

OPERATIONS RESEARCH

BATCHELOR

OPERATIONS RESEARCH

An Annotated Bibliography

by

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Management Counsel

SECOND EDITION

Operativa, Milan; Drs. K. Koyanagi and Kunisawa Kiyonari, The Union of Japanese Scientists, Tokyo; Dr. P. C. Mahalanobis, Indian Statistical Institute, Calcutta; Dr. R. Natarajan, Indian Institute of Science, Bangalore; Dr. Sixto Rios, Consejo Superior de investigaciones científicas, Madrid; Prof. Dr. S. Sagaroff, Institut für Statistik an der Universität Wien; Dr. R. S. Varma, Defence Science Laboratory, New Delhi; Dr. Eng. Z. Zbichorski, Institut Ekonomiki i Organizacji, Przemyslu, Warszawa.

Finally I am most indebted to the Reverend Thomas C. Donohue, S.J., for his long continued and steady interest and encouragement.

JAMES H. BATCHELOR

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PREFACE

The forerunner of this volume Operations Research A Preliminary Annotated Bibliography (Case Institute of Technology, Cleveland, Ohio, 1952) has long been out of print and a continuing widely scattered demand indicates that it has been found useful. Since publication there has been an enormous and almost explosive growth of the literature of operations research. Although very nearly complete when published the original edition no longer meets the needs arising from the flood of literature. Assembly of references has continued steadily since then and this Second Edition follows essentially the same plan and extends the list of published literature to the end of 1957.

The criterion for inclusion has been that the author or editor has indicated that the work concerns operations research or that it has been cited in support of such work. This has resulted in the inclusion of some items of dubious value and pertinence and of some cases where the term is used in a clearly different or special sense. I have preferred not to exercise any editorial preferences but to let the literature of operations research define itself. Foreign literature appears to disclose characteristic differences in national conceptions of operations research which serve to illuminate the possible varying viewpoints leaving to the reader to distinguish and evaluate them. It may be said quite properly that "this is operations research", without apologies to Merrill Flood (1321).

More specifically I have included all papers from the Operational Research Quarterly, Operations Research The Journal of the Operations Research Society of America, Naval Research Logistics Quarterly, Management Science, Management's Operations Research Digest, Bolletino del Centro per la Ricerca Operative, Revue de Recherche Operationnelle, Unternehmensforschung (Management Science), Journal of the Operations Research Society of Japan (Management Science), ORA News, and from personal collections of papers and reports, meetings on operations research, and individual published papers and books wherever found. To these I have added some references clearly within the spirit of the others and a selection seems convenient or useful to include.

Most of the primary publications indicated above contain references to other papers or books for supporting material or methods. These are included but the process has not been carried beyond these secondary references which should be followed up by persons interested in the particular fields. The great variety of publications cited is an imposing indication of the universal nature and wide range of disciplines drawn upon in operations research.

The large amount of material involved soon made it apparent that a truly comprehensive bibliography would exceed practical space limitations and that the list would have to be restricted to operations research liberally construed to include the various equivalent terms (not by any means generally so accepted). Related specialties such as linear programming, cybernetics, and the like, already the subjects of separate bibliographies, are omitted except where actually used in operations research, as are purely mathematical derivations and proofs unless giving a solution to a specific problem. Some exceptions have seemed desirable.

Abstracts have been prepared to indicate the nature of the article and the views and ideas of the authors or reviewers as they presented them and are really quite full digests. Abstracts are omitted where the title is adequate to indicate the contents, where the abstract only but not the full paper is published, and where the original is not available (indicated by "na"). In some cases abstracts have been quoted as published and for permission to use them I am indebted to the editors or publishers of Operational Research Quarterly, Operations Research The Journal of the Operations Research Society of America, and Management Science, to whom I express my thanks.

The references are arranged in alphabetical order by author or editor, and for anonymous items by institution, publication or sponsor. In alphabetizing names with prefixes the practice of International Who's Who has been followed, with index entries for the variants. Foreign language titles are followed by translations in English and by English abstracts. Comments, discussions, reviews, or summaries are entered with the original reference. The index is in a single alphabetical order with entries by author, title, and subject and forms a convenient index to the present world literature on operations research. It has been aimed to be adequate for the user's convenience without going into too great detail. Convenience of the user has been the principal guide in preparation of the book.

Incomplete and incorrect citations (sometimes repeated apparently without verification) have been the source of much trouble and special effort has been made to make them complete and correct. As a final check, each entry was compared with at least one source believed trustworthy and every discrepancy between the two verified with the original where available or with another secondary source. It is hoped that such errors have been reduced to an acceptable minimum. Notice of corrections or omissions will be most welcome.

I have had generous help from many authors for lists or copies of their publications and from librarians near and far whose patience and ingenuity in running down references is phenomenal, and to whom my thanks are due. I am indebted to W. A. Abendroth for a copy of a preliminary accession list for a bibliography he was preparing for the Case Institute of Technology, to the Reverend John Blewett, S.J., Sophia University, Tokyo, for translations of Japanese titles, and to the following for foreign lists, references, and corrections:- Prof. Francisco Brambilla, Centro per la Ricerca

OPERATIONS RESEARCH

An Annotated Bibliography

A

0001 R.L.A. - Operations-research services

OR JORSA, Oct 1956, 4:5:599-608

Contains descriptions of facilities offered by six private firms including special fields, staff, types of work, and publications by firms and staff members.

0002 NEWTON A. ABLAHAT - Some Statistical Shortcuts in Auditing

Informal Seminar in Operations Research 1953-1954
Seminar Paper No. 11 (Baltimore, The Johns Hopkins University Jan 5, 1954) 14 pp

Two case studies of statistical shortcuts in improving effectiveness and objectivity of audits of operations and in evaluating misuse of coupons indicate areas of interest to accountants.

0003 NEWTON A. ABLAHAT - An operations research approach to inventory controls

JORSA, Aug 1954, 2:3:346 (abstract)

0004 NEWTON A. ABLAHAT, JOHN S. YOUTCHEFF - Sequential decision theory in systems development

OR JORSA, Feb 1957, 5:1:149-150 (abstract)

0005 C. M. ABLOW, GEORGES BRIGHAM - An analog solution of programming problems

JORSA, Nov 1955, 3:4:388-394

Presents a simple method for solving static programming problems adopted to analog computers in which the problem is interpreted in terms of the dynamics of a massless particle which moves in n-space away from regions forbidden by the constraints and toward the optimum of the criterion function. Constraints and criterion function need not be linear but must be expressible with available computer components. 3 refs.

0006 J. W. ABRAMS - Operational research

The Business Quarterly, University of Western Ontario, School of Business Administration, Summer 1952, 17:2:104-116

A simple example illustrates characteristics of operational research. Military problems are of four main types, weapons evaluation, finding the best weapons tactics combination, prediction of the course of operations, and analysis of efficiency. These are illustrated by examples. Operational research is a branch of applied science which studies the metrical and denumerable aspects of systems of operations with the view of determining the behavior of the system under all conditions in order that the system itself may be improved. A mathematician would say it consists of the application of the methods of the calculus of variations to the analysis of

systems in general. Industrial operational research is illustrated by examples including some well established fields. Small businesses have problems equally amenable to this approach.

0007 J. W. ABRAMS - Military applications of operational research

National Conventions Transactions 1956 Tenth Annual Convention American Society for Quality Control, June 6, 7, 8, 1956, Montreal, Canada xvii 689 pp paper \$3.50 pp 107-113
OR JORSA, Jun 1957, 5:3:434-440

Describes the circumstances leading up to the organized development of operational research, some of the characteristics, several war time problems, and the present organization in the Royal Canadian Air Force.

0008 JOHN W. ABRAMS - Systems evaluation and military planning

Abstracts of Papers Presented at the NATO Conference on Operational Research sponsored by SHAPE & AGARD, Paris, 8-12 April 1957, pp 21-22 unnumbered (in English and French)

Operational Research in Practice Report of NATO Conference sponsored by AGARD and SHAPE 7 through 12 April 1957 pp 86-92, Discussion pp 92-93

Operational research established itself within the armed services because of successes achieved through the study of operations during a period of active combat. In peacetime it is being extended to the field of military planning. A procedure is shown by which the benefits of operational or systems analysis can be attained by integrating analysts into the planning process. The relations of planning analysis to the determination of requirements is shown, and the problem of best utilizing the results of research is discussed.

0009 A. ABRAMSON, W. ALDERSON, G. D. CAMP, R. D. CRISP, W. J. HORVATH, F. STEPHAN, G. P. WADSWORTH - An industry-operations research panel discussion

JORSA, Feb 1953, 1:2:78 (abstract)

0010 ADOLPH G. ABRAMSON, RUSSELL H. MACK (eds.) - Business Forecasting in Practice: Principles and Cases (John Wiley & Sons, Inc., New York, 1956, 275 pp \$6.50)

This book is concerned with short term projections up to one year, to show how forecasts are prepared and how existing studies of cycles can be used. Brief presentation is made of theory underlying forecasting and on techniques. Six cases of short range forecasting in the postwar period are presented.

Review by F. P. Boeber, Borg-Warner Corporation, OR JORSA, Jun 1957, 5:3:448-449

0011 J. ABRHAM - A note on a linear programming problem

Chekhoslovatskii Matematicheskii Zhurnal, 1957, 7:1:124-129

Some theorems on the behaviour of the solutions of a transportation problem.

Summary in ORQ, Mar 1958, 9:1:58

0012 ADAM ABRUZZI - Work Measurement, New Principles and Procedures (Columbia University Press, New York, 1952) xviii 290 pp cloth

Adopts the viewpoint that procedures of work measurement should be based on the rules of scientific method. Taking empirical action about productivity problems on the basis of subjective judgments is no longer tenable. This book undertakes to supply objective principles and procedures so that action taken will be sound in the scientific sense.

0013 ADAM ABRUZZI - Work, Workers, and Work Measurement
(Columbia University Press, New York, 1956)

nas

0014 ADAM ABRUZZI - Formulating a theory of work measurement
MS, Jan 1956, 2:2:114-130

Considers aspects of the problems of behavior, inference, standardization, and observation involved. A formal structure for a theory is proposed and the elements of the empirical structure required in application, discussed, including variability sampling, stability, interpretation and acceptability. 3 refs.

0015 SEYMOUR T. R. ABT - Opportunities for operations research in supermarkets

Informal Seminar in Operations Research 1952-1953, Seminar Paper No. 8 (Baltimore, The Johns Hopkins University, December 3, 1952) 16pp paper

Operations Research for Management, Edited by Joseph F. McCloskey and Florence N. Trefethen (Baltimore, The Johns Hopkins Press, 1954) pp 289-304

Describes briefly the nature of the business of supermarkets. The functions of buying, warehousing and delivery, and selling are discussed in detail giving some of the problems involved. Some of the information used and methods of analysis and adaptation to improvement of operations are described. There are numerous opportunities for operations research. 1 ref.

0016 S. T. R. ABT - Operations research and the small businessman

Operations Evaluation Group Decennial Conference on Operations Research pp 36-40

Defines operations research in terms of the area in which it is employed, namely as the investigation, analysis, and evaluation of operations. Basically it is quantitative, objective, systematic analysis seeking to provide management with quantitative bases for decision. The characteristics of small business set limits on operations research. Two avenues of investigation are discussed.

0017 SANFORD S. ACKERMAN - Symbolic logic: A summary of the subject and its application to industrial engineering

Journal of Industrial Engineering, Sep-Oct 1957, 8:5: 293-299

A brief introduction to symbolic logic viewed as a means of expressing verbal propositions and statements of relationships between propositions in a concise and unambiguous form. Alternate symbols of the same meaning are given. The translation of verbal statements to symbols is not simple but is a useful tool for analysis. 9 refs.

0018 RUSSELL L. ACKOFF - On a science of ethics

Philosophy and Phenomenological Research, Jun 1949, 9:4:
663-672

The latest development in scientific method is here examined in its relation to the social sciences. Since research methods have been themselves subjected to scientific study, it is now possible to construct an experimental model for a science of value - such as ethics. Behavior patterns are here considered as means to a specific end. The personality of the individual is examined and the important aspects of intent and interest measured. To progress beyond the present standard, the study of both the psychological and social individual must not be limited to any final end-point. A different concept is needed to take us beyond the realm of psychology and sociology as traditionally conceived. An analysis of history will show that mankind through competing societies and cultures has tended toward certain goals. The Ideal must be the always unattainable goal of this progressive movement.

0019 RUSSELL L. ACKOFF - Principles of operations research

Proceedings of the First Seminar in Operations Research, November 8-10, 1951 (Case Institute of Technology, Cleveland, Ohio, 1951), pp 8-16

A generally accepted definition is "a scientific method of providing decision makers with an efficient basis for making decisions regarding the operations under their control." Characteristic of OR are the principles of measurement, operations, feed-back, cooperation, practicality, all of which are discussed in considerable detail and with reference to general scientific methods. 20 refs.

0020 RUSSELL L. ACKOFF, LEON PRITZKER - The methodology of survey research

International Journal of Opinion and Attitude Research, Fall 1951, 5:3:313-334

The wide use of the survey leads to a great waste of energy from neglect of thorough planning of research. The meaning of the concept of methodologically designed research is carefully explained and objections to its use examined. Phases of design are explicitly stated, formal phase of the model described in detail. Statistical phases have been highly developed. Difficulties of the operational phase are developed in detail and required relationship of design indicated.

0021 RUSSELL L. ACKOFF - Operations research in business and industry

Industrial Quality Control, May 1952, 8:6:41-42, 44, 45, 46-47, 48-50

Case Institute of Technology Reprints O.R. - 1001 (Case Institute of Technology, Cleveland, Ohio, 1952) 8 pp paper

A general description of operations research giving five principles, measurement, operational, feed-back, cooperative, and practical principles which are discussed in detail with some further general comments. 25 refs.

Summary in ORQ, Sep 1952, 3:3:51

0022 RUSSELL L. ACKOFF - Some new statistical techniques available to operations research

JORSA, nov 1952, 1:1:10-17

Case Institute of Technology Reprints, O.R. 1101 (Case Institute of Technology, Cleveland, Ohio) 8pp paper

Describes three methods which have been found of particular interest and usefulness, a test applicable to certain replacement problems, method for including omitted information in surveys, and some short cuts or inefficient procedures. 9 refs.

Summary in ORQ, Dec 1952, 3:4:69-70

0023 RUSSELL L. ACKOFF - Production scheduling, a case study
 Proceedings of the Conference on Operations Research in Marketing, January 29-31, 1953, Case Institute of Technology, pp 31-39

Proceedings of Operations Research Conference by Society for Advancement of Management, New York City, January 28-29, 1954, Section 4, 20 pp, 1 chart

Advanced Management, Mar 1955, 20:3:21-28

A full and detailed description of application of operations research to a machinery company from the initial discussions with company executives through completion of one problem selected and its subsequent ramifications.

Summary in Industrial Quality Control, Jun 1955, 11:9:30

0024 RUSSELL L. ACKOFF - Operations research
 Cleveland Engineering, Mar 5, 1953, 46:10:21-23, 25, 26-27

Case Institute of Technology Reprints, O.R. - 1002 (Case Institute of Technology, Cleveland, Ohio) 3 pp paper
 Operations research is considered from three points of view, the way of formulating problems, the methods of solution, and the organization of the research effort. Operations research is decompartmentalized and takes an over-all view which includes the largest possible portion of the process and integrated and interrelates the various portions and the specialties concerned. The problem is given an abstract formulation in mathematical terms wherever possible and includes the methods of solution themselves and the factors measured. The work is done by teams of scientists of diverse kinds and requires access to all personnel at all levels, and usually is directly responsible to a top executive. These characteristics are illustrated by a description of the development of an operations research project for a manufacturing concern.

0025 RUSSELL L. ACKOFF - Statistics in operations research and operations research in statistics

Informal Seminar in Operations Research 1952-1953, Seminar Paper No. 19 (Baltimore, The Johns Hopkins University, March 18, 1953) 11 pp

Operations Research for Management, Edited by Joseph F. McCloskey and Florence N. Trefethen (Baltimore, The Johns Hopkins Press, 1954) pp 117-133

Presents mathematical statistics as an essential for operations research and shows that optimizing the selection of a sampling of estimating procedure is itself an operations research problem, giving an illustrative example. A case history of design of a sampling procedure for LCL freight way-bills for interline settlements is given.

0026 RUSSELL L. ACKOFF - Operations research - new tool of industrial science

Industrial Laboratories, Nov 1953, 4:11:64-67

Case Institute of Technology Reprints, O.R. 1005 (Case Institute of Technology, Cleveland, Ohio) 4 pp paper

A description is given of the workings of an operations research project. Existing types of research study various components of an industrial operation. Operations research is concerned with interrelation of policy problems and all phases of operations. This means that problems are very complex. A team is required of representatives of different disciplines in order to utilize common method found applicable to widely different problems. At least one member should be familiar with the problem and at least one unfamiliar. The first task is definition of the problem which must include all components, participants, objectives, policies, and operations. This requires an understanding of the details of the process and variables subject to control. The research problem involves determination of the scientific basis for policy selection requiring measures of effectiveness of alternatives including both efficiency and importance, and an abstracted statement of the actual operations involved. The next stage involves an analytic statement of the operation, determination of the constants involved, experimental determination of reliability, and lastly development of procedures for putting the solution into effect.

0027 RUSSELL ACKOFF - Information for overall company planning through operations research

Proceedings Railway Systems and Procedures Association Seminar on Operations Research February 1954 (Railway Systems and Procedures Association April 1954) pp 69-83

Describes in detail a study by the Case Institute of Technology Operations Research Group for the Warner & Swazey Company, manufacturer of turret lathes. Emphasizes the breadth of the OR approach in consideration of the effect of a policy decision on all phases of operations, and the continued dynamic nature of the research in that new problems are raised by tentative solutions of previous ones.

0028 RUSSELL L. ACKOFF - Production and inventory control in a chemical process, II

Proceedings of the Conference on Operations Research in Production and Inventory Control, January 20-22, 1954, Case Institute of Technology, pp 13-22

Proceedings of the Symposium on Operations Research in Business and Industry Sponsored by Midwest Research Institute April 8 and 9, 1954, Kansas City, Missouri, pp 69-91, Discussion p 91

JORSA, Aug 1955, 3:3:319-338

Describes in detail the application of operations research to study of a process involving about fifty operations, procedure followed, problems arising, interim decisions, tentative solutions, methods of test before use, and further questions uncovered.

For the situation involved see Production and Inventory Control in a Chemical Process, I, by Dr. Paul Stillson.

0029 RUSSELL L. ACKOFF - A methodologists approach

Journal of Industrial Engineering, May 1954, 5:3:11-12
 Progressive extension of scientific study through physical, biological and social processes leads to the scientific study of scientific method - methodology. The contribution involves four aspects of cost estimating, kind and quantity of data pertinent to the problem and method for obtaining and analyzing the data. The basis for answer to these questions require definition of the term best answer. One criterion is that of minimizing costs. Use of the criterion is explained by application to sampling and to estimating cost of a job. The ideal procedure must be modified to meet organizational requirements. These are examined by the psychologist and communication expert of the team.

0030 RUSSELL L. ACKOFF - A case study of an association between science and business

JORSA, Feb 1955, 3:1:114 (abstract)

0031 RUSSELL L. ACKOFF - Allocation of sales effort

Proceedings of the Conference on "What is Operations Research Accomplishing in Industry?" sponsored by the Operations Research Group Engineering Administration Dept., Case Institute of Technology, April 5-7, 1955, pp. 23-29. Comments by Mr. Davidson, p. 30.

- III. Determining optimum allocation of sales effort

Proceedings Operations Research Conference September 29-30, 1955, New York City, Society for Advancement of Management, pp 74-81, Discussion pp 82-85

Describes a project for determining how sales time can best be used to maximize returns on the investment in salesmen giving the plan for research, data and use, and method developed. Some related results are also presented. Management has accepted and plans to use operations research in the future and to give it full attention.

Summary by Herbert Solow, Fortune, Feb 1956, 53:2:154,156

0032 RUSSELL L. ACKOFF - Summary

Proceedings of the Conference on "What Is Operations Research Accomplishing in Industry?" Sponsored by the Operations Research Group Engineering Administration Dept., Case Institute of Technology, April 5-7, 1955, pp 93-99

- Operations research in business and industry - a report to management

Proceedings of The Institute on Operations Research for Business and Industry Presented at The University of California, Los Angeles (April 28-29, 1955) pp 36-42

Presents succinct and non-technical answers to seventeen questions which are likely to be asked about operations research and its application within a firm.

0033 RUSSELL L. ACKOFF - Comments on operations research

Journal of Marketing, Jul 1955, 20:1:47-48

Assuming there is only one old and familiar scientific method there are differences among sciences in subject matter. This is the case with operations research. It also evaluates policy from the point of view of the whole organization and studies the whole system. Scientific method has undergone major revolutions, a process which still continues. There is not a scientific method. Research methods become scientific

to the extent that they are controlled. The use of mathematical models is one of the principal methods of obtaining control. Their use might well be extended in marketing research.

See Elizabeth A. Richards, Journal of Marketing, Oct 1954, 19:2:159-160; John F. Magee, pp 160-161

0034 RUSSELL L. ACKOFF - I. A survey of operations research in industry

Proceedings Operations Research Conference September 29-30, 1955, New York City, Society for Advancement of Management, pp 52-61

A survey of 729 people in 310 firms yielded replies from 147 industries of which 85 were using operations research and 62 were not. Details by industry are given. A study of 12 published sources shows 55 case studies. Six principal types of well developed models are described. Discussion, pp 82-85.

0035 RUSSELL L. ACKOFF - Automatic management: a forecast and its educational implications

MS, Oct 1955, 2:1:55-60

Outlines a forecast of the future of management based on a survey and projection of some contemporary technicological developments. Measurement of performance and product is now accepted and frequently mechanized to a standard. The control of an entire sequence of operations requires a link between the individual elements, usually human, and now tending to be done by automatic control. This process is now being extended to the decision function, which for over-all efficiency is being studied scientifically, an activity that characterizes operations research. This has already been done. It does not seem possible to reduce all problems to a form where the automatic manager can take over, but increasing demands are going to be made on managers in both technical knowledge and managerial skills.

0036 RUSSELL L. ACKOFF - Operations research in organizing planning: a case study

Proceedings of The Seventh Annual National Conference of the American Institute of Industrial Engineers, Washington, D.C., May 17-18, 1956 (Columbus, American Institute of Industrial Engineers, 1956) pp 1-1 to 1-18 nas

0037 RUSSELL L. ACKOFF - Operations research - its relationship to data processing

Proceedings: Automatic Data Processing Conference (Boston, Harvard University, 1956) pp 161-175 nas

0038 RUSSELL L. ACKOFF - The role of recorded information in the decision making process - operational research approach

Documentation in Action, Edited by Jesse H. Shera, Allen Kent, and James W. Perry (New York, Reinhold Publishing Company, 1956) pp 253-256

A library is more than a building and books; it is an organized entity designed to provide the best possible service with limited resources. Problems involved are susceptible to operational analysis. Some problems are discussed in the utilization of facilities, and book acquisition and replacement programs.

0039 RUSSELL L. ACKOFF - A survey of applications of operations research

Proceedings of the Conference on Case Studies in Operations Research Sponsored by the Operations Research Group, Engineering Administration Department, Case Institute of Technology, February 1, 2, and 3, 1956, pp 9-17

The fundamental distinction among the various sciences is their subject matter. Brief review of the development of industrial management shows conflict of some or all points of view. Executive type decisions constitute the subject matter of operations research which is concerned with the overall or total-system point of view. The general form of an operations research model is a type representing the quantitative relationship between the effectiveness of the system and pertinent aspects, controllable and uncontrollable. Seven classes of recurrent problems are discussed: inventory, allocation, waiting-time, routing, replacement and maintenance, search, and competition. Real problems are generally mixed and may require approximations to optimum solutions.

0040 RUSSELL L. ACKOFF - The development of operations research as a science

OR JORSA, Jun 1956, 4:3:265-295

Operations research is or is becoming a science defined by the combination of phenomena studied, methods, concepts and techniques. The development of these are discussed in terms of a suggested art of phases of an operations research project on which there is common agreement, formulation of the problem (users' and analysts') model construction, solution, test, control, and implementation. Seven types of models that have been studied are discussed. 152 refs.

0041 RUSSELL L. ACKOFF - Operations research and national planning

OR JORSA, Aug 1957, 5:4:457-468

Considers the application of OR to national planning by showing that the problems are not as formidable as may be thought and that OR is applicable to them. The method has such power and strength that we should try to apply OR in planning development of underdeveloped nations. Describes current conditions in India and efforts in developing second five year plan. Considers objectives of national planning, the place of government, shortcomings, requirements for a plan, the place of OR, and the allocation of resources. Considers the future of OR in national planning and offers three recommendations for action by the Council of the society. 6 refs.

See: Charles Hitch - Operations research and national planning - a dissent, OR JORSA, Oct 1957, 5:5:718-723;
Russell L. Ackoff - On Hitch's dissent on operations research and national planning, OR JORSA, Jan-Feb 1958, 6:1:121-124

0042 RUSSELL L. ACKOFF and others - The operations research approach

Proceedings of the 1956 Annual Operations Research Conference, November 29-30, Hotel Commodore, New York City (Society for Advancement of Management, 74 Fifth Avenue, New York 11, N. Y., 1957) pp 11-34, 160-168

Brief answers to seventeen specific questions about OR which have been asked frequently by industrial management. Followed by brief answers to questions from the floor.

0043 RUSSELL L. ACKOFF - The fundamentals of operations research

Proceedings of the 1956 Annual Operations Research Conference, November 29-30, Hotel Commodore, New York City (Society for Advancement of Management, 74 Fifth Avenue, New York 11, N. Y., 1957) pp 1-10

An opening statement for a panel discussion. A brief outline of the evolution of man's way of studying the world begins with philosophy, divides into natural philosophy, into various sciences. But man's problems involve all the sciences plus a way of coping with them. OR addresses itself to the solution of these problems and uses methods from all disciplines. Its uniqueness lies in its class of problems, their study in the whole situation, and the methods used. An example of such a study is described briefly but fully.

0044 RUSSELL L. ACKOFF - Opsearch, what it is - how it is conducted, what it will do (Presented at the Symposium on Scientific Aids to Management - Chemical Engineering operations research, National Meeting, September 9-12, 1956, William Penn Hotel, Pittsburgh, Pa.)

Chemical Engineering Progress, Jan 1957, 53:14-J - 7-J
Complexities of modern managerial functions and need for aid in attacking resulting problems are reviewed as background and for development of operations research which is briefly reviewed. Operations research is the application of scientific method to the solution of executive type problems in organized systems. Its objective is to provide the executive with an objective basis for selecting policies which are best for the organization as a whole. It is this whole-istic approach to organized systems, then, that is one essential characteristic of operations research. Also, in operations research, science is applied to these problems by means of scientists and engineers drawn from various disciplines. Finally, an operations research method of attacking these problems has evolved, one which is uniquely well adapted to the type of problem involved. These characteristics are discussed in detail and some current problem areas being explored discussed. Operations research is developing and is now being made into what it will be.

Excerpts in Chemical Engineering Progress, Oct 1956, 52: 10:80, 82

Summary in ORQ, Sep 1957, 8:3:171

0045 R. L. ACKOFF - A comparison of operational research in the U.S.A. and in Great Britain (transcript of a talk given to the Field Investigation Group, National Coal Board on 7 January 1957)

ORQ, Jun 1957, 8:2:88-100

Principal differences occur in non-military applications. In Britain the social vision characterizing workers is noticeable. In U.S.A. operations research is largely methods and techniques oriented, for reasons of differences in industrial practice. In America extensive use has been made of applied science and many preliminary problems have already been solved so that operations research is encouraged to deal with interaction of functions and the organization as a whole. The tendency is to emphasize systems studies. Three illustrations are given. Basic research on methods and techniques has been extensive and intensive, illustrated by study of effects of

observational and sampling error in gathering information, and the distortion of research results in application leading to studies in organization theory. A major difference lies in the extent of academic participation, which is considerable in the United States when more than 36 major institutes and universities are providing some course work in operations research, including six having graduate curricula in operations research and an equal number giving degrees in other subjects with a minor in operations research. The reasons are discussed. An academic curriculum presupposes an identifiable subject matter. This subject is being debated, curriculum building proceeds. Considerable convergence of opinion appears. Operations research is the study of organized systems to provide decisions which enable those systems to operate in the most effective way from the point of view of the organization as a whole. Differences in models used by physicists and in operations research appear and the problem of control appears to be basic. Lastly the courses at Case Institute are described.

0046 RUSSELL L. ACKOFF - All related areas probed in search for answers to industry problems

New York Herald Tribune, Sunday, July 7, 1957, Engineers' News Supplement, July Issue 1957, 117:40411:Section 11:2

The whole-system approach of OR consists of a systematic investigation of the significant interconnections between operations in different parts of the business. A solution to any one problem tends to disclose related and sometimes more deep-seated problems from which continuous application of OR tends to increase the returns. This is illustrated by a description of the application of OR in the Lamp Division of General Electric Company.

0047 RUSSELL L. ACKOFF - On Hitch's dissent on operations research and national planning

OR JORSA, Jan-Feb 1958, 6:1:121-124

Considers that the dissents on technical questions can be settled by analysis and discussion. Concern is expressed at the advice against giving operations research an opportunity to attack such problems. Four specific objections are discussed in detail with reasons for disagreement. It is clear that attitudes may be conservative or not. Feels that effort should be made to widen the horizons of operations research and this can be benefited as well by constructive criticisms as by proposals.

See: Russell L. Ackoff - Operations research and national planning, OR JORSA, Aug 1957, 5:4:457-468; Charles Hitch - Operations research and national planning - a dissent, OR JORSA, Oct 1957, 5:5:718-723

0048 RUSSELL L. ACKOFF, JAMES E. TOWNSEND - Operations research for control

Chemical and Engineering News, Jun 7, 1954, 32:23:2322

Brief account of a project for control of a fermentation process. Six points in the process were found where control decisions could be made and a practical method of scheduling found requiring about ten minutes computation every ten days.

- Control of production and inventory in a chemical process

JORSA, Aug 1954, 2:3:347-348 (abstract)

0049 ACME REPORTER - The new techniques of statistical decision making

Acme Reporter, Jan 1955, 1955 Series:1:1-4

Includes a brief description of operations research which is considered as simply the application of scientific research techniques to business problems.

0050 A. ACRIVOS - Linear programming. How does it work?

Chemical Engineering, Aug 1956, 63:8:215-16

A hypothetical situation in the manufacture of two drugs is posed. It is desired to determine which of the two drugs should be manufactured. The required linear programming equations are set up and solved. The solution is discussed with respect to a geometric model.

Summary by Clark Holloway, Jr., Quality Control and Applied Statistics, 1956, 1:10:899-900

0051 ACTON SOCIETY TRUST - Nationalized Industry Relations with the Public (Acton Society Trust 1953) pp 39 paper 2s

Discusses the general problem of public relations describing the Operational Divisions of two of the industries and their efforts in developing a measure of public interest more adequate than a profit yardstick.

Review by R.T.E., ORQ, Sep 1953, 5:3:53-54

0052 THE ACTON SOCIETY TRUST - Size and Morale, A Preliminary Study of Attendance at Work in Large and Small Units (The Acton Society, London, 1953) 44 pp paper 3s 6d

A preliminary investigation of the hypothesis that the urgency and import of certain social problems vary directly with size of industrial units. The scope of the inquiry is outlined and results given of size effect in coal fields and two large industrial and commercial groups. refs.

0053 M. A. ACZEL, A. H. RUSSELL - New methods of solving linear programmes

ORQ, Dec 1957, 8:4:206-218

Recent advances in mathematical planning and applications in the case of linear programming are noted. The formulation of the problem and simplex method of solution are revised. A method for solution for a restricted class of problems is presented and reduction in computation shown. A double gradient method of Professor Ragnar Frisch is explained in considerable detail. 8 refs.

0054 ADOLF ADAM - Zur betrieblichen Regelung (For managerial control)

UFO, 1956, 1:1:27-29

Enumerates some concept and techniques essential for adequate control in modern management.

Abstract in RRO, 1st Quarter 1957, 1:2:107

0055 WILLIAM FREDERICK ADAMS - Road traffic considered as a random series

Journal of the Institution of Civil Engineers, Nov 1936, 4:1:121-130

Road traffic has previously been assumed to constitute a random distribution or series, but the author has established by a large number of observations under normal conditions that freely moving traffic does in fact correspond very