OPERATIONS RESEARCH

BATCHELOR
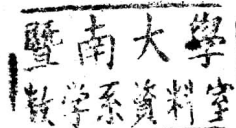
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OPERATIONS RESEARCH

An Annotated Bibliography

by

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Management Counsel

Volume 2

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ABBREVIATIONS

BCRO	Bolletino del Centro per la Ricerca Operativa
JORSA	Journal of the Operations Research Society of America
JORSJ	Journal of the Operations Research Society of Japan
MS	Management Science
NRLQ	Naval Research Logistics Quarterly
ORA	Operations Research Association (Bangalore) News Letter
OR JORSA	Operations Research The Journal of the Operations Research Society of America
ORMS (JUSE)	Operations Research as a Management Science (Japan Union of Scientists and Engineers)
ORQ	Operations Research Quarterly
RFRO	Revue Francaise de Recherche Opérationnelle
RRO	Revue de Recherche Opérationnelle
UFO	Unternehmensforschung (Operations Research)
na	Not available

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Volume 2

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PREFACE

The forerunner of this volume <u>Operations Research: An Anno-</u>
<u>tated Bibliography</u> (Saint Louis University Press, Saint Louis,
Missouri, 1959) included the literature through the year 1957.
Assembly of references has continued at intervals since then.
In the summer of 1960 arrangements were completed for its
continuance and publication. Since that time the work has
continued steadily. This Volume 2 follows essentially the
same plan and extends the list of published literature
through the years 1958 and 1959 including literature of pre-
vious years cited during those two years and entries com-
pleted too late to include in the previous volume. The cri-
terion 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 as fully detailed
in the Preface to the preceding volume. This includes all
articles from the operational research journals contained in
the list of abbreviations.

The intention remains to include all articles on or related
to operations research liberally construed to include the
various equivalent terms (not all generally so accepted).
Related specialties such as cybernetics, linear programming,
queueing, and the like, already the subjects of separate
bibliographies, are in general omitted except where actually
used in operations research, as are purely mathematical
derivations and proofs unless giving a solution to a specific
operational research problem or type. Some exceptions have
seemed desirable.

The large amount of material involved and limitations of
time made it beyond the capacity of one person to cover ade-
quately and has required the use of research assistants for
literature search and abstracting. The style and content of
abstracts may therefore vary considerably. I have had gen-
erous help from many authors for lists and copies of their
publications and from librarians near and far whose patience
and ingenuity in running down references is phenomenal to all
of whom my thanks are due. I am particularly indebted to the
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Cientifices, Instituto de Investigaciones Estadisticas
(Madrid); Leo Törnqvist, University of Helsinki, Institute of
Statistics; J. Wanty, Société de Recherche Opérationnelle et
d'Economie Appliquée (Brussels); S. Husain Zaheer, Regional
Research Laboratory, Hyderabad.

James H. Batchelor

Saint Louis
June 30, 1962

HELPS TO THE USER

The contents of the book are arranged in three sections.
Subsequently published additions to entries in the previous
volume are in numerical order from 0001 to 4195 using the
same serial numbers of the original entry to which the addi-
tion belongs. Entries beginning with number 4196 are
arranged alphabetically by author, journal or institution.
The index is arranged alphabetically containing entries for
name of author where there are multiple authors, title of
book or paper (omitting the definite or indefinite article),
subject, and a few other entries which may be helpful.

There are three ways to locate a particular known article.
If you know any of the following, look in the index for -

        1. Title of the article
        2. Name of one of multiple authors
        3. Some principal word of the title

To find an unknown article or explore an area, select a
probable subject or related subjects and search the index.

Trial of one hundred randomly selected items by a layman not
familiar with operations research resulted in locating the
article sought seventy-five percent on the first look,
ninety-five percent on the first two looks and all on the
first three looks.

Additions to Entries in Preceding Volume

OPERATIONS RESEARCH

An Annotated Bibliography

(Saint Louis University Press, 1959)

0011   JAROMIR ABRHAM - <u>A note on a linear programming prob-</u>
<u>lem</u>
        Abstract by A. G. Azpeitia in Mathematical Reviews,
1958, 19:6:719-720

0013   ADAM ABRUZZI - <u>Work, Worker and Work Measurement</u>
        Discusses deficiencies and shortcomings of time-study
work measurement methods relative to standards, contractual
restrictions, interaction between pay and production.   Fail-
ure to 'fix' variables, verify results, define terms and
rating procedures as a scientific procedure contrasts with
the theory of games.   The work measurement theory based on
the Shewhart criteria of stability permits use of appropriate
control charts.   Standard data systems exhibit shortcomings.
The central thesis is that automation is trivializing both
work and the worker.   New concepts on the nature of work and
new techniques for validating productivity should develop
from statistical procedures.
        Review by James R. Thomen in MS, Jul 1959, 5:4:484-489

0023   RUSSELL L. ACKOFF - <u>Production scheduling, a case study</u>
        Abstract in ORMS, Jun 1956, 1:1:34-35

0033   RUSSELL L. ACKOFF - <u>Comments on operations research</u>
        Abstract in ORMS, Jun 1956, 1:1:34

0044   RUSSELL L. ACKOFF - <u>Opsearch, what it is - how it is</u>
<u>conducted, what it will do</u>
        Excerpt in ORA News Letter (Bangalore), Sep 1, 1957,
1:4:6-7

0045   R. L. ACKOFF - <u>A comparison of operational research</u>
<u>in the U.S.A. and in Great Britain</u>
        Excerpts by M. M. Jacob in ORA News Letter (Bangalore),
Oct 1, 1957, 1:5:7-8

0053   M. A. ACZEL, A. H. RUSSELL - <u>New methods of solving</u>
<u>linear programmes</u>
        Comment and objections by Philip Wolfe in ORQ, Sep
1958, 9:3:254-256; reply by authors in ORQ, Sep 1958, 9:3:256

0061   ADVISORY GROUP OF AERONAUTICAL RESEARCH AND DEVELOPMENT
NORTH ATLANTIC TREATY ORGANIZATION - <u>Operational Research in</u>
<u>Practice, Report of a NATO Conference</u>
        Summary in Management Review, Mar 1959, 48:3:83

0069 WARREN E. ALBERTS - <u>Report to the Eighth AIIE National Convention on the System Simulation Symposium</u>
       Summary in Data Processing Digest, Feb 1958, 4:2:7; digest in EDP Idea Finder, pp 381-382

0095 M. ALLAIS - <u>Method of appraising economic prospects of mining exploration over large territories - Algerian Sahara case study</u>
       Abstract by H. K. Weiss in Quality Control and Applied Statistics, 1958, 3:4:325-326

0107 AMERICAN MANAGEMENT ASSOCIATION - <u>Operations Research Applied, New Uses and Extensions</u>
       Review in EDP Idea Finder, pp 367-368

0109 AMERICAN MANAGEMENT ASSOCIATION - <u>Operations Research, A Basic Approach</u>
       Review in EDP Idea Finder, p 336; abstract in ORMS, Aug 1957, 2:2:24

0124 FRANK J. ANDRESS - The learning curve as a production tool
       Statistical Decision Series, Reprints from Harvard Business Review, Apr 1, 1959, pp 1-12

0143 A. G. ARBOUS, H. S. SICHEL - <u>The use of estimates of absence-proneness for guiding executive action</u>
       <u>- New techniques for the analysis of absenteeism data</u>
       Biometrika, Jun 1954, 41:1/2:77-90

0154 E. LEONARD ARNOFF, JOHN C. CHAMBERS - <u>On the determination of optimum reserve generating capacity in an electric utility system</u>
       Excerpts in ORA News Letter (Bangalore), Oct 1, 1957, 1:5:9

0166 KENNETH ARROW, LEONID HURWICZ - <u>Gradient methods for constrained maxima</u>
       Abstract by P. Wolfe in Mathematical Reviews, 1958, 19:5:618-619

0171 W. ROSS ASHBY - <u>An Introduction to Cybernetics</u>
       Review by D. Gabor in British Journal for the Philosophy of Science, Aug 1958, 9:34:168-170

0198 NORMAN T. J. BAILEY - <u>Operational research in hospital planning and design</u>
       Excerpts in ORA News Letter (Bangalore), Jan 1, 1958, 1:8:9-10

0200 ROBERT A. BAILEY - <u>The application of operations research techniques to airborne weapon system planning</u>
       Abstract in ORMS, Aug 1956, 1:2:28

0218 EDWARD W. BARANKIN - <u>Stochastic Search for the Maximum of a Function</u>
       Abstract in the Journal of Industrial Engineering, May-Jun 1959, 10:3:248

0220   E. W. BARANKIN, R. DORFMAN - <u>Toward Quadratic Programming</u>
       Abstract by P. Wolfe in Mathematical Reviews, 1959,
20:1:123-124; in The Journal of Industrial Engineering, May-
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0238   D. Y. BARBER - <u>Queuing with impatient customers and indifferent clerks</u>
       Abstract by H. Spitz in Quality Control and Applied
Statistics, 1958, 3:10:913-915

0239   D. Y. BARBER - <u>Queuing with impatient customers and ordered service</u>
       Abstract by H. Spitz in Quality Control and Applied
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0249   T. E. BARTLETT - <u>An algorithm for the minimum number of transport units to maintain a fixed schedule</u>
       Abstract by D. F. Morrison in Quality Control and Applied Statistics, 1958, 3:7:637-638

0266   WILLIAM J. BAUMOL, CHARLES H. SEVIN - <u>Marketing costs and mathematical programming</u>
       Abstract by William Cervenka in Quality Control and
Applied Statistics Abstracts, 1958, 3:5:435-436
       Statistical Decision Series, Reprints from Harvard
Business Review, Apr 1, 1959, pp 32-39

0267   ALEX BAVELAS - <u>Communication patterns in task-oriented groups</u>
       Group Dynamics, D. Cartwright, A. Zander, editors
(Evanston, Illinois, Row, Patterson, 1953)

0271   E. F. BEACH - <u>Economic Models - An Exposition</u> (London,
Chapman & Hall, Ltd., 1957) 227 pp 60s
       Review by H. C. Cottrell in Journal of the Royal Statistical Society, Series B (Methodological), 1958, 121:3:
361-362; by John Fox, David W. Miller in MS, Oct 1958, 5:1:
141-142; by J. Marschak in Mathematical Reviews, 1958, 19:
11:1242; by Tibor Fabian in OR JORSA, Nov-Dec 1958, 6:6:904-
905; by J. P. Cavin in Agricultural Economics Research, Jul
1958, 10:3:99-100; by W. G. Mellon in NRLQ, Mar 1958, 5:1:94;
by R. S. G. Rutherford in Economic Record, Dec 1958, 34:69:
426; by Gerhard Tintner in American Economic Review, Mar
1958, 48:1:149-151

0275   E. M. L. BEALE - <u>On minimizing a convex function subject to linear inequalities</u>
       Author's summary in Mathematical Reviews, 1958, 19:5:
619

0289   M. BECKMANN, C. B. McGUIRE, C. B. WINSTEN - <u>Studies in the Economics of Transportation</u>
       (Second printing) Published for Cowles Foundation for
Research in Economics, New Haven, 1956 (Yale University Press,
New Haven, London, Geoffrey Cumberlege, Oxford University
Press) xix 232 pp illus., 32s
       Review by Glen D. Camp in OR JORSA, Mar-Apr 1959, 7:2:
262-263; by Claude Ponsard in Kyklos, 1958, 11:2:268-270;
in NRLQ, Mar 1959, 6:1:83

0291   MARTIN J. BECKMAN, R. MUTH – <u>An inventory policy for</u>
<u>a case of lagged delivery</u>
        Abstract in ORMS, Dec 1956, 1:4:27

0292   RICHARD E. BECKWITH – <u>The assignment problem – a spe-</u>
<u>cial case of linear programming</u>
        Abstract by S. H. Gaffen in Quality Control and Applied
Statistics Abstracts, 1958, 3:3:239-240

0313   R. E. BELLMAN – <u>On some variational problems occurring</u>
<u>in dynamic programming theory   I</u>
        Reference material for Special Summer Program in Opera-
tions Research, Massachusetts Institute of Technology, Jun
16 – Jul 2, 1953, pp 470-479

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<u>solution of variational problems</u>
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0347   EDWARD G. BENNION – <u>Capital budgeting and game theory</u>
        Statistical Decision Series, Reprints from Harvard
Business Review, Apr 1, 1959, pp 41-49

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        Excerpts in ORA News Letter (Bangalore), Aug 1, 1957,
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0380   CHARLES A BICKING – <u>Operational research in a chemical</u>
<u>plant</u>

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0390 ALBERT B. BISHOP - A model for optimum control of stochastic sampled-data systems
    Abstract by W. A. Thompson, Jr., in Quality Control and Applied Statistics, 1958, 3:8:741-742

0392 GEORGE T. BISHOP - On a problem of production scheduling
    Abstract by R. Bellman in Mathematical Reviews, Feb 1958, 19:2:230-231

0413 MARK S. BLUMBERG - Evaluating health screening procedures
    Abstract by S. H. Gaffen in Quality Control and Applied Statistics Abstracts, 1958, 3:3:251-252

0416 BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM - A national survey of liquid assets
    Continued by University of Michigan, Survey Research Center. Summary and results of surveys and data available in Economic Survey Data. Basic data available to Academic Researchers from the Survey Research Center (Ann Arbor, Dec 1960) pp 3-24

0451 K. E. BOULDING - General systems theory - the skeleton of science
    MS, Jan 1956, 2:2:189 (abstract)

0461 EDWARD H. BOWMAN, ROBERT D. FETTER - Analysis for Production Management (Richard D. Irwin, Inc., Homewood, Illinois, 1961) Revised edition   575 pp   cloth
    Review by E. H. Lloyd in Journal of the Royal Statistical Society, Series B (Methodological), 1958, 121:1:129-130; by Carl E. Woble in Industrial Quality Control, Oct 1957, 14:4:37; by H. M. Peston in Economica, Aug 1958, 25:99:260-262; by K. J. Arrow in Mathematical Reviews, 1959, 20:4:500

0466 G. E. P. BOX - The exploration and exploitation of response surfaces
    Biometrics, Mar 1954, 10:1:16-60
    Deals with the general principles in the experimental attainment of optimum conditions. Suggests the application of the response surface technique to fields beyond that of chemical research. The problem is outlined and methods of exploration are described. Considerations resulting from the investigations are the demonstration of results and the analysis of multifactor dependence. With some knowledge of the system under investigation, qualitative factors, as well as quantitative factors, may be incorporated. 9 refs

0483 FRANCESCO BRAMBILLA - La scelta tra ipotesi statistiche - L'impostazione della teoria del comportamento induttivo secondo Braithwaite (The choice between statistical hypotheses: the basis of the theory of inductive processes according to Braithwaite)
    Giornale Degli Economisti e Annali di Economica, Sep-Oct 1956, 15:9-10:na

0505 LEON BRILLOUIN - <u>Science and Information Theory</u>
xvii 320 pp $6.80
     A survey of the science of information requiring only
elementary physics and mathematics.
     Abstract by E. Reich, Mathematical Reviews, Nov 1956,
17:10:1099-1100; brief in Journal of Electronics and Control,
Jan 1960, 8:1:58
     - <u>La Science et la Théorie de l'Information</u> (Masson et
Cie, Paris, 1959)

0537 IRVIN D. J. BROSS - <u>Looking around: statistical deci-
sion making</u>
     Statistical Decision Series, Reprints from Harvard
Business Review, Apr 1, 1959, pp 51-54

0559 ARTHUR ALLEN BROWN - <u>Forest resource management</u>
     Mentions four areas in forest resource management where
operations research is applicable--harvesting and reforesta-
tion schedules and procedures, watershed management, disease
and pest control, and prevention and control of forest fires.
Discusses the latter.
     Abstract in American Paper and Pulp Association -
Bibliography Operations Research in the Pulp and Paper Indus-
try, Oct 1, 1960

0589 E. S. BUFFA - <u>The Additivity of Universal Standard Data
Elements</u>
     Journal of Industrial Engineering, Sep-Oct 1956, 7:5:
217-223; same, Nov-Dec 1957, 8:6:327-333

0610 G. C. BUSH, M. L. ERNST, B. SCHAFER - <u>M.I.T. Library
Operations</u>
     Two studies prepared for internal use are described.
One on loss-rates and circulation-accession relationships
yields recognizable characteristics, and the other on circu-
lation characteristics gave preliminary indications. Further
studies are planned for eliminating bias in the samples used,
users requirements, delays or failures in service, and report
indexing.

0671 F. C. CARLIN - <u>The use of a large scale computer for
manufacturing control</u>
     MS, Jan 1958, 4:2:177-182
     Considers problems in selection of a scientific com-
puter for shop control purposes, in handling large volumes
of input-output data, in joint use by engineering and ac-
counting personnel, in maximizing the utilization of machine
capabilities, and in minimizing management benefits.

0672 W. M. CARLSON - <u>Organizing for operations research</u>
     Excerpts by B. H. Iyer, ORA News Letter (Bangalore),
Jul-Aug 1958, 2:7-8:8

0679 C. F. CARTER, G. P. MEREDITH, G. L. S. SHACKLE (edi-
tors) - <u>Uncertainty and Business Decisions: A Symposium</u>
     Review by Marie-Francoise Bye in Revue Economique, Jan
1961, 12:1:156-157

0694 CASE INSTITUTE OF TECHNOLOGY - <u>Proceedings of the Con-
ference on Operations Research, Computers, and Management</u>

<u>Decisions</u>
Digest in EDP Idea Finder, pp 346-347

0707   JOHN C. CHAMBERS, ANGUS F. BOND, JAMES H. LEAKE - <u>The determination of optimum lot sizes in the aircraft industry</u>
   - <u>Optimum lot sizes for parts used in aircraft production</u>
   OR JORSA, May-Jun 1958, 6:3:385-398
Develops a more precise method for evaluating and including high obsolescence costs in an inventory model which includes optimum lot sizes. Important and unusual factors in this inventory situation are (a) a demand rate that increases irregularly until the maximum rate is reached and (b) splitting of lots in the shop.
Abstract by J. E. Walsh in Quality Control and Applied Statistics, 1958, 3:10:921-923

0709   GEORGE P. CHAMPION - <u>A continuation of the best in industrial engineering</u>
Excerpts in ORA News Letter (Bangalore), Aug 1, 1957, 1:3:5

0734   R. L. CHAPMAN - <u>Simulation in Rand's System Research Laboratory</u> (P-1074 The Rand Corporation, Apr 1957) 8 pp

0750   A. CHARNES, W. W. COOPER - <u>Generalizations of the Warehousing Model</u> O.N.R. Research Memorandum No. 34 (Graduate School of Industrial Administration, Carnegie Institute of Technology, 1955)

0751   A. CHARNES, W. W. COOPER - <u>A Note on the Non-Linear Power of Adjacent Extreme Point Methods in Linear Programming</u> O.N.R. Research Memorandum No. 35 (Graduate School of Industrial Administration, Carnegie Institute of Technology, Pittsburgh, Penn., Sep 1955, 14 pp; Purdue University School of Industrial Management, Lafayette, Ind., 1956, 22 pp)
Abstract by Herbert Glazer in Quality Control and Applied Statistics, 1958, 3:1:59-64; by W. F. Freiberger in Mathematical Reviews, 1958, 19:7:822

0753   A. CHARNES, W. W. COOPER - <u>Management models and industrial applications of linear programming</u>
Abstract by D. F. Morrison in Quality Control and Applied Statistics, 1958, 3:9:817-818; abstract in Mathematical Reviews, 1959, 20:7:846

0761   A. CHARNES, W. W. COOPER, G. H. SYMONDS - <u>Stochastic programming of heating oil by the horizon method</u>
Revised version entitled <u>Cost horizons and certainty equivalents: an approach to stochastic programming of heating oil</u> 22 refs
MS, Apr 1958, 4:3:235-263

0824   C. WEST CHURCHMAN, RUSSELL L. ACKOFF, E. LEONARD ARNOFF - <u>Introduction to Operations Research</u>
   - <u>Eléments de recherche opérationnelle</u> (Introduction to Operations Research) Traduit et adapté sous la direction de M. Verhulst et J. Lavault, par P. Rosenstiehl, P. Bertier, B. Roy, J. de Guenin et F. Piquemal (Paris, Dunod, Editeur, 1960)

Digest in EDP Idea Finder, pp 335-336; review by Reinhard Krogen in Journal of Marketing, Jan 1958, 22:3:345-347; by Marcel Marantz in Critique Revue Générales des Publications Francaises et Etrangeres, May 1958, 14:132:453-457; by Alison Doig in Biometrika, Jun 1959, 46:1/2:274-275; by John G. Brainerd, Ralph M. Showers in OR JORSA 1960, 7:3:395-396; by Stafford Beer - Thank the war for this, in Engineering, Jul 12, 1957, 184:4766:50

0832 CHARLES E. CLARK - Mathematical analysis of an inventory case
Review in Journal of Marketing, Jul 1958, 23:1:77

0844 ALAN COBHAM - Priority assignment in waiting line problems
Abstract in ORMS, Oct 1957, 2:3:25

0845 WILLIAM G. COCHRAN, GERTRUDE M. COX - Experimental Designs
Review by N. L. Johnson, Biometrika, Jun 1951, 38:182:260-261

0846 WILLIAM G. COCHRAN, GERTRUDE M. COX - Experimental Designs
Review in ORQ, Sep 1958, 9:3:260; by D. R. Cox in Journal of the Royal Statistical Society, Series B (Methodological), 1958, 121:1:237-238

0853 JOHN COHEN, MARK HANSEL - Risk and Gambling The study of subjective probability (Philosophical Library, Inc., New York, 1956) 153 pp Index $4
Based on experiments with school students of ages 6 to 15 in Manchester, England. Subjective probability is in constant use in everyone's everyday life as in the expectation attached to the future behavior of others. Everyone is engaged in risktaking. The authors wished to discover the principles underlying the way people actually choose, estimate, predict, judge or take risks, and, secondly, to trace the characteristic changes in these activities during the period of development. The experiments indicate that, even at the youngest age studied, a child does not "guess"; predictions and judgments follow an intricate system of preference and pattern-seeking varying in complexity from age to age. Learning in childhood is very largely a form of sampling, as the child accumulates experience from which he must learn to interpret uncertainties in order to arrive at a realistic expectation of what will occur. The idea of independence of previous events does not appear until about age 12. The authors discuss such matters as the language of uncertainty; the relative intensity of belief in one's expectation; the variations in tolerance of uncertainty; the gradual emergence between ages 10 and 15 of the understanding of the idea of a distribution; subjective probability in gambling. Further information about the experiments is to be found in the relevant journals. Examples, 24 tables, 28 refs

0861 RUSSELL COILE, BABA FOSTER - Use of computation facilities for mechanized literature processing in research libraries

– Use of computers for mechanized literature searching in operations-research libraries
OR JORSA, May-Jun 1958, 6:3:434-438
Abstract by R. C. Coile in Quality Control and Applied Statistics, 1959, 4:5:537-538

0880 E. U. CONDON – Food and the theory of probability
(George Washington University Logistics Research Project, Logistics Papers 8, Vol 1)

0890 CLYDE H. COOMBS – Psychological scaling without a unit of measurement
Psychological Review, May 1950, 57:3:145-158
Develops a new type of scale which does not involve a unit of measurement and falls logically between an interval scale and an ordinal scale. The intervals between objects may not be equal but their magnitudes can be ordered. The main concept is developed with a hypothetical experiment. An actual experiment is presented to illustrate the basic ideas and the experimental procedures required under certain limiting conditions to secure such a scale. 4 refs

0927 ROGER R. CRANE – Analysis of a railroad classification yard
Abstract in ORMS, Dec 1956, 1:4:26

0942 ROGER R. CRANE, JAMES E. SEITZ – An analysis of a paper company
Abstract in American Paper and Pulp Association – Bibliography Operations Research in the Pulp and Paper Industry, Oct 1, 1960

0947 GEORGE D. CREELMAN – Opsearch
Excerpt in ORA News Letter (Bangalore), Sep 1, 1957, 1:4:6

0948 GEORGE D. CREELMAN, RICHARD W. WALLEN – The place of psychology in operations research
OR JORSA, Jan-Feb 1958, 6:1:116-121
Concerned with the possible contribution of a psychologist to operations research teams that work in industrial settings. His training is explored and is relevant to four phases of operations research: (1) the formulation of the problem; (2) the development and solution of the model; (3) the implementation of the decision; and (4) the activity of the team itself. Each phase studied in relation to the psychologist's special skills in interviewing, measurement, research design and applied group dynamics. A study also made of the current use of psychology in operations research literature. 11 refs
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