AD 649555

NAVAL PERSONNEL PROGRAM SUPPORT ACTIVITY

PERSONNEL RESEARCH LABORATORY

WASHINGTON, D.C. 20390

WRM 67-23

FEBRUARY 1967

JOB ANALYSIS: SELECTING THE TYPE OF SYSTEM FOR NAVY USE

BY
MARK E. JOHNSON

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PERSONNEL SYSTEMS RESEARCH DEPARTMENT
PERSONNEL RESEARCH LABORATORY
NAVAL PERSONNEL PROGRAM SUPPORT ACTIVITY
WASHINGTON, D. C. 20390

FOREWORD

This study was accomplished under Objective No. PF016011301

SUBMITTED BY

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ABSTRACT

This is the second in a series of research reports, the principal objective of which is to design and develop a multipurpose occupational analysis system for Navy enlisted billets. The system will provide current, accurate, detailed information for users of occupational data, and will also serve as a basis for further studies in associated fields of personnel management.

In the phase of the study reported here, methods of occupational analysis used by other military services and the Department of Labor, reported previously, are reviewed briefly and appraised in terms of their applicability to Navy billets. A method for developing an occupational analysis system suitable to the Navy is proposed. It employs the most recent advances in the techniques of collecting, analyzing, storing and retrieving occupational information. The method proposed calls for the establishment of a computerized occupational data bank, and for the use of billet inventories in the collection of occupational information.

The report recommends that the proposed method be used to conduct an occupational analysis of the Boatswain's Mate and Radioman ratings, and that this work be considered as a pilot test of the method for its subsequent application to all Navy enlisted billets.

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I. INTRODUCTION

This report is the second in a series of research reports on the design and development of an occupational analysis system for Navy enlisted billets. In the first report[1], the occupational analysis practices followed by military and other agencies of the Government and by civilian industry were analyzed, and their applicability for Navy use was assessed.

The purpose of this report is to present the steps taken to reach a decision regarding the selection of a method of occupational analysis which would effectively describe the work done in the Navy.

A companion study in billet evaluation is closely related to the present study in billet analysis, and three reports[2,3,4] in that field have been presented.

---

[1] Johnson, Mark E. Job Analysis: An Assessment of Applicability of Analysis Systems of Other Services to Navy Enlisted Billets. Naval Personnel Research Laboratory, Washington, D. C. WRM 67-9. November 1966.

[2] Rose, Alexander J., and McTavish, Francis L. Job Evaluation: A Preliminary Analysis of Its Application to Navy Enlisted Billets. Naval Personnel Research Laboratory, Washington, D. C. WRM 66-27. January 1966.

[3] Rose, Alexander J. Job Evaluation: A Study of Selected Systems and Their Application to Navy Enlisted Billets. Naval Personnel Research Laboratory, Washington, D. C. WRM 67-3. September 1966.

[4] Rose, Alexander J. Job Evaluation: Selecting the Type of System for Navy Use. Naval Personnel Research Laboratory, Washington, D. C. WRM 67-7. November 1966.

II. APPROACH

A review was made of the criteria which had been proposed[1] for a system of billet analysis for Navy enlisted billets.

Methods of occupational analysis which are currently being used by the Marine Corps, the Air Force, the Army, and the Department of Labor, previously analyzed, were reviewed briefly, and each was appraised in terms of the criteria mentioned above.

Critical elements in a Navy occupational analysis system were identified, and a system was proposed for Navy use. It was proposed that the system be tested prior to Navy-wide application, and two ratings were selected for analysis in making a pilot test.

---

[1] Johnson, Mark E. Op. Cit.

III. DISCUSSION

A. Appraisal

To provide a basis for appraisal of an occupational analysis system for Navy use, the following factors must be considered:

1. The system must reflect those characteristics that are peculiar to the Navy work situation, and must respond to those characteristics.

2. The system must provide accurate, up-to-date information about billets which are composed of divergent, multiple duties and tasks.

3. The system must identify differences betweem similarly described billets on ships of different types if differences in actual work exist.

4. The system must be consistently applied and with consistent results.

5. The system must cover all kinds of billets and all duties involved in billets; that is, it must include collateral duties as well as rating and NEC duties.

6. Occupational information must be provided on a continuing basis to keep the system current and must be responsive to changing Navy tasks.

7. Kinds of data collected and information provided must be useful for the following purposes: training, classification, assignment, billet evaluation, and billet reengineering. Other requirements may be identified.

8. The system must be relatively inexpensive to establish and maintain, i. e., economically feasible.

9. The volume of data suggests that the system is feasible only if information is expressed and presented suitably for computer processing.

10. Information must be presented in clear, concise, unambiguous statements, and in standardized terminology.

B. Methods of Occupational Analysis

1. U. S. Marine Corps

In the Marine Corps procedure for occupational analysis, enlisted personnel who have received training in job analysis, conduct an analysis of each billet by a combination of questionnaire, interview and observation of one incumbent in the billet. Three analysts working separately analyze the billet and record their findings on Billet Analysis Forms. Completed forms are sent to Marine Corps Headquarters, and any discrepancies among the analysts are resolved to form a single written job description for the billet. Only the routine, i. e., Military Occupational Specialty duties of the billet are included in the job description; collateral duties are disregarded.

While the Marine Corps system would reveal the character of Navy work in most respects, it would not cover divergent multiple duties, and therefore would not present a complete picture of the shipboard billet. The Marine Corps system has proven highly satisfactory for doing the job it was designed to do for that service. However, the Marine Corps is considerably smaller than the Navy, and requires far fewer different skills. In addition, the primary purpose of billet analysis in the Marine Corps is to supply basic information for billet evaluation. The development of such procedures for the Navy requires a multi-purpose approach that calls for obtaining more detailed and varied occupational information. On one hand, the Marine Corps had about 1200 different billets to describe in order to evaluate its billets. The Navy, on the other hand, has over 3100

different billets to describe, not only for billet evaluation, but also for a variety of other purposes. Where the Marine Corps did not have to use EDP procedures, the Navy must.

2. U. S. Air Force

Analysis of the jobs within a specific career ladder is in the research and development phase, and is performed on an 'as needed' basis. Personnel research analysts prepare inventories of the tasks involved in career ladder jobs, and check these inventories for accuracy with qualified technical personnel. The inventories are then sent to a selected sample of enlisted personnel at Air Force bases throughout the world. Inventories are filled in by incumbents and are returned to the Personnel Research Office, where incumbent responses are key-punched into electronic data processing cards. After checks are made for accuracy, the information is fed into a computer which analyzes and tabulates the data. The printed computer output shows:

(1) Percent of incumbents (in the sample) who perform each task listed.

(2) Average percent of incumbent time that is spent on each task performed.

(3) Average percent of time all incumbents in the sample spend on every task listed in the inventory.

(4) Cumulative average percent of time spent on all tasks listed in the inventory and arranged in order from the highest average-percent to the lowest. Total for final task listed amounts to 100 percent, thus accounting for all time spent on tasks included in the job.

Many of the features of this system appear to meet the requirements of the Navy situation. The system accomplishes what it sets out to do, and does this regularly in acceptable fashion. It is applicable to either large or small numbers of personnel, and can bring out both the extremes and the differences between extremes in billets. It uses EDP methods extensively, and is acceptable to higher levels of management. Initially, at least, there are no major obstacles to applying a system of this type to the Navy situation.

3. U. S. Army

In the Army, a new system of occupational analysis is under development. Although details are not available as yet, it appears very likely the system will include the use of line-item inventories of sample jobs and a computerized occupational data bank.

4. U. S. Department of Labor

In the Department of Labor, job analysts interview and observe incumbents in various industrial organizations to determine the typical content of jobs and their parameters.

Analysts combine and condense the information, and the resulting job definitions are published in the Department's Dictionary of Occupational Titles. The publication is intended chiefly for the use of the U. S. Employment Service in matching people with available jobs.

The Labor Department proceeds inductively to form a generalized description of a job from a number of observations of variations of it. The Department goes beyond the specifics which characterize ' .

the job as it exists in a certain company, and seeks to identify the essential features of the job.

This objective seems to resemble that of the Navy, for both are concerned about knowing what duties a job includes. But the Navy has extensive interests in job specifics, and can scarcely be content with a general description of the duties, say, of a Missile Technician. A Missile Technician who can work on a team operating one missile cannot necessarily, because of that fact, participate in operating all other missiles as well. The Labor Department system, therefore, is not valid for Navy purposes.

C. Method for Navy Use

1. Selection of Method

As an aid in selecting a method for a Navy occupational analysis system, informal conferences were held with current and potential users of occupational data. They were informed that a comprehensive billet analysis system was under development. All of those who were consulted said they could use to advantage more billet information than they currently have. They were invited to suggest particular types of information which would be helpful in performing their organizational functions.

To select and develop the most appropriate procedure for a Navy billet analysis system, the purpose of the system must be re-examined. This study was initiated to develop an occupational analysis system that would provide information for use in a variety of operations involved in personnel management, such as training, classification, advancement, retirement, assignment, and others. To provide information, a system must arrange for getting it. The system will be incomplete, however, if it is concerned only with collecting and analyzing information. It must primarily provide information for whatever use is intended. As a whole, the system will have to provide for the selection, collection, analysis, storage and retrieval of occupational information. If a system is to be viewed in terms of the objective it seeks, then all its component procedures must be borne in mind.

The content, scope and use of the system's information will be limited and influenced by the manner in which the information is provided. Historically, the tool of writing has been used to store information, and reading has been the process by which the information concealed in written symbols was retrieved. But writing and reading lead to problems in semantics, and limit the information which can be conveyed from writer to reader. Until recently, similar limitations restricted the usefulness of occupational analysis systems.

In recent years, the use of computers has added a new dimension to the process of storing and retrieving information. A single machine will analyze, store and retrieve large quantities of information in a matter of seconds. The technical improvements which have been made in this type of machine, and the wide satisfaction which has attended its use by industrial organizations, educational institutions and government agencies have made the phrase 'data bank' a commonplace in contemporary language.

The data bank procedure for providing occupational information comprises methods which are markedly different from the traditional methods of human analysis, writing and reading. The two contrasting procedures offer alternative courses of action in developing a Navy occupational data system.

Of these two alternatives, the data bank is by far the preferable choice, for the following reasons:

a. Analysis, storage and retrieval of information are mechanized, and, provided the premises and programing are correct, the opportunity for human error is greatly diminished.

b. Availability of information is greatly increased.

c. Manageable quantity of information is greatly increased.

d. Processing of information is very greatly accelerated.

e. Space required for storage of information is much diminished.

If computer processing can be planned to accomplish the analysis, storage and retrieval of information, there remains the question of selection and collection - that is, of what information to get and how to get it.

The research analyst should select the types of information to be obtained. It is assumed that the analyst will make his selection on the basis of the purposes which the system is to serve. Before selecting the type of information which would serve any specific purpose, the analyst should consult with persons in the fields which are concerned with that purpose. For instance, if the information is to serve as a basis for determining the training to be given, then the people responsible for training should be consulted to ensure that the type of information to be obtained will be useful to them and will help accomplish their objectives. The information to be obtained and stored in a data bank should be determined by the multiple purposes which the system seeks to serve.

Methods of collecting occupational information fall essentially into two groups. One group comprises the methods which involve the joint efforts of analyst and incumbent, such as interview, conference, and observation. Here the analyst and incumbent are working together. The other group includes methods in which analyst and incumbent work separately, apart from each other. These methods rely on questionnaires, job inventories or diaries to obtain information.

If cost is a factor in deciding how to collect information, then the latter group of methods has a great advantage, for one analyst can in a given time accomplish much more by mail than he can when his personal presence is required for an interview. The problem for this group of methods is communication. Does the reader get the meaning which the writer seeks to convey?

To a considerable degree, this problem can be managed when the analyst exercises control over the language used. This is the advantage of the job inventory, in which the analyst selects the language used and the incumbent replies with a 'yes' or 'no' or perhaps only with a checkmark. In this situation, the possible variants in meaning are greatly limited, and the whole operation becomes more controllable and objective. In addition, verbalization becomes unnecessary for the incumbent, and this facilitates the transfer of information.

The collection of occupational data for Navy enlisted billets involves more than 3100 billet classes and more than 650,000 persons. (Any combination of rating, rate, and NEC is considered to be a billet

class. Currently there are 66 ratings, and 744 NECs. A list of NECs by source rating will be found in Appendix A, page 16) In view of the magnitude of this task, it would appear practical, economical and desirable to use the job inventory method of obtaining the large bulk of Navy occupational information. Additionally, however, techniques of billet analysis requiring observation and interview must be employed. Selective application of these techniques to billets covered by billet inventories will (1) contribute toward the completeness and accuracy of the inventories and, (2) will serve as a check for validating the job information obtained through the inventories.

Observation and interview techniques must also be applied to billets that exist in small numbers, or to billets of an unusual type where construction of an adequate inventory would, in fact, necessitate on-site observation/interview by an analyst.

In summary, the most promising procedure for a multi-purpose occupational analysis system for Navy use appears to be a combination of the following components:

a. Analyst research to select type and amount of information to be obtained.

b. Use of job inventories to collect most of the information required.

c. Use of on-site observation/interview techniques to augment and validate the inventories.

d. Establishment and maintenance of a computerized occupational data bank for analysis, storage and retrieval of information.

2. Pilot Test of Method

Before any broad-scale application of the foregoing system is undertaken, the system should be tested to permit observation of its operation and assessment of its results. Testing could be accomplished by using the system to make an occupational analysis of perhaps two enlisted ratings and their related NECs.

The ratings to be selected for analysis should:

a. Embody duties which are thoroughly characteristic of Navy duties, although not necessarily exclusively Navy duties.

b. Differ sufficiently from each other to provide some indication of the flexibility and adaptability of the system in describing Navy skills of varying kind and complexity.

c. Include all rates from Third Class to Master Chief Petty Officer.

d. Have a substantial number of related NECs.

e. Be found on all types of ships.

The ratings of Boatswain's Mate and Radioman meet the foregoing criteria, and will be used in a pilot test of the proposed occupational analysis system.

IV. CONCLUSIONS

It is concluded that a multi-purpose occupational analysis system suitable for Navy purposes requires the establishment and maintenance of an occupational data bank. In this system, a computer will be used for the analysis, storage and retrieval of billet information which will be obtained through the use of job inventories. The system will provide a variety of information for different purposes in personnel management. A practical test of the system will be conducted prior to its general application.

V. RECOMMENDATION

Proceed to develop job inventories and other materials needed to conduct a pilot test of the proposed method for a Navy occupational data system.

APPENDIX A

NEC's By Source Rating*

ABE	7013, 7014, 7015
ABF	7022
AC	6911, 6912, 6913, 6922
AD	6313, 6432, 6492, 8301, 8394
ADJ	6422, 8309, 8318, 8319, 8324, 8326, 8331, 8337, 8344, 8351, 8357, 8376, 8377, 8382
ADR	8303, 8339, 8378, 8381
AE	6313, 6619, 6621, 6622, 6655, 7101, 7103, 7104, 7105, 7106, 7107, 7108, 7109, 7111, 7113, 7114, 7123, 7124, 7125, 7126, 7127, 7128, 7129, 7132, 7133, 7134, 7135 7136, 7138, 7145, 7146, 7166, 8301, 8309, 8318, 8319, 8324, 8326, 8331, 8337, 8339, 8344, 8351, 8376, 8378, 8381
AG	8382, 7412, 7414, 7423, 7424
AM	6313, 7125, 7222, 7224, 8301, 8303, 8309, 8318, 8319, 8324, 8326, 8331, 8337, 8339, 8344, 8351, 8357, 8376, 8378, 8381, 8382
AO	6863, 6868, 6878, 6879, 8301, 8303, 8309, 8319, 8324, 8326, 8331, 8344, 8351, 8357, 8377, 8378, 8381, 8382
AQ	6619, 6621, 6622, 6655, 7916, 7917, 7946, 7947, 7948, 7961, 7962, 7963, 7964, 7971, 7972, 7981, 8309, 8324, 8326, 8331, 8344, 8357, 8382
AT	0333, 1541, 1547, 6313, 6523, 6526, 6527, 6529, 6531, 6533, 6601, 6602, 6603, 6606, 6607, 6608, 6609, 6611, 6612, 6613, 6614, 6615, 6616, 6617, 6619, 6621, 6622, 6634, 6655, 6665, 6677, 7916, 7917, 7961, 7964, 7971, 8195, 8301, 8303, 8309, 8313, 8319, 8324, 8326, 8331, 8337, 8339, 8344, 8351, 8357, 8376, 8377, 8378, 8382, 8394, 8395
AX	6523, 6526, 6527, 6529, 6531, 6533, 6621, 6622, 8303, 8319, 8377, 8378, 8381, 0413, 8301
AZ	6313

* Source: Manual of Navy Enlisted Classifications, NAVPERS 15105L, February 1967.

BM	0107, 0113, 0114, 0161, 0162, 0163, 0164, 0165, 0166, 0215
BR	4518, 4915, 4916, 4917, 4918, 4919
BI	3385, 3386, 3389, 4511, 4512, 4513, 4514, 4515, 4516, 4517, 4518
CE	5631, 3371, 5642
CM	5631, 3371
CS	2813
CT	1539, 1542, 1543, 1544, 1547, 1548, 1549, 2314, 2315, 2342, 2343, 2344, 2401, 2402, 2403, 2404, 2405, 2406
DC	5025
DS	1615, 1616, 1617, 1618, 1621, 1622, 1631, 1636, 1651, 1652, 1666
DT	8703, 8707, 8713, 8722, 8732, 8752, 8753, 8765
EM	3551, 3355, 3359, 3384, 3389, 4613, 4666, 4722, 4731, 5631
EN	3551, 3355, 3356, 3359, 3385, 3386, 3389, 4292, 4316, 4318, 4353, 4354, 4356, 5631, 8394
EO	3371, 5707, 5708
ET	1317, 1501, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1511, 1513, 1514, 1517, 1518, 1519, 1523, 1524, 1526, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1539, 1541, 1542, 1543, 1544, 1547, 1548, 1549, 1552, 1553, 1561, 1563, 1565, 1672, 1573, 1577, 1578, 1579, 1588, 1589, 1591, 1592, 1593, 1594, 1596, 1598, 3322, 3323, 3324, 3331, 3332, 3338, 3339, 3353, 3359, 3383, 3384, 3389, 8394, 8395
FT	1317
FTB	3307, 3308, 3309
FTG	1112, 1114, 1117, 1123, 1125, 1126, 1128, 1129, 1146, 1166, 1172, 1173, 1174, 1175, 1179, 1192, 1193, 1194, 1195, 1198

FTM	1113, 1115, 1116, 1118, 1119, 1135, 1137, 1139, 1143, 1144, 1155, 1156, 1157, 1158, 1159, 1161, 1162, 1163, 1164, 1165, 1167, 1182, 1184, 1185, 1186
GMG	0854, 0873, 0891, 0892
GMM	0984, 0986, 0987, 0988, 0997, 0998
GMT	0771, 0926, 0927
HM	3371, 8402, 8403, 8404, 8405, 8406, 8407, 8408, 8409, 8412, 8413, 8414, 8416, 8417, 8432, 8442, 8453, 8454, 8462, 8463, 8472, 8482, 8483, 8484, 8485, 8486, 8487, 8488, 8492, 8493, 8494, 8495, 8496, 8497, 8498
IC	3359, 3383, 3384, 3389, 4613, 4712, 4722, 4724, 4725, 4726, 4731, 4737, 4745, 4746, 1317,
IM	1812, 1911
JO	8148, 3221
MA	2713, 2716, 2717, 2718, 2719, 2724, 2725, 2726, 2727, 2728, 2733, 2734, 2764, 2765, 2771, 2772, 2773, 2774
ML	4915, 4916, 4917, 4918, 4919
MM	3351, 3355, 3356, 3359, 3385, 3386, 3389, 4272, 4282, 4292, 4356, 4518
MR	4915, 4916, 4917, 4918, 4919
MT	0719, 0721, 1312, 1317, 3314, 3315, 3316, 3317, 3318
MU	3801, 3802, 3803, 3804, 3805, 3806, 3807, 3808, 3809, 3811, 3813, 3814
OM	1902, 1903, 1904, 1911
PC	2211
PH	8126, 8133, 8136, 8143, 8144, 8148, 8149, 8192, 8195, 8309, 8319, 8344, 8357
PN	2525, 2612, 2614, 2616, 2618
PR	7312, 7352, 7354
PT	2734, 6701, 6733

QM	0161, 0162, 0163, 0165, 0166, 0215, 0221
RD	0312, 0313, 0314, 0316, 0317, 0318, 0319, 0333, 0334, 6922
RM	1519, 1541, 1542, 1543, 1544, 1547, 1548, 1549, 2303, 2304, 2312, 2314, 2315, 2318, 2319, 2332, 2333, 2342, 2343, 2344, 2372, 2393, 2395
SD	9011, 9013, 9014
SF	4915, 4916, 4917, 4918, 4919, 4944, 4945, 4946
SH	2813, 3111, 3112, 3122, 3142, 3154
SK	2813, 2861, 2863
SM	0165, 0166
ST	0411, 0416
STG	0406, 0407, 0408, 0412, 0413, 0417, 0418, 0419, 0422, 0471, 0474, 0475, 0476, 0478, 0479, 0481, 0482, 0483, 0484, 0485, 0486, 0487, 0488, 0489, 0491, 0492, 0493, 0494, 0495, 0496, 0497
STS	0409, 0414, 0415, 0423, 0426, 0427
SW	6015
TD	7513, 7514, 7522, 7523, 7533, 7543, 7553, 7555, 8301, 8303, 8309, 8318, 8319, 8324, 8326, 8331, 8337, 8339, 8344, 8351, 8357, 8376, 8378, 8381, 8382
TM	0715, 0716, 0718, 0719, 0726, 0727, 0737, 0743, 0744, 0745. 0746, 0747, 0748, 0771, 3342, 3343, 3344, 3345, 3347, 3348, 3349
UT	3371, 6117
YN	2505, 2513, 2514, 2515, 2516, 2525

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13. ABSTRACT

~~This is the second in a series of research reports,~~ the principal objective ~~of which~~ is to design and develop a multi-purpose occupational analysis system. The system will provide current, accurate, detailed information for users of occupational data, and will also serve as a basis for further studies in associated fields of personnel management.

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Billet Analysis						
Occupational Analysis						
Task Inventory						
Job Inventory						
Data Collection						
Billet Design						
Billet Evaluation						
Checklist						

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