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A Forecast of Logistics Requirements

Application of the Delphi Method to the Study of the Peacetime Army Logistic Base

by Albert D. Tholen
Louis C. Peltier
Thomas F. Ferrara
John T. Sincavage

RAC Research Analysis Corporation

The findings in this report are not to be construed as an official Department of the Army position.

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FOREWORD

This technical paper is the report of an Institutional Research project established to examine the effects of technological, political, strategic and policy trends on Army logistics skills and materiel requirements in peacetime, under mobilization and in wartime. The study considered the 1975-1985 time period. The examination of trends and their effects was accomplished by use of the Delphi method (questionnaire) submitted iteratively to some 30 RAC analysts. The results provide interesting group opinions on a variety of related logistics futures.

Lee S. Stoneback
Head, Logistics Department

ACKNOWLEDGMENTS

The interest and cooperation of the 31 respondents are acknowledged, as also are the advice and assistance of the personnel at the Institute of Land Combat and Institute for Advanced Studies (both of the US Army Combat Developments Command) in the identification of critical problems in the logistics of the future. The initial research into historical trends performed by Mrs. Martha Breon helped immeasurably in gaining a perspective on the subsequent design of the Delphi Questionnaire. Technical assistance in data collection and analysis was provided by Mrs. Dorothy W. Payne and Mrs. Lorraine M. Rinehart. We also thank Mrs. Esmene B. Bassett, Mrs. Mary C. Fetzer, Mrs. Kathlyn J. Spaur and Mrs. Margaret B. Vick for their efficient administrative and secretarial assistance.

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SUMMARY

PROBLEM

To address the question, "What logistic units, skills, and materiel should the peacetime Army contain during the 1975 to 1985 period to perform its initial wartime missions and also to provide a base for rapid expansion to meet subsequent support requirements."

FACTS

1. The United States is presently decreasing the size of its armed forces.

2. Under conditions of uncertainty, the Army must be prepared for mobilization and commitment of forces.

3. Determination of skills which should be retained in a peacetime Army for mobilization and commitment is an ever present planning problem.

4. Technological progress is omnipresent and influences the Army and civilian industry as well as the objectives and capabilities of foreign policy.

5. The ability of an Army to support itself particularly under conditions of mobilization depends significantly on the ability of the national economy to provide materiel and skilled personnel.

DISCUSSION

Assumptions

1. That the size of the US Army will be limited because of budget constraints.

2. That the US Army must have the potential to mobilize rapidly.

3. That the characteristics and requirements of the Army will continually change in response to technological progress.

4. That national production capability and the development of civilian skills will not necessarily maintain a balance with the actual and potential requirements of the Army.

Approach

The method of studying this problem involved the use of the Delphi technique originally developed by RAND Corporation. This method consists of developing a pertinent questionnaire, and sending the questionnaire in successive iterations to a selected group of respondents who are unknown to each other. Each successive iteration, after the first, is accompanied by the answers and comments received on the previous iteration so that the respondents may consider the responses and positions of the entire group. This technique offers the advantage of the full range of knowledge of all respondents consulted and tends to diminish the influence of particularly vocal consultants and to diminish any tendency to defer to authority and seniority.

The questionnaire was formulated and submitted to a group of six respondents through a series of three iterations for a shakedown. The questions were then revised and submitted to a group of 31 respondents. Statistical analyses of responses were feasible. A stratification of responses according to the technological background of the respondents was also made.

Scope and Limitations

The study was directed to the period between 1975-1985, a mid-range forecast period. The questionnaire contained five sections:

a. An evaluation of past performance of the Army's logistics operations.
b. A projection of the anticipated size and location of Army forces, activation time estimates, and threats to be considered.
c. A forecast of technological innovations and related effects on future Army logistics.
d. An appraisal of expected shifts in Army skill composition.
e. A cursory examination of Army construction futures.

CONCLUSIONS

The primary objective of the study was to obtain quantitative and qualitative answers to questions addressing future logistic requirements for units, skills, and materiel. Since the entire study took the form of a series of questions, each answer is in effect a conclusion. Rather than summarize the answers to the diverse questions here, the reader should go to those questions of particular interest and examine the respondents' answers plus the short analysis made for each question. In general:

1. The answers themselves provide insights and inputs to forecasting Army futures.
2. The answers suggest specific trends which seem critical for the Army in the future including:
    a. equipment is increasingly more complicated.
    b. requirements for operation and maintenance of equipment are likely to require increasingly higher skill levels.
    c. the Army is not likely to have adequate numbers of skilled personnel to support mobilization.
    d. there are questions concerning the ability of the civilian economy to provide either the equipment or the skills in an emergency mobilization situation.

3. There is a general opinion that the Army should and could do a better job of improving its logistics capabilities by utilization of evolving technology and management tools and techniques.

A second objective of the study was the evaluation of the "Delphi" technique for this type of problem. Conclusions relating to this objective are summarized explicitly from Chap. 2 and implicity from the entire report.

1. The "Delphi" technique was useful and appropriately used.
2. The respondents grasped the objectives readily, were adequate in numbers, and represented a broad enough range of expertise for the problem examined.
3. Three iterations were optimal for results obtained.
4. The self appraisal feature used was crude and did not provide adequate basis for correlation of the background and qualifications of the respondents with their answers.
5. Management of the experiment was difficult because of the volume of material handled (31 respondents, 37 questions) for each iteration. Better procedures are needed to speed up the analysis of results and expedite the feedback to the respondents.
6. Especially difficult to handle were the questions requiring independent essay type answers. Analysis of such responses required judgmental interpretations on the part of the study staff to cast them into summaries for use in subsequent iterations. Much had to be summarized, generalized and simplified. It was felt that questions which caused respondents to provide their own data or write opinions might be dealt with in a cursory manner and might even have resulted in some "bandbagon effects" which the Delphi technique is intended to avoid.

A FORECAST OF LOGISTICS REQUIREMENTS

Application of the Delphi Method to the Study of the Peacetime Army Logistic Base

ABBREVIATIONS

AR	Army Regulation
POL	Petroleum, oils and lubricants
RAC	Research Analysis Corporation
R&D	Research and Development
USA CDC	US Army, Combat Developments Command

Chapter 1

STUDY BACKGROUND AND BASIS FOR RESEARCH

INTRODUCTION

The purpose of this report is to describe the research conducted under RAC Institutional Research Project 010.210. The study addressed the question, "What logistic units, skills, and materiel should the peacetime Army possess in order to perform its initial wartime missions and also to provide a base for rapid expansion to meet subsequent support requirements."

Through the use of forecasting techniques, an experiment was conducted addressing the effects of developments, conditions, and futures in general on trends in Army composition. This effort was intended to provide insights for future study and planning.

APPROACH

Sequencing of Tasks

The following tasks were included in the study plan:

a. Identify significant policies, trends, technologies and environmental criteria which will affect future Army logistics.

b. Design a questionnaire(s) addressing the above for submission to "experts" employing the Delphi method.

c. Select a body of "experts" in Army logistics futures.

d. Conduct the experiment including analysis of results.

Development of Delphi Experiment

This project was conceived and started based on an objective to gain new insights toward determining the Army's peacetime requirements for logistic units and skills. The study of the problem became a vehicle for demonstrating and testing the Delphi technique as a possible methodology for investigating such problems. This report describes an experiment using the Delphi method as a tool for examining the stated question, "What logistic units, skills, or materiel should the peacetime Army contain during the 1975-1985 period to perform its initial wartime missions and also to provide a base for rapid expansion to meet subsequent support requirements?"

The objective was to encourage the participants to describe the future size, distribution and threats they would ascribe to the Army in the future. Such a portrayal by the respondents themselves provides an understanding of the future environment for which logistic forces are assumed required. Therefore the answers of the respondents can be seen in the context of the respondents' view of the future. The study was designed to examine the logistic future employing the Delphi method as a forecasting tool.

ORGANIZATION OF REPORT

Chapter 2 describes the characteristics of the "Delphi" technique and the design of its application to this study: specifically to address five major topics (reported on in the chapters indicated).

a. Estimation of forces to be supported in the future (Chap. 3).
b. Evaluation of Army logistics in the past (Chap. 4).
c. Impact of future technology (Chap. 5).
d. National support of future logistic skills and materiel (Chap. 6).
e. Construction activities (Chap. 7).

STUDY MOTIVATION

The study was undertaken to provide insights into trends in Army composition.

Basic Premise

A basic premise (admittedly over simplified) is that the Army exists in peacetime to preempt (by its very existence) its need in wartime, or if war occurs, to win the war. Historically, the Army strength has been drastically reduced in peacetime immediately following a war. Historically also, at least two trends have become more and more obvious: (1) reaction time is more critical; (2) logistics operations are becoming more complex. These trends are dichotomous. They have been recognized in the single problem of strategic deployment (i.e., the Presidential decision to buy a fleet of C5As). The authors did, however, develop certain qualitative opinions as a result of the study efforts based largely on readings and intuitive interpretations of past work. The following few paragraphs summarize these general opinions in a somewhat philosophical vane.

Historical Perspective

The Army exists to support national policy either indirectly as a force in being or as a direct instrument of national policy.

> "The Department of the Army is charged with the responsibility of providing support for national and international policy and the security of the United States by planning, directing, and reviewing the military and civil operations of the Department of the Army, to include the organization, training, and equipping of land forces of the United States for the conduct of prompt and sustained combat operations on land in accordance with plans for national security." [1]

In the context of logistic requirements an Army is both a measure and reflection of national power and a creature and product of the power of the state. It reflects national power insofar as it is an instrument for the exertion and extension of national power. It is the product of national power insofar as it depends upon the resources of the state for its support.

The logistic requirements of the Army are directly dependent upon the mission and responsibilities assigned to the Army. These, in turn are dependent upon the exigencies of national and international politics. The logistic requirements of an army may be projected from estimates of future international conditions and of the probabilities of the

requirements of military force in support of national policy under these conditions. A second projection may be derived from a review of technological progress and its extrapolation into the future recognizing the constantly changing nature of armies and the correspondingly changing requirements for materiel, expendable or consumable supplies, transportation and the organizational integration of special manpower skills. A third projection may be derived from a review of the national industrial posture extrapolated to some future time with particular regard to the ability of industry to convert to meet the requirements of mobilization and its ability to share trained personnel with the Army and other military services. Such projections, when considered in the context of expected requirements to be placed on the Army, provides insight into the amount and kind of stockpiling which would be wise and the number of types of specialized personnel which the Army would be wise to train for itself.

The international scene in this and previous centuries has been characterized by the continued promotion, on the part of most states, of national interests by the exercise or threat of various kinds of warfare such as economic warfare, political warfare, social warfare, psychological warfare and military warfare. During the past three centuries the world has had few if any periods of as long as five years in which there were no military conflicts. Thus, one is lead to postulate that war of some sort is the normal state of world affairs.

Technological progress expressed in terms of the rate of discovery, has been developing, over the past century or more, at a rate which is best described by an exponential growth curve which is more rapid than that of population growth. Projections of future technology have generally been expansionist rather than conservative; they are thus unique among the general series of projections into the future. This derives from a consideration of only one part of the technological picture; this is the ability to discover. The ability to discover seems to proceed at a much more rapid rate than the ability to accept and employ. Fundamentally, the acceptance and actual integration of technological progress into a larger system, such as that of an army or a national economy, may be considered to be dependent upon three points: 1) the technical ability

to discover, 2) consumer acceptance, and 3) the general cycle of obsolescence of production and distribution facilities.

Discovery is the most spectacular aspect of technological progress. It includes not only the ability to discover new principles, new materials, and new products, but also the combination of these innovations into rational and economic production processes and their integration into an economic system.

Consumer acceptance is the most significant aspect of new product development. It is a conservative factor and proceeds at a much slower rate than scientific development. It may be considered to be a function of the length of human generations. Thus, acceptance of innovation by a society seems to proceed in spurts at about 15-year intervals, each 15-year interval being approximately the length of time during which any particular generation dominates the market.

The cycle of obsolescence of production facilities is, generally speaking, a 20- to 50-year cycle of machine and plant design. It roughly is represented by the period of amortization of investment in plant and equipment. During the early stages of development, the factory may be expected to operate under conditions of decreasing costs; later on it encounters increasing costs, loss of patent rights and increasing competition. There comes a time when new designs, new methods of production, and reorientation of markets puts a particular plant or factory in a poor competitive position. It must, at this time, consider relocation, retooling or reorganization. It is under these circumstances that new products, new sites and technological changes are most readily integrated into the existing corporate structure and it is at these times that technological trends are most likely to be reflected in new products offered to the consumer. For these reasons it seems wise to be conservative in the projection of the impact of technological innovation.

The acceptance and integration of technological innovation by the Army follows a similar pattern. The stages involved roughly proceed in the following sequence:

Formulation of military characteristics or R&D objective.

Research and engineering.

Engineer and user tests.

Pilot plant or production design.

Production and distribution.

Training and organizational integration of new item.

Formulation of doctrine for the employment of the new item.

Integration of new capability into planning.

Clearly a long period of time is involved. For this reason, it is likely that the technological innovations which will be most useful during the 1975-1985 period already exist in prototype form or are at least now on the drawing boards.

Chapter 2

DESIGN AND CONDUCT OF THE DELPHI EXPERIMENT

INTRODUCTION

The method of forecasting used in this study was that of a series of questionnaires sent to a selected group of individuals. It has been described in a series of papers published in 1967 and 1968 and commonly called the "Delphi Method."[2,3,4,5,6]

In this exercise a two-part approach was followed. First a preliminary Delphi experiment was conducted as a trial-run. Then a full-scale Delphi experiment was conducted to:

a. probe the problem of the nature and magnitude of the expected logistics problems of the future; and,

b. test the value of the method.

The preliminary experiment was conducted between 20 July and 31 July 1970 involving six respondents who were selected from the RAC staff because of their broad background in logistics requirements planning. The net result of their involvement was a reordering of questions plus considerable revision of the questions or substitution of new questions to reduce redundancy and ambiguity. Eighteen of the original questions were retained and 19 new questions were introduced. Thus, the first questionnaire of 35 questions became one of 37 questions. Project members and the six respondents met and, following a critique, agreement was reached on a final questionnaire to be used in a full-scale experiment.

The full-scale experiment was conducted during the month of August 1970. Invitations to participate were sent to 73 staff members of RAC selected by the study-group after reviewing the biographies of members

of RAC's technical staff. The selection was based on the attempt to find 30 or more individuals with broad backgrounds in military planning with a mix of tactical, strategic and logistics experience. Those who accepted, 31 in number, represented all technical departments of RAC and a rather broad range of background, (Tables 1 and 2).

In order to facilitate exploration of the effect of different points in view on the responses (while maintaining anonymity), the respondents were arranged into four groups matching the predominant experience in the past (Table 3). Their questionnaires were so identified.

After each iteration the responses to the questions were compiled and summarized and returned to the respondents for their use in preparing responses to the next iteration. Thus, the opinions and reasons of all the others were made available to each respondent as additional contributions in formulating his own opinions. The effect of this procedure was measured by examining the replies to 35 questions for which numerical answers were requested. First, the percent change in the median answer from the median of the previous iteration was examined. The main change between the first and second iterations was 12.6 percent, and between the second and third iterations was 3.3 percent. Out of the 35 questions, 14 showed no change in the median from the first to the third iteration. The third iteration changed the median slightly.

Using the 1st and 3rd quartiles as descriptive of the range of variance, the mean percent variance about the median was calculated for the same 35 questions using the formula $D = \frac{1/2\ (B-A)}{M}\ 100$ where:

D = mean difference
B = 3rd quartile value
A = 1st quartile value
M = median value

The mean of the 35 values so calculated resulted in a 78.0 percent difference in the first iteration, 48.5 percent in the second iteration and 5.0 percent in the third iteration. Of the 35 questions 28 showed a consistent decline from the first to the third iteration. Thus, one feature of the successive iterations was to produce a decline in the range of variance in the answers and a convergence toward a relatively stable median value.

Table 1

DISTRIBUTION OF RESPONDENTS BY DEPARTMENT

Department	Number
Office of the Vice President, Operational Systems	2
Office of the Vice President, Technological Systems	2
Office of the Vice President, Economic, Political and Social Sciences	1
Advanced Research	1
Economic and Social Development	3
Force Structure	2
Gaming and Simulations	2
Logistics	7
Public Communications and Safety	2
Resource Analysis	3
Science and Technology	5
Strategic Studies	1
Total	31

Table 2

EXPERIENCE CHARACTERISTICS OF RESPONDENTS

(Experience by Type in Years)

Type	1st Quartile	Median	3rd Quartile
Government oriented research organizations	5.9	9.5	16.3
Active duty in armed services	1.0	3.5	9.0
Reserve duty in armed services	0.0	1.5	6.5
Related academic studies	0.5	3.0	5.0
Civilian government service	0.0	0.0	5.0

Table 3

GROUPING OF RESPONDENTS

Group	Group designator	Number	Percent
Mathematics, Science & Engineering	A	12	38.7
Political, Social & Economic Sciences	B	8	25.8
Logistics	C	7	22.5
Military Science	D	4	12.9
Total		31	99.9

The variation in response between different groups was examined for 16 questions related to the requirements for logistic support (Table 4). Giving equal weight to each group the mean percent variation of the median of a group's responses from that of the total was 29.5 percent and the median 10.7 percent. However, if three questions dealing with the chances of general and nuclear war are excluded, this mean variation becomes only 11.9 percent (and the median 7.7 percent). With a few exceptions there is little important difference between the responses of the four groups. On the other hand some clear divergences of one group from the others suggest that categorization into groups may prove useful. For example, Group B, social scientists, believe that there is a distinctly greater chance of a tactical and strategic nuclear war than do any of the other groups. Group D, military science, believe that a tactical nuclear war would be much shorter than do other groups and that the time required to organize and field a division would be clearly greater than do the others.

CONCLUSIONS OF USE OF "DELPHI"

1. The questionnaire method was useful and effective because it permitted a large number of consultants to be questioned without requiring them to meet together. The time requirement was minimal, opportunity for reflection was provided, and the influence of personalities was eliminated.

2. The use of a large number of respondents was valuable because it permitted stratification of the responses and indicated the degree of certainty associated with the consensus.

3. The usefulness of successive iterations of the same questionnaire, with feedback of information concerning the responses of others, diminished with each iteration. The median values tended to be stable; the range of variance decreased with each iteration, the greatest reduction occurred at the first iteration.

4. The confidence of the respondents varied with the topic although no substantive differences in responses resulted.

COMPOSITION OF THE QUESTIONNAIRE

The questionnaire (reproduced in App B) consists of a series of 37 questions, grouped into five sections.

Section A (8 questions) - Army Logistics Performance.

Section B (13 questions) - Size and Dispersion of Army, Activation Times, and Type of War Should War Occur.

Section C (3 questions) - Technological Innovations and Their Impact on the Army's Logistics System.

Section D (7 questions) - Shifting Patterns of Logistical Personnel Skills in the 1975-1985 Time Frame.

Section E (6 questions) - Activities and Projected Trends in Army Construction.

Table 4

COMPARISON OF SELECTED RESPONSES BY GROUP

(Median Values, 3rd Iteration)

No.	Question	Group A Math-science	Group B Soc.science	Group C Logistics	Group D Military	All Groups
B-1	Minimum number of combat divisions for which logistic support should be provided in peacetime.	12.0	12.0	12.5	12.0	12.0
B-2	Maximum number of combat divisions that could exist.	75.0	100.0	100.0	100.0	100.0
B-3	Chance that Army will provide technical assistance to indigenous forces (%)	90.0	90.0	90.0	100.0	90
B-3	Chance that US Army will be aiding counter-insurgency force. (%)	40.0	37.5	35.0	40.0	40
B-3	Chance that US Army will be involved in limited war. (%)	20.0	10.0	20.0	10.0	15
B-3	Chance that US Army will be involved in general conventional war. (%)	5.0	7.5	7.5	5.0	5
B-3	Chance that US Army will be involved in tactical nuclear war. (%)	2.0	6.5	0.5	1.5	2
B-3	Chance that US Army will be involved in strategic nuclear war. (%)	1.0	7.5	0.5	1.0	1
B-5	Likely duration of conventional war. (weeks)	150	150	150	153	150
B-5	Likely duration of tactical nuclear war. (weeks)	30	40	40	17.5	28
B-5	Likely duration of strategic nuclear war. (weeks)	12	5	8	7	7

Table 4 (continued)

No.	Question	Group A Math-science	Group B Soc.science	Group C Logistics	Group D Military	All Groups
B-6	Maximum mobilization rate (thousands of personnel per month)					
	during 0-3 months	30.0	30.0	30.0	30.0	30
	during 3-6 months	50.0	50.0	50.0	50.0	50
	during 6-9 months	80.0	75.0	100.0	75.0	80
	during 9-12 months	100.0	100.0	150.0	100.0	100
B-7	Length of time to activate a combat division. (weeks)	14.0	13.0	13.0	18.0	14
B-8	Probable distance from US that Army might operate in conventional war. (miles)	6500	6000	6000	6700	6000
B-8	Probable distance from US that Army might operate in strategic nuclear war. (miles)	5000	3000	3800	3500	4000
B-9	Number of divisions stationed outside US in 1980.	8.0	7.0	5.0	5.5	6

Chapter 3

REQUIREMENTS FOR LOGISTIC SUPPORT

INTRODUCTION AND BACKGROUND

This chapter deals with Section B of the questionnaire, "Size and Dispersion of Army Activation Times and Type of War Should War Occur." It is presented before Section A because of its "stage setting" nature for the rest of the study.

A logistical forecast must be based on an estimate of the kind, magnitude, geographical range and characteristics of the future strategic and tactical environment. Because of the particularly difficult nature of these questions characterized, as they are, by the virtual impossibility of verification except by the passage of time, the "Delphi" technique is particularly well-suited.

The questions posed in this section were selected to represent the general nature of the mid-range future in terms of Army size, location and activity.

ARMY SIZE AND LOCATION

In an attempt to define the range of Army sizes for which logistic support might reasonably be expected to be required, the respondents were asked to both estimate the smallest size of Army for which logistics support should be available under peacetime conditions and the largest size under any and all conditions.

Questions B-1 and B-2

B-1. Assuming a peacetime role, what is the minimum number of US Army combat divisions for which logistic support capability should exist in the 1975-1985 time frame?

B-2. Recognizing the limitations of national population and industrial base, what is the maximum number of US Army combat divisions that could exist under any and all contingencies during the time frame 1975-1985?

Response

The median replies indicated that the Army could be reduced to 12 divisions or at least that logistic support for about 12 divisions should be available and that the Army could, under certain circumstances, be increased to 100 divisions. This implies a possible mobilization of 88 divisions with a corresponding possible increase of logistic support. It imposes a particularly great requirement on logistic systems (and on the country) for flexibility, planning and reserve capability (Table 5).

Questions B-3 and B-4

B-3. Assuming a 1975-1985 time frame, what are the chances in percent that the US will be engaged in one or more of the following types of war? (Answer each part.)

	% Chance	
Aiding counterinsurgency -- internal forces given US logistical and technical assistance only:	_____	3a
Aiding counterinsurgency -- US ground fighting forces aid internal forces:	_____	3b
US and other major power(s) at war -- limited objectives; less than all-out war:	_____	3c

Table 5

ESTIMATES OF MINIMUM AND MAXIMUM
ARMY SIZE - COMBAT DIVISIONS

(Answer to Questions B-1 and B-2)

Question	Quartile	Iteration 1	Iteration 2	Iteration 3
Minimum number of US Army combat divisions for which logistical support capability should exist.	1	8	9.5	10
	Median	12	12.0	12
	3	16.7	15.2	15
Maximum number of US Army combat divisions that could exist.	1	36.7	50.0	63.7
	Median	75	88	100
	3	100	100	100

US and other major power(s) at war -- general war -- unlimited use of "conventional" weapons: _____ 3d

US and other major power(s) at war -- general war -- use of tactical nuclear weapons: _____ 3e

US and other major power(s) at war -- general war -- use of strategic nuclear weapons: _____ 3f

B-4. Assuming a 1975-1985 time frame, what is the most likely maximum size of a US Army aiding or fighting the various types of war indicated below?

	Number of Combat Divisions	
Aiding counterinsurgency -- internal forces given logistical and technical assistance only:	_____	4a
Aiding counterinsurgency -- US ground fighting forces aid internal forces:	_____	4b
US and other major power(s) at war -- limited objectives; less than all-out war:	_____	4c
US and other major power(s) at war -- general war -- unlimited use of "conventional" weapons:	_____	4d
US and other major power(s) at war -- general war -- use of tactical nuclear weapons:	_____	4e
US and other major power(s) at war -- general war -- use of strategic nuclear weapons:	_____	4f

Response

The refinement of the implied requirement to build up the Army, from a minimum of 12 divisions to some maximum number short of 100 divisions, depends upon the estimates of the type of operation which will be required, the likely size of forces for each type of operation, and, in the case of general war, its likely duration and amount of logistic support required.

A summary of the median responses concerning the likelihood of different kinds of military activity and the likely magnitude of effort involved is presented in Table 6. These data suggest that it is almost a certainty that logistical and technical support of counterinsurgency will continue throughout the next 15 years. The distinctly lower chance that ground forces will be involved indicates a noteworthy likelihood that

Table 6

ANTICIPATED ARMY ACTIVITY BY TYPE OF WAR - SUMMARY

(Answer to Question B-3)

Type of war	Median of chances that US will be engaged during 1975-1985	Median of most likely number of US divisions involved
	(Percent)	
Aiding counterinsurgency-internal forces given logistical and technical assistance only.	90	2
Aiding counterinsurgency-US ground combat forces involved.	40	4.5
Limited war - US and other major power(s) at war, limited objectives less than all-out war.	15	15
General war - US and other major power(s) at war, unlimited use of conventional weapons.	5	50
Tactical nuclear war - US and other major power(s) in general war.	2	35
Strategic nuclear war - US and other major power(s) in general war.	1	20

escalation will not occur. Indeed it seems that these estimates are best interpreted, not in terms of escalation or evolution from limited to general types of war, but rather in terms of separate and discrete situations whose probability of occurrences and type of operation reflect the policy objectives of the conflicting parties, their allies and associates.

The respondents consider that there is a very good chance (40 percent) that there will be ground involvement in counterinsurgency, but that there will be only a minor likelihood (23 percent) of any conflict with a major power.

The respondents expect a requirement for logistic support of counterinsurgency both at the technical assistance and ground combat level and for support of the Army in limited war. They indicate about one chance in 14 of a requirement for logistic support under conditions of general war (Table 7).

The greatest requirement for logistic support is indicated for the situation of general conventional war (Table 8).

Question B-5

What is the likely duration of the following types of war should they occur in the 1975-1985 time frame?

	Weeks	
General war -- unlimited use of "conventional" weapons:	_____	5a
General war -- use of tactical nuclear weapons:	_____	5b
General war -- use of strategic nuclear weapons:	_____	5c

Response

In the relatively unlikely event of general war, the median duration estimated was: general conventional war 150 weeks (3 years), tactical nuclear nuclear war 28 weeks (1/2 year), and strategic nuclear war 7 weeks (Table 9). The relatively small number of divisions involved in tactical or strategic nuclear conflict indicated in Table 6 are consistent with the expected duration. However, it is possible that the respondents did not consider the requirements for Army support of Civil Defense.

Table 7

ANTICIPATED ARMY ACTIVITY BY TYPE OF WAR - DETAIL

(Answer to Question B-3)

Type of war	Quartile	Iteration 1	Iteration 2	Iteration 3
		Percent chance		
Aiding Counterinsurgency Logistical & Technical Assistance only.	1	90	90	90
	Median	90	90	90
	3	100	100	100
Aiding Counterinsurgency US Ground forces.	1	20	20	25
	Median	50	40	40
	3	75	70	70
Limited War with Major Power	1	10	5	10
	Median	20	20	15
	3	50	30	27.5
General, Conventional War	1	4	2.5	4.5
	Median	7	5.0	5
	3	20	10.0	10
General, Nuclear War (Tactical)	1	1	1.0	1
	Median	4	3.0	2
	3	10	10.0	7.5
General, Nuclear War, Strategic Weapons	1	0.5	0.7	0.5
	Median	1.5	1.0	1
	3	10	5.0	3.5

Table 8

ANTICIPATED ARMY COMMITMENT BY
NUMBER OF DIVISIONS - DETAIL

(Answer to Question B-4)

Type of war	Quartile	Iteration		
		1	2	3
Aiding Counterinsurgency Logistical and Technical Assistance only.	1	1	1.	2
	Median	2	2.0	2
	3	12	3.5	2.7
Aiding Counterinsurgency, US Ground Forces	1	3	2.7	3
	Median	5	4.5	4.5
	3	15	10.0	6.
Limited War with Major Power	1	8	8.0	8.5
	Median	15	15.0	15
	3	21.7	20.0	19
General Conventional War	1	24	24.7	30
	Median	50	50.0	50
	3	92.3	81.5	80
General War, Tactical Nuclear	1	10	4.0	15
	Median	35	35.0	35
	3	71.3	51.5	50
General War, Strategic Nuclear	1	10	4.0	15
	Median	20	20.0	20
	3	35	24.0	20

Table 9

LIKELY DURATION OF WAR BY TYPE -- WEEKS

(Answer to Question B-5)

Type of war	Quartile	Iteration		
		1	2	3
General, Conventional War	1	73.3	100	100
	Median	150	150	150
	3	200	167	156
General War, Tactical Nuclear	1	9.7	10	14.7
	Median	25	27.5	28
	3	52	50	50
General War, Strategic Nuclear	1	3	4	4.2
	Median	6.5	6	7
	3	15	12	12

Questions B-6 and B-7

B-6. Assuming a general nonnuclear war in the 1975-1985 time frame, what is the maximum rate of mobilization of personnel per month that the US Army could experience during the first year of war?

First 3 months of war -- persons per month:	_____ 6a
3-6 months of war -- persons per month:	_____ 6b
6-9 months of war -- persons per month:	_____ 6c
9-12 months of war -- persons per month:	_____ 6d

B-7. Excluding individual personnel training, i.e., basic training plus specialty training, what will be the length of time required to activate a combat division including training (e.g., company, battalion, etc.), equipping and making ready for combat in the 1975-1985 time frame?

Weeks _____ 7

Response

Mobilization appears to be a unique feature of general conventional war. The projected maximum mobilization rate (per month) is shown in Table 10 in summary and Table 11 in detail. As shown above (Question B-5) a conventional war is considered to be one of about three years duration (nearly 1/2 the duration of World Wars I and II), a tactical nuclear war of 1/2 year duration and a strategic nuclear war of seven weeks duration. Thus, at the end of the strategic nuclear war the US could have mobilized up to four additional divisions. However, because it was also estimated that such an eventuality would be likely to require 20 divisions, a force in being of 16 divisions must be assumed. Similarly, by the end of a tactical nuclear war a force of up to 25 divisions could have been mobilized. The median estimated force requirement for this kind of war is, however, 35 divisions. This implies a force in being of 10 divisions. This size of army has already been projected but it is further projected that most of the existing divisions will be so widely deployed that the further implication of a requirement for rapid redeployment over long-distance seems also to be present.

Table 10

MEDIAN ESTIMATES OF MAXIMUM RATE OF MOBILIZATION
(Answer to Question B-6)

Time interval	Median number of personnel per month
1st three months	30,000
3rd to 6th month	50,000
6th to 9th month	80,000
9th to 12th month	100,000

Table 11

ESTIMATES OF MAXIMUM MOBILIZATION CAPABILITY -
THOUSANDS OF PERSONNEL
(Answer to Question B-6)

Time interval	Quartile	Iteration		
		1	2	3
First 3 months	1	30	30.0	30
	Median	50	30.0	30*
	3	100	62.5	50
3 - 6 months	1	37	40.0	40
	Median	60	50.0	50*
	3	100	60.0	60
6 - 9 months	1	50	50.0	60
	Median	90	80.0	80*
	3	200	95.0	95
9 - 12 months	1	51.1	90.0	90.0
	Median	100.0	100.0	100*
	3	275	150.0	100

*Source of entries in Table 10.

The requirements of counterinsurgency and limited war are too small to require mobilization. The expected duration of tactical and nuclear war is too short to permit the significant use of mobilized forces. Thus, only in the event of protracted conventional war can the process of mobilization be considered useful.

In the development of organized forces the estimates must be tempered by the estimates of the time required to organize the mobilized personnel into combat units, train them, and deploy them. The median estimated time required to activate and deploy a new division is 14 weeks (3-1/2 months). This must be added to the time required for basic training plus specialty training (see Chap. 6). Thus, in a strategic nuclear war no new divisions could be mobilized, activated and deployed in time to be useful. In the event of a tactical nuclear war, up to a maximum of nine new divisions might be formed and deployed before the estimated end of the conflict. Therefore, under these relatively unlikely circumstances, primary reliance must be placed on forces in being. Organization, equipment and training must preexist the conflict (Table 12).

Question B-8

What is the most likely distance from the limits of conterminous United States that the Army might operate in (a) a general nonnuclear war; (b) a general strategic nuclear war, during the time frame 1975-1985?

Response

The median radius from Continental United States at which general conventional and strategic nuclear war might require Army operations was 6000 and 4000 miles, respectively. The 6000 mile radius includes most of Western Europe. It seems to exclude Mainland Asia, most of Africa and South America. The requirements for long-distance transportation thus appear to be for the support of overseas garrisons in Europe, the Pacific and the Caribbean, a minor requirement to support counterinsurgency operations and, in the event of a general conventional war, the support of expeditionary forces in Western Europe, (Table 13).

Table 12

ESTIMATES OF TIME REQUIRED TO ACTIVATE
A COMBAT DIVISION - WEEKS
(Answer to Question B-7)

Task	Quartile	Iteration		
		1	2	3
Training and Organization Time*	1	9.5	12.0	12
	Median	12	14.0	14
	3	24.5	16.0	15.5

*Does not include basic training plus specialty training (see Chap. 6).

Table 13

LIKELY MAXIMUM DISTANCE FROM CONUS OF ARMY OPERATIONS
(Answer to Question B-8)

Type of war	Quartile	Iteration		
		1	2	3
		Thousands of miles		
General, Conventional War	1	4	5	5
	Median	6.5	6.5	6
	3	10	9.3	8
General, Strategic Nuclear War	1	3	3	3
	Median	3.7	4	4
	3	7	5.5	5

Question B-9

What is the most likely number of US Army divisions stationed outside of conterminous United States in 1980?

	Number of divisions	
Europe (including Iceland)	_____	9a
Mid-East (North Africa and Southwest Asia)	_____	9b
Mainland Asia (Central and East Asia)	_____	9c
Pacific Area (including Japan and Hawaii)	_____	9d
Latin America (including Puerto Rico, Panama and other Caribbean Sea area)	_____	9e
Africa (except North Africa)	_____	9f
Alaska, Canada and Greenland	_____	9g
Other (specify)	_____	9h

Response

It was indicated, by the median replies, that during this period (1975-1985) foreign policy and defense considerations would be likely to require the stationing of about six divisions outside the conterminous United States (i.e., 48 states). They are expected to be distributed as follows: (Table 14).

Europe	2
Pacific Area, including Hawaii	2
Alaska	1
Latin America, including the Caribbean Sea area	1

Only the two European divisions would be on distinctly foreign soil. This number (six divisions), it should be noted, is 1/2 of the estimated minimum size of the Army. No forces are projected for Mainland Asia, Africa or the Middle East.

The rationale presented by the respondents shows a strong (47.6 percent) feeling that the demand, both domestic and foreign, for withdrawal for political and economic reasons will dominate the overseas force distribution in 1980. Over one-third (39.0 percent in each case)

Table 14

LIKELY NUMBER OF US ARMY DIVISIONS
STATIONED OVERSEAS IN 1980
(Answer to Question B-9)

Overseas location	Quartile	Iteration		
		1	2	3
Europe	1	2.2	2.0	2
	Median	2.5	2.0	2
	3	3	3.2	3
Mid-East	1	0	0	0
	Median	0	0	0
	3	0	0	0
Mainland Asia	1	0	0	0
	Median	0	0	0
	3	2	1.2	1
Pacific Area	1	1	1.0	1
	Median	2	2.0	2
	3	3	2.2	2
Latin America	1	0	0	0
	Median	0.5	1.0	1
	3	1	1.0	1
Africa	1	0	0	0
	Median	0	0	0
	3	0	0	0
Alaska, Canada and Greenland	1	1	1.0	1
	Median	1	1.0	1
	3	1	1.0	1
Other	1	0	0	0
	Median	0	0	0
	3	0	0.2	0

believe that the political situation will require military presence in some form in both Europe and East Asia, but not, in all instances, of division strength. It is noteworthy that the greatest number of respondents believe that the political pressures for withdrawal, with its implications of isolationism, will persist for a decade. It is also noteworthy that logistic support over long distances to Europe and East Asia have a good chance of persisting over this same period of time.

Questions B-10 and B-11

B-10. How many combat divisions can be newly deployed overseas within one year after the decision to mobilize?

B-11. What is the total number of combat divisions that can be supported overseas within one year after the decision to mobilize?

Response

The respondents estimated that a median of 16.5 divisions could be deployed overseas within the first year after the requirement arose and that a median of 20 divisions was the maximum number that could be supported overseas (Tables 15 and 16).

Question B-12

The amount of logistic support required in general (a) strategic or (b) tactical nuclear war will be:

Response

The majority of the respondents (84 percent) believe that logistic support for strategic nuclear war would be less than that required for nonnuclear war (Table 17).

The majority of the respondents (57 percent) believe that logistic support for tactical nuclear war would be less than than required for nonnuclear war although opinion is generally distributed across the entire scale from much more to much less.

Table 15

NUMBER OF COMBAT DIVISIONS WHICH CAN BE DEPLOYED OVERSEAS IN FIRST YEAR

(Answer to Question B-10)

Quartile	Iteration		
	1	2	3
1	10	10	12
Median	12	15	16.5
3	26.3	20	20

Table 16

NUMBER OF COMBAT DIVISIONS WHICH CAN BE SUPPORTED OVERSEAS

(Answer to Question B-11)

Quartile	Iteration		
	1	2	3
1	10	18	19.2
Median	21	20	20
3	30	25	25

Table 17

RELATIVE LOGISTIC SUPPORT FOR
NUCLEAR VS NON-NUCLEAR WAR
(Answer to Question B-12)

Logistic support requirement relative to non-nuclear war	Type of nuclear war	Iteration		
		1	2	3
Much less	Strategic	52	71	76
	Tactical	14	15	9
Less	Strategic	17	11	8
	Tactical	21	30	48
Same	Strategic	4	4	0
	Tactical	24	18	22
More	Strategic	10	0	0
	Tactical	27	26	12
Much more	Strategic	17	14	16
	Tactical	14	11	9

Chapter 4

EVALUATION OF LOGISTICS SYSTEMS

INTRODUCTION AND BACKGROUND

This chapter deals with Section A of the questionnaire, "Army Logistics Performance."

The Army does not have a single integrated system for the evaluation of its logistics posture and operations. There are, indeed, many useful standards and criteria for the measurement and evaluation of separate parts of the logistics system.

Logistic readiness is defined (AR 11-14) as:

> "... a condition that exists when a unit or activity has sufficient logistic associated assets readily available to assure mission accomplishment."

This definition is amplified by saying:

> "It is the ability to plan for and to promptly and efficiently carry out the movement and maintenance of forces. It means the supply and maintenance of materiel, providing a sustaining movement capability, facilities construction and management, and the acquisition and furnishing of services."

Problems of funding, personnel and training can degrade logistic readiness. The emphasis of the definition is on assets and ability. The respondents, in replying to a request for criteria to be used in judging "good logistics systems performance" tended to emphasize the actual end product of logistics support and thus, primarily by implication, logistics ability.

Question A-1

In judging what constitutes "good logistics system performance," would you use a different set of criteria for performance in wartime as opposed to peacetime?

Response

The answer was predominantly "no" by a ratio of 2 to 1 (Table 18). However, a comparison of the lists of criteria for the two conditions shows that the difference in criteria is primarily one of relative importance or priority.

Question A-2

List in descending order of importance the criteria which should be used in judging "good logistics system performance by the US Army." (Complete this item in conformance with your response to Question A-1 above.)

Response

Under wartime conditions, in comparison with those of peacetime, such considerations as cost effectiveness, demand rate, salvage, planning, and modernization tend to disappear. Accountability and operating costs decline in importance. Flexibility is introduced in place of the capability for transition to war. Conversely, visibility and stockage are given greater importance. These differences may be seen by comparing the lists which summarize the responses to this question in Table 19.

Because the respondents were asked to use their own words, there is some overlap and redundancy in this list. Readiness, as shown above, includes accountability, planning, salvage, stockage and training. Responsiveness is taken to mean speed of reaction or the speed with which the requirement for logistic services is met. It thus includes the rate at which materiel is taken off deadline or the reciprocal of the deadline rate. Asset visibility is one aspect of management accountability. It does not, however, imply the same degree of management control as does accountability. Flexibility and the capability of transition to war are both implied in the definition of logistic readiness.

Table 18

CRITERIA FOR MEASURING LOGISTICS PERFORMANCE

IN WAR AND PEACE

(Answer to Question A-1)

Choice	Iteration		
	1	2	3
Would use same criteria in War and Peace	60	75	67
Would use different criteria in War and Peace	40	25	33

Table 19

CRITERIA FOR USE IN JUDGING GOOD LOGISTICS PERFORMANCE BY THE US ARMY, IN ORDER OF DECREASING IMPORTANCE

(Answer to Question A-2)

Order of importance	Peacetime	Wartime
1	Readiness	Responsiveness
2	Responsiveness	Readiness
3	Deadline rate	Visibility
4	Cost effectiveness	Flexibility
5	Operating cost	Stockage
6	Capability of transition to war	Deadline rate
7	Demand rate	Operating cost
8	Accountability	Simplicity
9	Stockage	Manpower utilization
10	Visibility	Efficient use of resources
11	Salvage	Accountability
12	Simplicity	
13	Modernization	
14	Planning	
15	Manpower utilization	
16	Manpower training	

The introduction of the notions of demand rate (or volume of business), cost effectiveness, manpower utilization and simplicity, all related to the measurement of operational efficiency, is noteworthy. The suggestion that some measure of the degree of modernization should be included is also quite pertinent.

This list has, however, not provided a complete answer for most of the criteria presented. Reasonable and significant as they may be, they provide no established scales of measurement nor standards of performance. Effort is needed to attempt to develop such scales and standards.

PERFORMANCE OF ARMY LOGISTICS FORCES

Question A-3

In consonance with your answer to Question A-2, rate the performance of Army logistics forces during the periods shown by placing an "X" appropriately.

Response

In an attempt to identify problem areas in the general field of logistics, the respondents were asked to rate, using their own criteria, the performance in 10 major logistics activities. The 30-year time period was broken down into seven parts and each part was rated (see App B). Response averages were calculated by assigning values of 70 for superior, 50 for good, and 30 for poor, by multiplying these values by the percent responding and dividing the sums of the three categories by 100. Averages greater than 55 were called superior, 45-55 good, and below 45 poor. On this basis medical services, communications and transportation improved through time and are currently rated as superior. The remainder are currently considered to be good. Procurement was identified as the weakest area in logistic operations (Table 20).

Some of the activities show a cyclical pattern of alternating peaks and slumps over the 30 year period (Table 21). Procurement, supply,

Table 20

RATINGS OF LOGISTICS PERFORMANCE - SUMMARY

(Answer to Question A-3)

Logistic activities	Percentage average*
Medical Services	68.0
Transportation System	64.8
Communications	62.6
Construction	55.6
Personnel Training	55.4
Port Operations	52.4
Depot Operations	51.2
Supply Operations	50.2
Equipment Maintenance	49.0
Procurement	45.8

$$*\text{Score} = \frac{(\text{superior }\%) \times (70) + (\text{good }\%) \times (50) + (\text{poor }\%) \times (30)}{100}$$

Rating scale: > 55 = superior

$45\text{-}55$ = good

< 45 = poor

Table 21

RATINGS OF LOGISTICS PERFORMANCE - DETAIL

(Answer to Question A-3)

Logistic operation	Iteration 1	2	3
Port Operations			
WWII Mobilization	45.4	44.4	47.6
Post WWII Period	46.2	48.2	50.0
Korean Mobilization	44.6	45.2	45.6
Post Korean Period	47.0	47.2	48.8
1955 through 1960	46.2	46.4	48.8
Vietnamese Buildup	45.2	43.0	42.2
Present time	55.4	52.0	52.4*
Procurement			
WWII Mobilization	48.2	45.2	42.4
Post WWII Period	46.0	45.2	46.6
Korean Mobilization	42.8	45.0	41.0
Post Korean Period	46.2	44.2	46.6
1955 through 1960	45.2	43.6	45.6
Vietnamese Buildup	52.6	50.0	49.0
Present time	48.4	46.4	45.8*
Supply Operations			
WWII Mobilization	40.0	36.6	36.6
Post WWII Period	44.4	46.2	47.6
Korean Mobilization	41.8	40.4	40.0
Post Korean Period	47.2	46.4	47.6
1955 through 1960	45.4	48.2	47.6
Vietnamese Buildup	46.4	48.2	47.6
Present time	50.0	51.0	50.2*
Depot Operations			
WWII Mobilization	42.8	42.6	39.0
Post WWII Period	43.4	44.2	46.6
Korean Mobilization	44.6	45.2	44.4
Post Korean Period	46.4	47.2	47.6
1955 through 1960	47.4	47.2	47.6
Vietnamese Buildup	52.0	50.0	47.6
Present time	51.8	51.3	51.2*

*Source of entry in Table 20

Table 21 (continued)

Logistic operation	Iteration 1	2	3
Equipment Maintenance			
WWII Mobilization	41.8	42.4	45.6
Post WWII Period	41.4	42.4	46.6
Korean Mobilization	40.0	40.4	44.4
Post Korean Period	42.6	43.4	45.6
1955 through 1960	43.8	44.6	48.8
Vietnamese Buildup	45.4	48.2	50.0
Present time	44.8	48.0	49.0*
Construction			
WWII Mobilization	55.4	51.8	50.0
Post WWII Period	50.0	49.0	50.0
Korean Mobilization	52.8	51.8	51.2
Post Korean Period	52.0	49.0	51.2
1955 through 1960	50.0	48.2	51.2
Vietnamese Buildup	60.0	57.0	56.6
Present time	54.2	54.6	55.6*
Medical Services			
WWII Mobilization	52.8	52.8	50.8
Post WWII Period	50.8	53.6	54.2
Korean Mobilization	57.2	57.6	54.2
Post Korean Period	57.8	56.2	54.2
1955 through 1960	57.8	56.2	56.4
Vietnamese Buildup	63.6	65.6	64.8
Present time	65.8	66.6	68.0*
Communications			
WWII Mobilization	39.0	39.6	39.0
Post WWII Period	46.2	45.4	49.0
Korean Mobilization	45.6	46.2	47.8
Post Korean Period	48.2	46.4	47.8
1955 through 1960	50.0	45.4	47.8
Vietnamese Buildup	54.6	57.2	58.8
Present time	59.2	58.6	62.6*
Personnel Training			
WWII Mobilization	46.4	44.4	42.4
Post WWII Period	44.4	47.2	49.0
Korean Mobilization	48.0	46.2	47.6
Post Korean Period	46.2	48.0	50.0
1955 through 1960	47.2	47.2	50.0
Vietnamese Buildup	--	50.8	55.4
Present time	54.4	47.2	55.4*

*Source of entry in Table 20

Table 21 (continued)

Logistic operation	Iteration 1	2	3
Transportation System			
WWII Mobilization	48.0	48.0	50.0
Post WWII Period	48.0	50.0	51.2
Korean Mobilization	48.0	50.8	50.0
Post Korean Period	50.8	51.8	51.2
1955 through 1960	51.8	52.0	53.4
Vietnamese Buildup	56.6	57.8	61.0
Present time	58.4	61.8	64.8 *

*Source of entry in Table 20.

port operations and depot operations tend to show a slump in performance during mobilization periods and a peak in performance immediately after the mobilization followed by a leveling or slight decline. It implies that these activities experience the greatest difficulty in readjustment to wartime conditions and, presumably, are the least flexible. Conversely, construction shows a pattern of peak performance during episodes of mobilization separated by relative slumps. The pattern of personnel training, medical services and communications is one of continuous, almost uninterrupted improvement in performance over the entire 30 year period.

ARMY REORGANIZATION

Questions A-4, A-5, and A-6

A-4. Do you know about the 1962 reorganization? Place an "X" as appropriate.

A-5. Do you believe that the results of that reorganization benefited the Army? Place an "X" as appropriate.

A-6. If you feel the 1962 organization had a negative effect, what specific aspects of the reorganization caused this negative effect?

Response

With the reorganization that some of the changes, described above, might have been affected by the Army reorganization of 1962, questions specifically related to this reorganization were asked. Nearly 3/4 (71 percent) of the respondents were generally acquainted or very well acquainted with the reorganization (Table 22). The respondents' replies ascribed some beneficial results to the reorganization but seemed to believe that the reorganization has been of very slight benefit to the Army. Nearly 1/4 (24 percent) believe that the reorganization had a negative effect (Table 23). Those who took this latter position tended to emphasize four points: that as a result, 1) technical specialization was downgraded with a corresponding loss of competence and efficiency, 2) responsibility became diffused and obscure, 3) management complexity was increased with an increase of echelons thereby resulting in

Table 22

KNOWLEDGE OF ARMY REORGANIZATION

(Answer to Question A-4)

Degree of knowledge	Percent of respondents
None	12
Vague	17
General	63
Very well	8

Table 23

BENEFIT TO THE ARMY OF REORGANIZATION

(Answer to Question A-5)

Degree of benefit	Percent of respondents
Very much	5
Some	66
None	5
Negative	24

inadequate performance and duplication, and 4) there was emphasis on management with a concurrent downgrading of the importance of technical expertise and military preparedness and this change of emphasis created a condition of low morale.

Chapter 5

IMPACT OF TECHNOLOGY

INTRODUCTION AND BACKGROUND

This chapter deals with Section C of the questionnaire, "Technological Innovations and Their Impact on the Army's Logistics System."

The question concerning the innovations which are likely to be introduced into the Army and which will have the most significant effect on the Army's logistics system was one which called for a high degree of imagination and background of the respondents. It is the type of question which is most appropriate to put to consultants. No constraints were placed on the range of responses.

Quoting from the questionnaire:

> "This section primarily addresses the 1975-1985 time frame. The term "technological innovations" implies innovative utilization of equipment of some type, e.g., computer advances, satellite applications, transportation modes, etc. In considering the impact of such innovations it is suggested that respondees also consider the effect, if any, of technological innovations on general management processes, e.g., planning, organizing, directing, and controlling, as applied to Army logistics."

TECHNOLOGICAL INNOVATIONS

Question C-1

List five technological innovations which you believe could have the most significant favorable or unfavorable impact on the Army's logistics system in the 1975-1985 time frame. List also the corresponding impact.

Response

The expected technological innovations which were suggested as having the greatest impact fell mostly into four categories: transportation, materiel, computers, and communications. They indicate a general impact in the direction of increased responsiveness of the supply system. The 109 suggestions given in response to this question in the final iteration may be divided as shown in Table 24.

Innovations in transportation technology are expected to lie primarily in the development of aircraft, ships and containers, rather than in land surface transport, and to result primarily in faster response and increased flexibility of the supply system.

Innovations in materiel technology are expected to lie primarily in the development of throw-away components, miniaturization, modularization and standardization. The result of such innovations would be to reduce the maintenance effort, reduce salvage requirements, reduce the construction effort and reduce the number of items required to be stocked. Modularization and miniaturization might reduce supply and transportation requirements, but the use of throw-aways would be likely to increase these requirements.

Improvements in computer design and the increased use of computers are expected to increase the responsiveness of the supply system and facilitate supply management primarily through improved asset visibility and management accountability.

The innovations in communications are mostly suggested in general terms. These innovations are expected to result not only in improvements in combat intelligence but also in better logistic visibility.

In an unconstrained question such as this, the points raised by single respondents may merit recognition and consideration. One of them suggested that nuclear powered electrical generators may come into use and that these generators will have the effect of reducing fluid fuel (POL) requirements, but at the expense of the development of new maintenance skills. Another concerned himself with the development of weapons capabilities of potential enemy countries and pointed out that, as a result, large or permanent ports, airfields or depots would be extremely vulnerable and that there would be a requirement for centralized control over a widely dispersed operation.

Table 24

EXPECTED TECHNOLOGICAL INNOVATIONS, 1975-1985

(Answer to Question C-1)

Category	Innovation	Number suggesting
Transportation		
	Larger and faster aircraft	11
	Helicopters and short take-off aircraft	5
	Improved ships	6
	Containerization	5
	Generally improved transport	5
	Other	3
Materiel		
	Throw-away components	5
	Miniaturization	5
	Modularization	4
	Standardization	2
	Other	10
Computers		
	Improved design and increased use	21
Communications		
	Sensors	3
	Lasers	3
	Satellite communications	3
	Generally improved communications	8
Other		
	Advanced weapons systems	6
	Improved management and training systems	4

BENEFITS OF TECHNOLOGY

Question C-2

To what degree has the Army's logistics system benefited to date from technological innovations in the areas outlined below?

Response

The degree to which the Army tends to adjust itself and benefit from technological innovations was sought through a selected sample. Questions were asked concerning the benefits derived from innovations in data handling, communications and transportation. In all instances the majority indicated that the Army derived only a moderate degree of benefit from technological innovations. In another question concerning the projected impact of innovations upon the Army construction program the respondents were nearly evenly divided between a projected slight effect and a very significant effect. These responses are taken to indicate that, as in the civilian economy, consumer acceptance of innovations constitutes a major problem. They are taken to indicate that, in the R&D cycle, emphasis on the integration of new developments into organizations and operational doctrine is important, (Table 25).

Table 25

DEGREE ARMY HAS BENEFITED FROM
TECHNOLOGICAL INNOVATIONS
(Answer to Question C-2)

Logistic function and rating	Iteration		
	1	2	3
Data Handling			
Extremely well	10	8	4
To advantage	66	70	79
Little, if any	21	22	17
Has made things worse	3	0	0
Communications			
Extremely well	24	26	17
To advantage	62	63	79
Little, if any	14	11	4
Has made things worse	0	0	0
Transportation			
Extremely well	17	7	4
To advantage	66	78	92
Little, if any	17	15	4
Has made things worse	0	0	0

Chapter 6

NATIONAL SUPPORT OF LOGISTICS REQUIREMENTS

INTRODUCTION

This chapter deals with Section D of the questionnaire, "Shifting Patterns of Logistical Personnel Skills in the 1975-1985 Time Frame."

Again, quoting from the questionnaire: "This section is attempting to ascertain significant shifts in logistical personnel skills requirements from the current time through the 1975-1985 time frame. An attempt will also be made to correlate training times for certain skills with estimates of the number and rapidity with which Army divisions would be activated under general mobilization conditions." This section of the questionnaire also raises questions about materiel requirements. The questions are a representative sample only of the many that could be asked.

MATERIEL REQUIREMENTS

Question D-1

List in order of decreasing importance the 10 categories of Army materiel which you feel will be of paramount importance should there be a requirement for general mobilization in the 1975-1985 time frame.

Response

The 10 categories of materiel which more than half of the respondents mentioned are listed in Table 26.

The primary emphasis is placed on weapons systems, target acquisition and related functions. Transportation equipment (except aircraft),

Table 26

TEN MOST IMPORTANT CATEGORIES OF
ARMY MATERIEL
(Answer to Question D-1)

Materiel category		Iteration*		
Materiel code category	Name	1	2	3
1000-1300	Guns and related ammunition	87	91	90
1520	Aircraft rotary wing	83	91	90
2350	Tanks and self propelled weapons	78	91	95
5820	Radio and TV communication equipment	70	100	100
1425	Guided missile systems, complete	65	69	81
1230	Fire control systems, complete	61	69	81
1340	Rockets and rocket ammunition	57	69	67
4920	Aircraft maintenance and repair shop special equipment	57	52	71
2320	Truck and truck tractors	52	48	38
5855	Night vision equipment	43	65	67
7440	Automatic data processing system	43	52	52

*Percent of respondents citing the category.

medical equipment and construction equipment were considered relatively unimportant. Presumably the items on this list merit particular attention in the determination of stand-by stockage levels.

MANPOWER REQUIREMENTS

Question D-2

The Army logistical system currently recognizes a number of "major occupational areas." These occupational areas are listed below. You are asked to express your opinion as to whether the number of civilian and military personnel employed by the Army in these areas is likely to increase, decrease, or remain the same in the 1975-1985 time frame with respect to the proportions of personnel currently employed by the Army in these areas. You are asked to answer this question in the light of two different conditions: (a) the probability of change occurring as a result of a change in the Army's strategy or tactics; (b) the probability of change occurring as a result of increasing weapon or system complexity.

Response

Out of a selected sample of 32 occupational area categories, 12 were expected to involve an increase in the number of civilian and military personnel employed by the Army and six to decrease as a result of estimated changes in strategy and tactics. Similarly 16 were expected to increase and two to decrease as a result of a change in the complexity of weapons systems. In total 15 categories are expected to increase for either or both reasons and six to decrease. These expected changes are listed in Table 27.

The large body of increases lie in the general area of repair and maintenance of electronic equipment.

Question D-3

With respect to logistical officer personnel, please select from App D2 the Military Occupational Specialty (MOS) codes and job titles which correspond to the 10 occupational specialties which will be most critical in the 1975-1985 time frame assuming that the country were to

Table 27

EXPECTED CHANGES IN MANPOWER REQUIREMENTS

(Answer to Question D-2)

Increases		Decreases	
Occupational code	Major occupational area	Occupational code	Major occupational area
21	Missile, ballistic, electronic maintenance	36	Wire maintenance
22	Missile, guided, electronic maintenance	43	Textile leather repair
23	Missile, fire control, electronic maintenance	44	Metal working
26	Radar and microwave maintenance	53	Industrial gas production
27	Missile, combat electronic maintenance	54	Chemical
31	Field communications equipment maintenance	65	Railway maintenance and operations
33	Intercept equipment maintenance		
34	Data processing equipment maintenance		
35	Electrical electronic devices maintenance		
41	Precision devices maintenance		
45	Armament maintenance		
46	Missile, mechanical maintenance		
67	Aircraft maintenance		
68	Aircraft components repair		
74	Data processing		

undergo general mobilization. Please list these 10 codes and titles below. Once listed, check the columns which most closely approximate your estimate of (a) how many weeks of training it will take to qualify an individual in such jobs, (b) how well the civilian non-Army labor pool will be able to provide these skills in event of general mobilization, and (c) recognizing the problems, if any, posed by your answers to (a) and (b) preceding, what percent of the total number of these personnel authorized for general mobilization should be maintained either in an active duty or standby reserve status in the 1975-1985 time frame, assuming peacetime conditions.

Response

The respondents analysis of the labor pool for potential officers indicated that, among those categories believed to be most critical, only four would exist in adequate supply in the civilian economy. These are:

Transportation Officer
Transportation Movements Officer
Procurement Officer
Water Supply Unit Commander

On the other hand 15 of those categories considered most critical were believed to be represented by an inadequate or negligible supply in the civilian labor pool. These are listed in Table 28.

These estimates indicated that, as far as officer personnel in logistics is concerned, the Army will have to depend, to a significant degree, upon its own training. It was further estimated that this specialized training would require about six months and that about half of the estimated requirement would be readily available either on active duty or in reserve status (Table 29). If the possibility of a general tactical nuclear war is small, this requirement is for the support of on the order of 35 divisions; for limited war operations, it is presumably about 15 divisions (Table 29).

The period of special training for medical officers was estimated to be about 2-3/4 years (139 weeks) and the desired proportion to be maintained on active duty or in reserve status is about 2/5 of the total requirement.

Table 28

ADEQUACY OF CIVIL LABOR POOL
AS SOURCE FOR OFFICERS

(Answer to Question D-3)

Occupational code	Title	Iteration*		
		1	2	3
	Adequate or more than Adequate			
0692	Transportation Officer	80	67	100
0694	Transportation Movements Officer	50	100	67
4320	Procurement Officer	50	100	100
4940	Water Supply Unit Commander	100	100	100
	Inadequate or Neglibible Civilian Supply			
0205	Communication and Electronic Staff Officer	69	70	85
0221	Communication Center Officer	83	75	78
0515	Radio Systems Officer	75	62	87
0815	Port Operations Officer	100	67	100
2624	Logistical Commander	100	100	100
2625	Logistics Officer	70	67	90
2640	Troop Movements Officer	60	80	80
4420	Aircraft Supply Officer	67	50	83
4515	Missile and Munitions Officer	100	100	100
4516	Missile Maintenance Officer	92	85	100
4517	Special Ammunition Officer	100	100	100
4808	Armament Maintenance and Repair Officer	92	84	100
4823	Aircraft Maintenance Officer	80	80	69
2615	Organization and Equipment Planning Officer	80	75	75
0213	Post Communications Electronics Officer	100	100	--
0405	Telephone-Digital Communications Officer	50	75	--
0693	Transportation Traffic Management Officer	72	80	57
2622	Training Center Unit Officer	50	75	66
4490	Medical Supply Officer	--	100	--
4815	Mechanical Maintenance Officer	--	75	--
4825	Electronics Maintenance Officer	62	70	61
1220	Area Signal Center Officer	100	--	--
4514	Conventional Ammunitions Officer	100	--	67

*Percent of respondents citing the category

Table 29

PERCENT OF OFFICER SKILLS REQUIRED
ON ACTIVE DUTY OR IN RESERVE FORCE AND
AVERAGE TRAINING TIME REQUIRED IN WEEKS

(Answer to Question D-3)

Occupational area code	Job title	Average estimated training time in weeks	Average % of requirement recommended to be maintained on active duty or in reserve status
0205	Communications and electronic staff officer	30	53
0221	Communications center officer	24	48
2624	Logistical commander	21	60
2625	Logistics officer	17	56
2640	Troop movements officer	19	50
2615	Organization and equipment planning officer	19	54
0693	Transportation traffic management officer	16	47
4420	Aircraft supply officer	24	41
4515	Missile and munitions officer	23	59
4516	Missile maintenance officer	25	55
4517	Special ammunition officer	24	40
4808	Armament maintenance and repair	19	47
4823	Aircraft maintenance officer	28	34
4514	Conventional ammunition officer	23	34
3100	General medical officer	139	41

Question D-4

With respect to logistical enlisted personnel, please select from App D3 the 10 occupational area subcodes and corresponding job titles which will be most critical in the 1975-1985 time frame, assuming that the country were to undergo general mobilization. Please list these 10 codes and titles below. Once listed, check the columns which most closely approximate your estimate of (a) how many weeks of training it will take to qualify an individual in such jobs, (b) how well the civilian non-Army labor pool will be able to provide these skills in event of general mobilization, and (c) recognizing the problems, if any, posed by your answers to (a) and (b) preceding, what percent of the total number of these personnel authorized for general mobilization should be maintained either in an active duty (AD) or standby reserve status in the 1975-1985 time frame, assuming peacetime conditions.

Response

The estimates concerning the availability of the most critical skills for enlisted personnel from the civilian labor pool lead to similar conclusions. The Army must depend upon itself for trained specialists in critical logistic areas. In general the critical specialties were considered to be either marginally adequate or inadequate in the civilian labor pool. Among these, seven appear to be distinctly inadequate in numbers. These are listed in Table 30. These are skills in the area in which expanded demand is to be expected.

The training period required for critical enlisted personnel is six months to a year. Generally, the respondents felt that 40 to 50 percent of the total required strength should be continuously available to the Army.

Question D-5

What new logistical personnel skills do you see being required in the 1975-1985 time frame from technological innovations or any other conditions of that period?

Table 30

PERCENT OF ENLISTED SKILLS REQUIRED ON ACTIVE DUTY OR IN RESERVE FORCE AND AVERAGE TRAINING TIME REQUIRED IN WEEKS

(Answer to Question D-4)

Occupational area sub-code	Job title	Average estimated training time in weeks	Average % of total requirement recommended to be maintained on active duty or in reserve status
22K	Hawk missile and launcher repairman	25	51
26B	Weapons support radar repairman	29	43
26H	Air defense radar repairman	28	54
27D	Combat support missile systems repairman	25	50
31W	Tactical electronics maintenance chief	31	48
35J	Aircraft fire control repairman	28	40
55F	Missile and rocket explosive specialist	32	51

Response

New logistical personnel skills which the respondents expect to be required because of technological innovations are listed below in order of decreasing frequency of mention:

Laser maintenance
Nuclear reactor operator and repairman
Systems analyst
Computer operations and repair
Satellite operators and repair
Advanced electronic maintenance
Fuel cell maintenance and repair
Information and communications specialists.

These are mostly different kinds of electronic equipment operators and repair personnel. This suggests that the trend of the future is going to be in the direction of greater handling of electrical and electronic equipment.

Question D-6

D-6. What proportion of DOD military and civilian personnel are located outside the Continental United States (CONUS)?

Response

This question was asked simply to determine how closely the group of respondents understood the distribution of DOD personnel. The correct answer is approximately 33 percent. The distribution of answers by the respondents is shown in Table 31.

Table 31

PROPORTION OF DOD PERSONNEL
OUTSIDE CONUS

(Answer to Question D-6)

Percent of personnel outside CONUS	Percent of* respondents
Over 85 percent	0
67 - 85 percent	0
51 - 66 percent	0
33 - 50 percent	75
Under 33 percent	25

*Percent of respondents citing category

Chapter 7

CONSTRUCTION ACTIVITIES

INTRODUCTION

This chapter deals with Section E of the questionnaire, "Activities and Projected Trends in Army Construction."

Construction activities were selected, from the spectrum of logistic activities, as a sample exploration in slightly greater depth. The results amplify those given above in the discussion of the evaluation of logistics systems.

Again, quoting from the questionnaire, "This section addresses the relatively broad area of Army construction and attempts to perceive the degree and nature of change, if any, in this area in a future time frame."

RESOURCE UTILIZATION

Questions E-1, E-2, and E-3

E-1. In the light of the availability of industry to construct military facilities overseas and the desirability of maintaining Army construction units in some state of readiness for potential mobilization, what is an appropriate proportion to be made among the following in actually fulfilling overseas construction requirements? Assume a 1975-1985 time frame, and a peacetime environment.

Active Army construction units -- percent _____ 1a

Activation of reserve Army construction units -- percent _____ 1b

Civilian industrial construction sources -- percent _____ 1c

E-2. Again assuming a 1975-1985 time frame, but in a wartime environment, what is an appropriate proportion for fulfilling overseas construction requirements?

Active Army construction units -- percent _____2a

Reserve Army construction units -- percent _____2b

Civilian, industrial construction cources -- percent _____2c

E-3. To what extent do you believe the Army should use locally available construction material in the 1975-1985 time frame?

Response

It was generally felt that under peacetime conditions, overseas military construction should rely on civilian construction sources in the ratio 80 percent civilian to 20 percent active Army. However, under wartime conditions, the ratio changed sharply to 40:33:25 (civilian; Army reserve; active Army). This was interpreted to mean that under such circumstances any and all sources should be utilized as available. Most further believed that, during the 1975-1985 time period, and regardless of whether peacetime or wartime conditions prevailed, locally available construction materials should be used to the fullest extent possible, even if designs must be changed (Tables 32, 33 and 34).

ALLOCATION OF EFFORT

Questions E-4 and E-5

E-4. How much of an impact will innovations (e.g., in building materials, construction methods, construction equipment, etc.) have on the Army construction program in the 1975-1985 time frame?

E-5. The Army constructs a wide range of facilities in an overseas theater including ports, hospitals, depots, roads, barracks, service centers, clubs, PXs, etc. Do you anticipate any marked change in the need for such facilities in the 1975-1985 time frame assuming peacetime conditions?

Table 32

PROPORTIONS OF MILITARY AND CIVILIAN
CONSTRUCTION EFFORT - PEACETIME
(Answer to Question E-1)

Source of effort	Quartile	Iteration 1	Iteration 2	Iteration 3
Active army construction units	1	10	10.0	10
	Median	20	20.0	20
	3	26.3	20.0	20
Activation of reserve army construction units	1	0	0	0
	Median	0	0	0
	3	10	0	0
Civilian industrial construction sources	1	60	70.0	80
	Median	80	80.0	80
	3	85	83.7	82.5

Table 33

PROPORTIONS OF MILITARY AND CIVILIAN
CONSTRUCTION EFFORT - WARTIME
(Answer to Question E-2)

Source of effort	Quartile	Iteration 1	Iteration 2	Iteration 3
Active army construction units	1	20	20.0	20
	Median	25	25.0	25
	3	50	40.0	34
Activation of reserve army construction units	1	20	22.5	27.5
	Median	22.5	30.0	33
	3	43.5	45.0	45
Civilian industrial construction sources	1	10	25.0	25
	Median	35	40.0	40
	3	50	50.0	45

Table 34

DEGREE TO WHICH LOCALLY AVAILABLE
CONSTRUCTION MATERIALS SHOULD BE USED

(Answer to Question E-3)

Degree of use	Iteration		
	1	2	3
To fullest extent possible	85	100	96
Only if available materials are to US standards	12	0	4
None at all	3	0	0

Response

All peacetime construction activities overseas were expected to decline during the 1975-1985 period. This was in general accord with the expected decline in overseas garrison strength described earlier. Greatest certainty was apparent in the estimates of decline in the construction of barracks, recreation centers, post exchanges, laundries and dependent housing. Least certainty was apparent in the estimates of decline in the construction of electrical utilities, piers, wharves and docks (Tables 35 and 36).

Table 35

IMPACT OF INNOVATIONS ON MILITARY CONSTRUCTION
(Answer to Question E-4)

Degree of impact	Iteration		
	1	2	3
Very significant	38	46	52
Slight	58	50	48
None	4	4	0

Table 36

ANTICIPATED CHANGE IN NEED FOR FACILITIES

Facility	Anticipated change*		
	Increase	Decrease	No change
Runways	0	72	28
Barracks	0	88	12
Ammunition storage	0	76	24
Bulk POL	8	71	21
Storage	4	72	24
Roads	0	76	24
Electrical utilities	16	72	12
Piers, wharves and docks	12	72	16
Administration	4	76	20
Hospitals	8	72	20
Maintenance shops	8	72	20
Dependent housing	4	84	12
Recreation centers	4	88	8
BOQs	4	80	16
Clubs	4	80	16
Laundries	4	84	12
Post exchanges	4	88	8

*Percent of respondents.

APPENDIX A

LETTER OF INVITATION

29 July 1970

MEMORANDUM TO:

FROM: Lee S. Stoneback

SUBJECT: Participation in Logistics Forecasting Experiment

1) You are invited to participate in an experiment in group forecasting of future military requirements using the "Delphi Technique." This technique, developed at RAND Corporation has been used for the elicitation of opinions with the object of obtaining a group response of a panel of experts. In this procedure direct confrontation and debate is replaced by a program of three sequential individual interrogations conducted by questionnaires. These questionnaires are interspersed with feedback derived from the respondents. This technique attempts to improve the panel or committee approach by subjecting the views of individuals to each other's criticism in ways that avoid face to face confrontation and provide anonymity of opinion and of arguments advanced in defense of those opinions.

2) The Logistics Department is engaged in research under RAC-IR-010.210 (Peacetime Army Logistics Base). The object of this project is: "To study the question: What logistic units and/or skills should the peacetime Army contain in order to perform its initial wartime missions and also provide a base for rapid expansion to meet subsequent support requirements." The methodology being used in this study is the Delphi Experiment. Your opinions concerning various aspects of this question are sought. The experiment will be conducted during the period 3 August to 21 August with iterations approximately one week apart. To be meaningful it will be necessary for all iterations to be completed. If you will not be available throughout the entire period and will not be able to complete all iterations, please do not participate.

3) Please complete the following form and return it to Room B-240.

- -

_____Yes, I am willing to fill out the questionnaires needed for this forecast.

_____No, I shall be unable to participate. I recommend

_____ instead.

_____
(signed)

Appendix B

DELPHI QUESTIONNAIRE

SECTION

Section A

ARMY LOGISTICS PERFORMANCE

(This section solicits your evaluation of past and current performance of the Army's logistics system.)

1. In judging what constitutes "good logistics system performance," would you use a different set of criteria for performance in wartime as opposed to peacetime?

Yes _____ 1a

No _____ 1b

2. List in descending order of importance the criteria which should be used in judging "good logistics system performance by the US Army." (Complete this item in conformance with your response to Item 1, above.)

a. Peacetime

_____ 2a (1)
_____ 2a (2)
_____ 2a (3)
_____ 2a (4)
_____ 2a (5)
_____ 2a (6)
_____ 2a (7)
_____ 2a (8)
_____ 2a (9)
_____ 2a (10)

b. Wartime

_____ 2b (1)
_____ 2b (2)
_____ 2b (3)
_____ 2b (4)

2. (cont'd)

_____ 2b (5)

_____ 2b (6)

_____ 2b (7)

_____ 2b (8)

_____ 2b (9)

_____ 2b (10)

3. In consonance with your answer to Question 2, rate the performance of Army logistics forces during the periods shown by placing an "X" appropriately.

	Superior	Good	Poor
(a) Port operations:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			
(b) Procurement:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			
(c) Supply Operations:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			
(d) Depot Operations:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			

3. (cont'd)

	Superior	Good	Poor
(e) Equipment Maintenance - All Levels			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			
(f) Construction:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			
(g) Medical Services:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			
(h) Communications:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			
(i) Personnel Training:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			

3. (cont'd)

	Superior	Good	Poor
(j) Transportation System:			
1. WWII Mobilization			
2. Post WWII Period			
3. Korean Mobilization			
4. Post Korean Period			
5. 1955 through 1960			
6. Vietnamese buildup			
7. Present time			

4. Do you know about the 1962 reorganization? Place an "X" as appropriate.

No . . . . . _____ 4a
Vaguely . . . . . _____ 4b
Generally . . . . . _____ 4c
Very well . . . . . _____ 4d

5. Do you believe that the results of that reorganization benefited the Army? Place an "X" as appropriate.

Very much . . . . . _____ 5a
Somewhat . . . . . _____ 5b
No . . . . . _____ 5c
Had negative effect . . . . . _____ 5d

6. If you feel the 1962 reorganization had a negative effect, what specific aspects of the reorganization caused this negative effect?

_____ 6a
_____ 6b
_____ 6c
_____ 6d
_____ 6e

7. Please rate your qualifications in responding to this section:

Highly qualified . . . . . _____ 7a
Generally qualified . . . . . _____ 7b
Casually familiar with subject areas . . . _____ 7c
Unfamiliar with subject areas . . . . . _____ 7d

8. Please indicate your experience in political and military affairs:

How many years have you been on active duty in the armed services? . . . . . _____ years 8a

How many years have you served in the military or naval reserves? . . . . . _____ years 8b

How many years have you served in civilian capacity in government? . . . . . _____ years 8c

How many years have you been employed by RAC or other government-oriented research organizations? _____ years 8d

How many years have you devoted to related academic studies? . . . . . _____ years 8e

Section B

SIZE AND DISPERSION OF ARMY, ACTIVATION TIMES, AND TYPE OF WAR SHOULD WAR OCCUR*

(This section attempts to establish a background for the Army logistics system in a 1975-1985 time frame.)

1. Assuming a peacetime role, what is the minimum number of US Army combat divisions for which logistic support capability should exist in the 1975-1985 time frame?

Combat divisions _____ 1.

2. Recognizing the limitations of national population and industrial base, what is the maximum number of US Army combat divisions that could exist under any and all contingencies during the time frame 1975-1985?

Combat divisions _____ 2.

3. Assuming a 1975-1985 time frame, what are the chances in percent that the US will be engaged in one or more of the following types of war? (Answer each part.)

	% Chance
Aiding counterinsurgency—internal forces given US logistical and technical assistance only:	_____ 3a
Aiding counterinsurgency—US ground fighting forces aid internal forces:	_____ 3b
US and other major power(s) at war—limited objectives; less than all-out war:	_____ 3c
US and other major power(s) at war—general war—unlimited use of "conventional" weapons:	_____ 3d
US and other major power(s) at war—general war—use of tactical nuclear weapons:	_____ 3e
US and other major power(s) at war—general war—use of strategic nuclear weapons:	_____ 3f

*The term "division" as used in this section denotes a normal strength division exclusive of any logistical support elements which are not an integral part of the division.

4. Assuming a 1975-1985 time frame, what is the most likely maximum size of a US Army aiding or fighting the various types of war indicated below?

	Number of Combat Divisions	
Aiding counterinsurgency—internal forces given logistical and technical assistance only:	_____	4a
Aiding counterinsurgency—US ground fighting forces aid internal forces:	_____	4b
US and other major power(s) at war—limited objectives; less than all-out war:	_____	4c
US and other major power(s) at war—general war—unlimited use of "conventional" weapons:	_____	4d
US and other major power(s) at war—general war—use of tactical nuclear weapons:	_____	4e
US and other major power(s) at war—general war—use of strategic nuclear weapons	_____	4f

5. What is the likely duration of the following types of war should they occur in the 1975-1985 time frame?

	Weeks	
General war—unlimited use of "conventional" weapons:	_____	5a
General war—use of tactical nuclear weapons:	_____	5b
General war—use of strategic nuclear weapons:	_____	5c

6. Assuming a general nonnuclear war in the 1975-1985 time frame, what is the maximum rate of mobilization of personnel per month that the US Army could experience during the first year of war?

First 3 months of war—persons per month:	_____	6a
3-6 months of war—persons per month:	_____	6b
6-9 months of war—persons per month:	_____	6c
9-12 months of war—persons per month:	_____	6d

7. Excluding individual personnel training, i.e., basic training plus specialty training, what will be the length of time required to activate a combat division including training (e.g., company, battalion, etc.), equipping and making ready for combat in the 1975-1985 time frame?

Weeks _____ 7

8. What is the most likely distance from the limits of conterminous United States that the Army might operate in (a) a general nonnuclear war, (b) a general strategic nuclear war, during the time frame 1975-1985?

General nonnuclear war: No. miles _____ 8a

General strategic nuclear war: No. miles _____ 8b

9. What is the most likely number of US Army divisions stationed outside of conterminous United States in 1980?

	Number of Divisions	
Europe (including Iceland)	_____	9a
Mid-East (North Africa and Southwest Asia)	_____	9b
Mainland Asia (Central and East Asia)	_____	9c
Pacific Area (including Japan and Hawaii)	_____	9d
Latin America (including Puerto Rico, Panama and other Caribbean Sea Area)	_____	9e
Africa (except North Africa)	_____	9f
Alaska, Canada and Greenland	_____	9g
Other (specify)	_____	9h

Rationale underlying above distribution: _____

_____

_____

_____

_____

_____

_____

_____

_____ 9i

10. How many combat divisions can be newly deployed overseas within one year after the decision to mobilize?

Combat divisions _____ 10

11. What is the total number of combat divisions that can be supported overseas within one year after the decision to mobilize?

Combat divisions _____ 11

12. The amount of logistic support required in general (a) strategic or (b) tactical nuclear war will be:

	(a) Strategic Nuclear War	(b) Tactical Nuclear War
(1) much less than nonnuclear war	_____	_____
(2) less than a nonnuclear war	_____	_____
(3) about same as nonnuclear war	_____	_____
(4) more than nonnuclear war	_____	_____
(5) much more than nonnuclear war	_____	_____

13. Please rate your qualifications in responding to this section:

Highly qualified . . . . . _____ 13a
Generally qualified . . . . . _____ 13b
Casually familiar with subject area _____ 13c
Unfamiliar with subject area . . . . _____ 13d

Section C

TECHNOLOGICAL INNOVATIONS AND THEIR IMPACT ON THE ARMY'S LOGISTICS SYSTEM

(This section primarily addresses the 1975-1985 time frame. The term "technological innovations" implies innovative utilization of equipment of some type, e.g., computer advances, satellite applications, transportation modes, etc. In considering the impact of such innovations it is suggested that respondees also consider the effect, if any, of technological innovations on general management processes, e.g., planning, organizing, directing, and controlling, as applied to Army logistics.)

1. List five technological innovations which you believe could have the most significant favorable or unfavorable impact on the Army's logistics system in the 1975-1985 time frame. List also the corresponding impact.

	Innovation	Impact	
a.	_____	_____	1a (1)
b.	_____	_____	1b (1)
c.	_____	_____	1c (1)
d.	_____	_____	1d (1)
e.	_____	_____	1e (1)

2. To what degree has the Army's logistics system benefited to date from technological innovations in the areas outlined below:

Degree of Benefit		
	a. Data Handling	
Extremely well	_____	2a (1)
To advantage	_____	2a (2)
Little, if any	_____	2a (3)
Has made things worse . .	_____	2a (4)
	b. Communications	
Extremely well	_____	2b (1)
To advantage	_____	2b (2)
Little, if any	_____	2b (3)
Has made things worse . .	_____	2b (4)
	c. Transportation	
Extremely well	_____	2c (1)
To advantage	_____	2c (2)
Little, if any	_____	2c (3)
Has made things worse . .	_____	2c (4)

3. Please rate your qualifications in responding to this section:

Highly qualified	_____	3a
Generally qualified	_____	3b
Casually familiar with subject areas	_____	3c
Unfamiliar with subject areas	_____	3d

Section D

SHIFTING PATTERNS OF LOGISTICAL PERSONNEL SKILLS
IN THE 1975-1985 TIME FRAME

(This section is attempting to ascertain significant shifts in logistical personnel skill requirements from the current time through the 1975-1985 time frame. An attempt will also be made to correlate training times for certain skills with estimates of the number and rapidity with which Army divisions would be activated under general mobilization conditions.)

1. List in order of decreasing importance the 10 categories of Army materiel which you feel will be of paramount importance should there be a requirement for general mobilization in the 1975-1985 time frame. (See App D1 attached for list of categories.)

_____ 1a
_____ 1b
_____ 1c
_____ 1d
_____ 1e
_____ 1f
_____ 1g
_____ 1h
_____ 1i
_____ 1j

2. The Army logistical system currently recognizes a number of "major occupational areas." These occupational areas are listed below. You are asked to express your opinion as to whether the number of civilian and military personnel employed by the Army in these areas is likely to increase, decrease, or remain the same in the 1975-1985 time frame with respect to proportions of personnel currently employed by the Army in these areas. You are asked to answer this question in the light of two different conditions: (a) the probability of change occurring as a result of a change in the Army's strategy or tactics; (b) the probability of change occurring as a result of increasing weapon or system complexity.

Code	Major Occupational Area	a Change in Strategy or Tactics			b Change in Weapon/System Complexity		
		1 Inc	2 Dec	3 No Chge	1 Inc	2 Dec	3 No Chge
21	Missile, Ballistic Electronic Maintenance	___	___	_____	___	___	_____
22	Missile, Guided Electronic Maintenance	___	___	_____	___	___	_____
232	Missile, Fire Control Electronic Maintenance	___	___	_____	___	___	_____
26	Radar and Microwave Maintenance	___	___	_____	___	___	_____
27	Missile, Combat Electronic Maintenance	___	___	_____	___	___	_____
31	Field Communications Equipment Maintenance	___	___	_____	___	___	_____
32	Fixed Plant Communications Equipment Maintenance	___	___	_____	___	___	_____
33	Intercept Equipment Maintenance	___	___	_____	___	___	_____
34	Data Processing Equipment Maintenance	___	___	_____	___	___	_____
35	Electrical Electronic Devices Maintenance	___	___	_____	___	___	_____
36	Wire Maintenance	___	___	_____	___	___	_____
41	Precision Devices Maintenance	___	___	_____	___	___	_____
43	Textile Leather Repair	___	___	_____	___	___	_____
44	Metal Working	___	___	_____	___	___	_____

2. (Cont'd)

Code	Major Occupational Area	a Change in Strategy or Tactics			b Change in Weapon/System Complexity		
		1 Inc	2 Dec	3 No Chge	1 Inc	2 Dec	3 No Chge
45	Armament Maintenance	___	___	___	___	___	___
46	Missile, Mechanical Maintenance	___	___	___	___	___	___
51	Construction & Utilities Specialties	___	___	___	___	___	___
52	Power Production & Distribution	___	___	___	___	___	___
53	Industrial Gas Production	___	___	___	___	___	___
54	Chemical	___	___	___	___	___	___
55	Ammunition	___	___	___	___	___	___
57	General Duty	___	___	___	___	___	___
61	Marine Operations	___	___	___	___	___	___
62	Engineer Heavy Equipment Operation & Maintenance	___	___	___	___	___	___
63	Automotive Maintenance	___	___	___	___	___	___
64	Motor Transport	___	___	___	___	___	___
65	Railway Maintenance and Operations	___	___	___	___	___	___
67	Aircraft Maintenance	___	___	___	___	___	___
68	Aircraft Components Repair	___	___	___	___	___	___
74	Data Processing	___	___	___	___	___	___
76	Supply	___	___	___	___	___	___
91	Medical Care and Treatment	___	___	___	___	___	___

3. With respect to logistical officer personnel please select from App D2 the Military Occupational Specialty (MOS) codes and job titles which correspond to the ten occupational specialties which will be most critical in the 1975-1985 time frame assuming that the country were to undergo general mobilization. Please list these ten codes and titles below. Once listed, check the columns which most closely approximate your estimate of (a) how many weeks of training it will take to qualify an individual in such jobs, (b) how well the civilian non-Army labor pool will be able to provide these skills in event of general mobilization, and (c) recognizing the problems, if any, posed by your answers to (a) and (b) preceding, what percent of the total number of these personnel authorized for general mobilization should be maintained either in an active duty or standby reserve status in the 1975-1985 time frame, assuming peacetime conditions.

		(a)	(b)				(c)
Occpnl area code	Job title	Tng time (weeks)	(1) More than adequate supply in labor pool	(2) Adequate civilian supply	(3) Inadequate supply in civilian labor pool	(4) Negligible labor supply from non-mil sources	% to keep in AD or res status

4. With respect to logistical enlisted personnel please select from App D3 the ten occupational area subcodes and corresponding job titles which will be most critical in the 1975-1985 time frame assuming that the country were to undergo general mobilization. Please list these ten codes and titles below. Once listed, check the columns which most closely approximate your estimate of (a) how many weeks of training it will take to qualify an individual in such jobs, (b) how well the civilian non-Army labor pool will be able to provide these skills in event of general mobilization, and (c) recognizing the problems, if any, posed by your answers to (a) and (b) preceding, what percent of the total number of these personnel authorized for general mobilization should be maintained either in an active duty (AD) or standby reserve status in the 1975-1985 time frame, assuming peacetime conditions.

		(a)	(b)				(c)
Occpnl area sub-code	Job title	Tng time (weeks)	(1) More than adequate supply in labor pool	(2) Adequate civilian supply	(3) Inadequate supply in civilian labor pool	(4) Negligible labor supply from non-mil sources	% to keep in AD or res status

5. What new logistical personnel skills do you see resulting in the 1975-1985 time frame from technological innovations or any other conditions of that period?

_____ 5a

_____ 5b

_____ 5c

_____ 5d

_____ 5e

6. What proportion of DOD military and civilian personnel are located outside the continental United States (CONUS)?

Over 85 percent _____ 6a

67-85 percent _____ 6b

51-66 percent _____ 6c

33-50 percent _____ 6d

under 33 percent _____ 6e

7. Please rate your qualifications in responding to this section:

Highly qualified . . . . . _____ 7a

Generally qualified . . . . . _____ 7b

Casually familiar with subject areas _____ 7c

Unfamiliar with subject areas . . . _____ 7d

Section E

ACTIVITIES AND PROJECTED TRENDS IN ARMY CONSTRUCTION

(This section addresses the relatively broad area of Army construction and attempts to perceive the degree and nature of change, if any, in this area in a future time frame.)

1. In the light of the availability of industry to construct military facility overseas and the desirability of maintaining Army construction units in some state of readiness for potential mobilization, what is an appropriate proportion to be made among the following in actually fulfilling overseas construction requirements? Assume a 1975-1985 time frame, and a peacetime environment.

Active Army construction units—percent . . . . . ____ 1a

Activation of reserve Army construction units—percent ____ 1b

Civilian industrial construction sources—percent . . ____ 1c

Explain your position _____

_____

_____

_____ 1d

2. Again assuming a 1975-1985 time frame, but in a wartime environment, what is an appropriate proportion for fulfilling overseas construction requirements?

Active Army construction units—percent . . . . . ____ 2a

Reserve Army construction units—percent . . . . . ____ 2b

Civilian, industrial construction sources—percent . . ____ 2c

Explain your position _____

_____

_____

_____ 2d

3. To what extent do you believe the Army should use locally available construction material in the 1975-1985 time frame?

To the fullest extent possible even if designs must be changed . . . . . ____ 3a

Only if US standard materials are available . . . . ____ 3b

None at all . . . . . ____ 3c

4. How much of an impact will innovations (e.g., in building materials, construction methods, construction equipment, etc.) have on the Army construction program in the 1975-1985 time frame?

Very significant ____ 4a

Slight . . . . . ____ 4b

None . . . . . ____ 4c

Explain your position _____

_____

_____

_____

_____ 4d

5. The Army constructs a wide range of facilities in an overseas theater including ports, hospitals, depots, roads, barracks, service centers, clubs, PXs, etc. Do you anticipate any marked change in the need for such facilities in the 1975-1985 time frame assuming peacetime conditions?

	(1) Increase	(2) Decrease	(3) No Change
a. Runways			
b. Barracks			
c. Ammunition Storage			
d. Bulk POL			
e. Storage			
f. Roads			
g. Electrical Utilities			
h. Piers, Wharves and Docks			
i. Administration			
j. Hospitals			
k. Maintenance Shops			
l. Dependent Housing			
m. Recreation Centers			
n. BOQs			
o. Clubs			
p. Laundries			
q. Post Exchanges			

6. Please rate your qualifications in responding to this section:

Highly qualified	_____	6a
Generally qualified	_____	6b
Casually familiar with subject areas . . .	_____	6c
Unfamiliar with subject areas	_____	6d

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13. ABSTRACT

Technological advance has made the task of planning more difficult and more critical at the same time. The rapid expansion of opportunity requires a highly developed capability to be selective. The correct choice among alternatives is crucial to the future competitive position in all fields.

In military planning, correct choices are essential. This paper reports on a project which addressed a very broad question, "What logistic units, skills and materiel should the peacetime Army contain in order to perform its initial wartime missions and also to provide a base for rapid expansion to meet subsequent support requirements?"

The problem was addressed by use of The Delphi technique originally developed by RAND Corporation. The study addresses the period 1975 to 1985 and contained five sections: (1) an evaluation of past performance of the Army's logistics operations; (2) a projection of future threats; (3) a forecast of technological innovations and expected effects on future Army logistics; (4) an appraisal of expected shifts in Army skill requirements; and (5) a cursory examination of Army construction futures.

Results imply: (1) equipment is increasingly more complex and costly; (2) skills required will be more sophisticated and less available to the Army; (3) better use could be made of existing technology by the Army; and (4) The Delphi approach was appropriate for this study.

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