is very simple. The Navy first allocates its personnel to fill all the CNO-priority billets and then allocates the remaining personnel to the non-CNO-priority billets (see Figure 2).

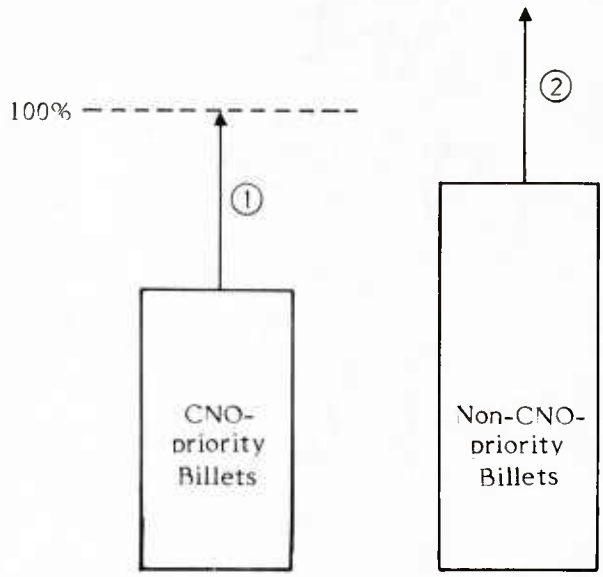

Figure 2. Personnel allocation between CNO-priority and non-CNO-priority billets.

Allocation for Sea/Shore Balance

A new procedure was developed to automate the sea/shore allocation process in order to provide faster and more accurate allocation estimates and for use for policy analysis.

Figure 3 shows how allocations should be made between sea duty and shore duty. For this example, assume that (1) the current manning for sea duty is 90 percent, (2) the current manning for shore duty is 97 percent, (3) the minimum manning requirement for sea duty is 95 percent, and (4) the maximum manning requirement for shore duty is 105 percent. Based on these figures, the following procedure would be used to achieve sea/shore balance:

1. Allocate personnel to sea duty to raise sea manning to match its minimum manning of 95 percent.

2. Allocate personnel to raise the sea manning to match the shore manning of 97 percent.

3. Allocate personnel to increase both mannings from 97 percent proportionally.

4. Allocate the rest of the personnel to sea duty after the shore manning reaches 105 percent.

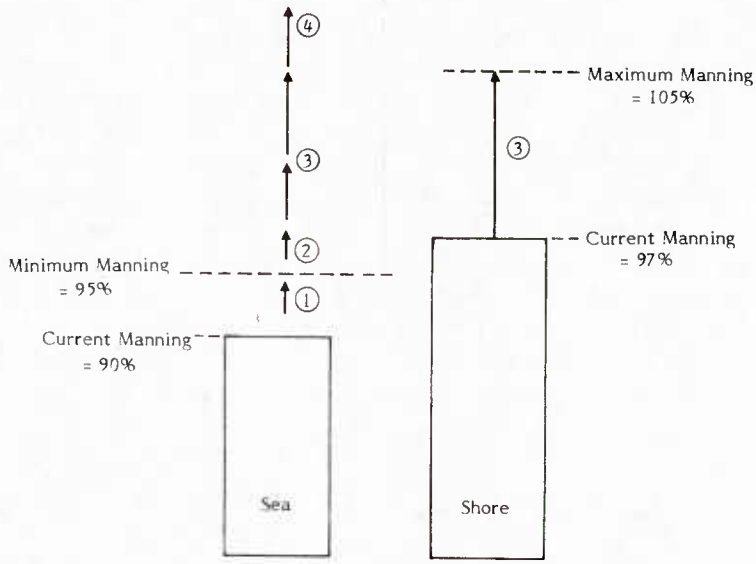

Figure 3. Personnel allocation between sea and shore duty.

The current procedure to achieve sea/shore balance is to compute first need, second need, etc. If there are 900 personnel available for allocation and assignment on the first day of the allocation period, they can be allocated directly based on these numerical goals. However, if an additional 280 personnel are available on the third day of the same period, these 280 persons cannot be allocated based simply on the allocation goals. Rather, the final assignment decision of the 900 available personnel from the day before has to be considered. Since the assignment of the first 900 persons affects composite manning, it affects how the next 280 persons should be allocated.

To solve these problems, an iteration process was developed to estimate numerical allocations directly from the number of available personnel. The allocation goals are implicitly considered during the iteration process. The up-to-date personnel file, which is used to compute current and projected manning, includes not only the final up-to-date assignments but also the daily loss of personnel. The input for this approach is the 280 persons described above and the output is a set of two numbers; that is, the numerical allocations for sea duty and for shore duty. This iteration process includes the following steps:

1. Allocate available personnel to the duty that has a minimum manning requirement to raise its manning to match the minimum manning.

2. Allocate each additional person to the duty with lower manning and recompute the manning by including this additional person.

3. Repeat step 2 until the duty that has maximum manning reaches the maximum manning level. (This iteration process consolidates two steps: (a) raising one manning to match another and (b) raising the two mannings proportionally.)

4. Allocate the rest of the personnel to the duty that does not have a maximum manning limit.

Allocation for MCA Balance

The objective of allocation for MCA balance is to achieve equal manning. Figure 4 illustrates this by assuming the current mannings for the LANTFLT, PACFLT, and NAVMILPERSCOM MCAs are 80, 75, and 95 percent respectively. At present, MCA balance is achieved by (1) raising PACFLT manning to match LANTFLT manning, (2) raising PACFLT and LANTFLT mannings to match NAVMILPERSCOM manning, and (3) after the three mannings are equal, computing a set of percentage shares based on billet proportions. Allocation beyond this point is based solely on the percentage shares. Therefore, in the current procedure, it is necessary to compute a first need, second need, and third need, which are used as allocation goals. Whenever a group of people is available for allocation, additional computations are required.

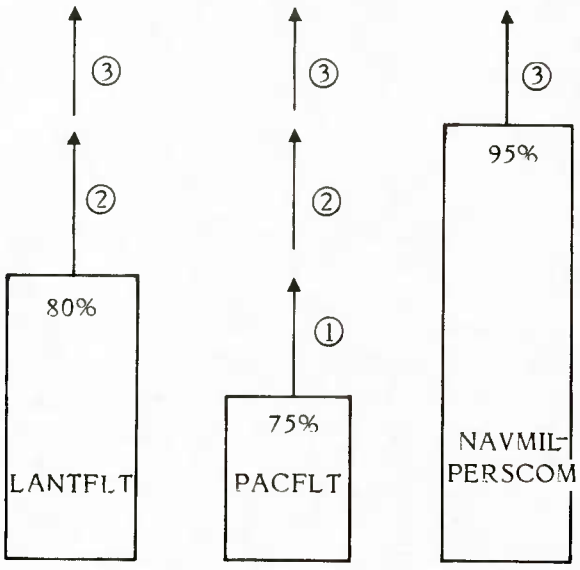

Figure 4. Personnel allocation among MCAs.

As with sea/shore balance allocation, an iteration process was developed to estimate numerical MCA allocations directly from the number of available personnel. The concept of the first, second, and third needs is used implicitly as an intermediate step to generate numerical allocations. The existing multiple-stage allocation procedure can be expressed by a single iteration proccess. The final numerical quotas can be estimated by allocating each additional person to the MCA with the lowest manning.

For example, if 900 personnel are available, the first person should be allocated to the MCA with the lowest manning. In the example shown in Figure 4, the PACFLT MCA has the lowest manning. Thus, the first person would be allocated to PACFLT. If, after this allocation, PACFLT's manning is still the lowest, the second person should also be allocated to PACFLT. When PACFLT's manning increases to more than 80 percent, making LANTFLT's manning the lowest, the next person would be allocated to LANTFLT. The iteration process continues until all 900 persons are allocated. This process results in a set of three numbers that show how many persons should be allocated to the LANTFLT, PACFLT, and NAVMILPERSCOM MCAs.

Overall Allocation

The above sections demonstrate how the numerical quotas can be estimated separately for each of the allocation criteria. Since these criteria are not independent of each other, the overall allocation procedure is a sequential combination of procedures for all criteria that is used to estimate allocation by considering all the criteria simultaneously.

When multiple allocation criteria are involved in the decision-making process, the relative importance of the criteria must be determined. If, for example, the relative importance of the criteria were male/female community groups, billet priorities, sea/shore duties, and MCAs, in sequential order, the overall allocation procedure would be developed by connecting all the single criterion one after another. As shown in Figure 5, the Navy would (1) allocate available personnel to the three male/female community groups, based on the criteria for community allocation, (2) allocate the allocated personnel to the two billet priority groups, and (3) allocate the personnel to the two sea/shore duties and the three MCAs. There are a total of 36 possible composites for this case. Given the number of available personnel, this procedure will provide a set of 36 numerical quotas for 36 composites resulting from consideration of all the allocation criteria.

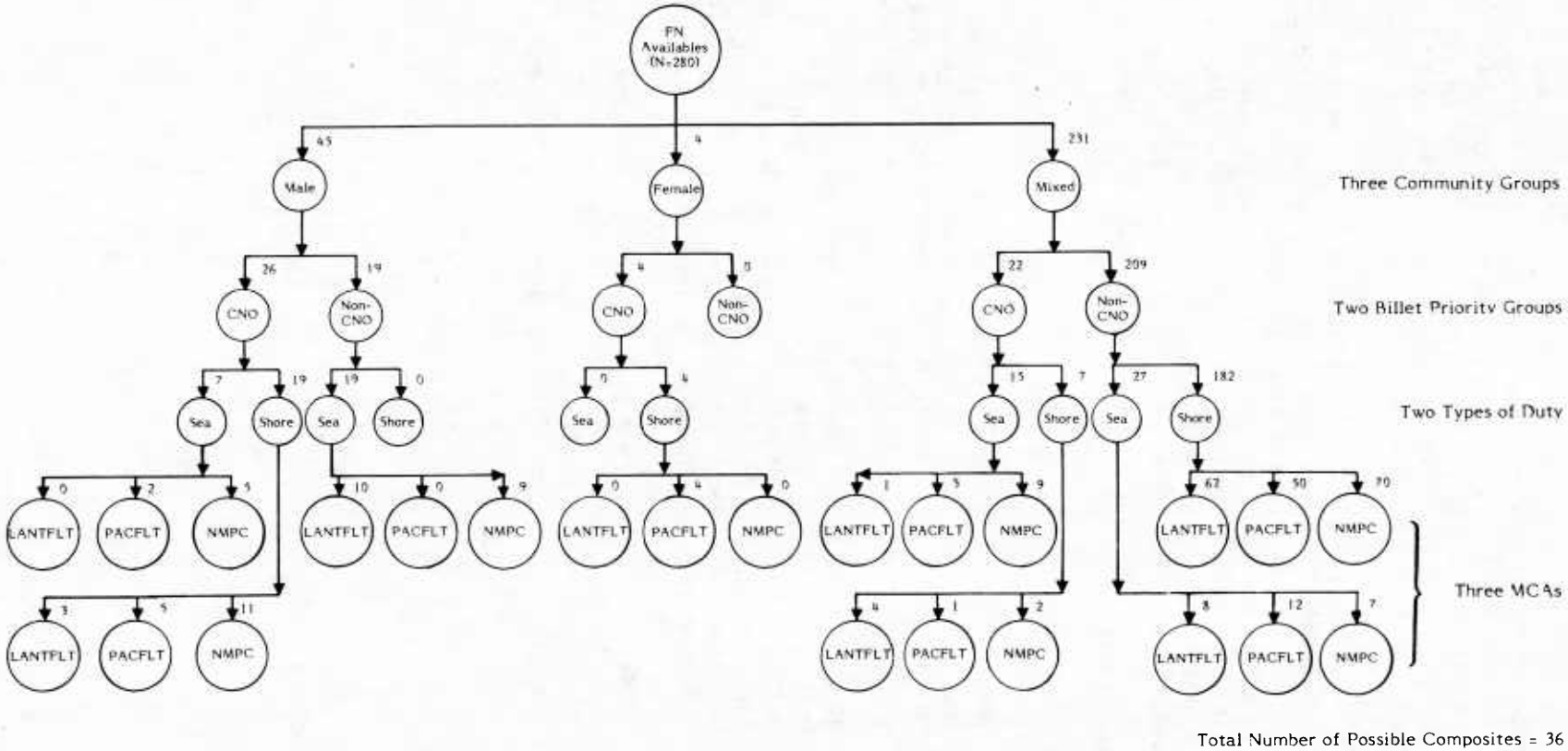

Figure 5. A sequential allocation procedure for FN availables (N = 280)

RESULTS

A computer program was written and the procedure developed was tested, using hypothetical data, with satisfactory results.

Tables 1 through 5 illustrate sample outputs if there are 280 FN personnel available for allocation. Table 1 shows how these 280 personnel are allocated among the three communities. Table 2 demonstrates how the mixed community allocation (N = 231) can be further allocated to the billet priority and sea/shore groups. Table 3 provides statistics for the mixed-community, non-CNO-priority allocation (N = 209). Table 4 shows how the mixed community, non-CNO-priority, shore-duty allocation (N = 182) can be further allocated to the three MCAs. Table 5 shows how the mannings are changing toward balance by sea/shore duty and MCA for various combinations of community and billet priority groupings. Finally, Table 6 shows detailers where the 280 FNs should be allocated.

Table 1

Allocation of FNs (N = 280) to Community Groups

FNs	Community Group			Total
	Male	Female	Mixed	
Male	45	0	155	200
Female	0	4	76	80
Total	45	4	231	280

Note:

Male manning--min = 100%, max = 0%.
Female manning--min = 100%, max = 0%.

Table 2

Allocation of FN Mixed-community Allocation (N = 231) by Billet Priority Group and Sea/Shore Duty

Billet Priority Group	Sea Duty	Shore Duty	Total
CNO-priority			
NMPC	9	2	11
LANT	1	4	5
PAC	5	1	6
Total	15	7	22
Non-CNO-priority	27	182	209
Total	42	189	231

Table 3

Statistics for Allocation of FN Mixed-community, Non-CNO-priority Personnel (N = 209) to Sea/Shore Duty

Duty	Min	Balance	Dist. (%)	Max	Remainder	Total
Sea	0	0	81	27	0	27
Shore	0	21	19	161	0	182
Total	0	21	100	188	0	209

Table 4

Allocation of FN Mixed-community, Non-CNO-priority, Shore-duty Allocation (N = 182) to MCAs

MCA	Need 1	Need 2	Split 2	Dist.	Remainder	Total (%)
NAVMILPERSCON	0	2	67	40	68	70
LANTFLT	0	0	0	36	62	62
PACFLT	7	1	33	24	42	50
Total	7	3	100	100	172	182

Table 5

Summary Statistics for FN Mixed-community, Non-CNO-priority, Sea/Shore Groups (N = 209)

Duty/MCA	Billet	Personnel On Board	Manning (%)	Available Personnel	Total N	Total %
Sea:						
NAVMILPERSCOM	4500	4493	100	7	4500	100
LANTFLT	3500	3492	100	8	3500	100
PACFLT	2500	2489	100	12	2501	100
Total	10500	10474	100	27	10501	100
Shore:						
NAVMILPERSCOM	1000	991	99	70	1061	106
LANTFLT	900	894	99	62	956	106
PACFLT	600	588	98	50	638	106
Total	2500	2473	99	182	2655	106
Total:						
NAVMILPERSCOM	5500	5484	100	77	5561	101
LANTFLT	4400	4386	100	70	4456	101
PACFLT	3100	3077	99	62	3139	101
Total	13000	12947	100	209	13156	101

Table 6

Final Allocation of Available FN Personnel

Community	Billet	Duty	MCA	Available Personnel
Male	CNO-priority	Sea	NAVMILPERSCOM	5
Male	CNO-priority	Sea	PACFLT	2
Male	CNO-priority	Shore	NAVMILPERSCOM	11
Male	CNO-priority	Shore	LANTFLT	3
Male	CNO-priority	Shore	PACFLT	5
Male	Non-CNO-priority	Sea	NAVMILPERSCOM	9
Male	Non-CNO-priority	Sea	LANTFLT	10
Female	CNO-priority	Shore	PACFLT	4
Mixed	CNO-priority	Sea	NAVMILPERSCOM	9
Mixed	CNO-priority	Sea	LANTFLT	1
Mixed	CNO-priority	Sea	PACFLT	5
Mixed	CNO-priority	Shore	NAVMILPERSCOM	2
Mixed	CNO-priority	Shore	LANTFLT	4
Mixed	CNO-priority	Shore	PACFLT	1
Mixed	Non-CNO-priority	Sea	NAVMILPERSCOM	7
Mixed	Non-CNO-priority	Sea	LANTFLT	8
Mixed	Non-CNO-priority	Sea	PACFLT	12
Mixed	Non-CNO-priority	Shore	NAVMILPERSCOM	70
Mixed	Non-CNO-priority	Shore	LANTFLT	62
Mixed	Non-CNO-priority	Shore	PACFLT	50
Total				280

CONCLUSION AND DISCUSSION

The purpose of this effort was to improve the efficiency of the allocation process. A heuristic iteration approach was sufficient for this purpose. However, since allocation is not the only objective guideline for personnel assignment, actual assignments may not be totally consistent with the numerical allocation goals. To make allocation a "realistic" goal for assignment, allocation and assignment processes must eventually be integrated and an optimization technique must be developed for the automated enlisted personnel allocation and nomination system (EPANS). The automated allocation process developed in this effort is useful for daily operation and for policy testing.

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