

January, 2016

## CURRICULUM VITAE

### **Name: Wade Douglas Cook**

Citizenship: Canadian

Date of Birth: June 22, 1946

Marital Status: Married: 2 children

### **PRESENT POSITION**

University Professor

Gordon Charlton Shaw Professor of Management Science, Schulich School of Business, York University, Toronto, Canada ( February 1, 2004 - present).

### **PREVIOUS POSITIONS**

Professor, York University: January 1, 1981 – January 31, 2004

Associate Professor, York University: July 1, 1975 - December 31, 1980

Assistant Professor, York University: July 1, 1972 - June 30, 1975

Lecturer, Dalhousie University: July 1, 1971 - June 30, 1972

### **VISITING POSITIONS**

Visiting Scholar, University of Bath, UK, January, 1994- Jun, 1994

Visiting Scholar, Worcester Polytechnic Institute, Worcester, Mass, September, 2004- December, 2004

Visiting Scholar, University of Science and Technology, Hei Fey, China, May 2005-June, 2005

### **UNIVERSITY DEGREES**

Ph.D., Dalhousie University, 1972 (Operations Research)

M.Sc., Queen's University, 1969 (Mathematics and Operations Research)

B.Sc., Mount Allison University, 1968 (Mathematics)

### **COURSES TAUGHT AT GRADUATE AND UNDERGRADUATE LEVELS**

- Statistics
- Operations Research
- Production/Operations Management
- Inventory Control

### **UNIVERSITY SERVICE:**

#### ***University committees:***

SCOR, APPC, SCOTL, York Ad Hoc Research Committee, University Ethics Committee, and HPRC.

#### ***Schulich, School of Business:***

Associate Dean, Student Affairs; Ph.D. Program Director; Chair of Tenure & Promotions Adjudication Committee; Area Coordinator, OMIS; Associate Dean of Research.

***Current administrative service:***

- Area Coordinator of OMIS (1976-Present except for sabbaticals)
- Associate Dean of Research for SSB (1999-present)
- Chair, Tenure & Promotions Adjudication Committee for SSB (1981-Present, except for sabbaticals)
- Member Management, Operating and Executive Committees
- Member of York Adhoc Research Subcommittee
- Vice Chair, HPRC Committee, 2008- 2010
- Chair, HPRC Committee, 2010- present

**MEMBERSHIPS IN PROFESSIONAL SOCIETIES**

- Institute for Operations Research and Management Science (**INFORMS**)
- Canadian Operational Research Society (**CORS**)

**EDITORIAL RESPONSIBILITIES**

- Past Associate Editor, **Operations Research**
- (Past Editor, **INFOR, J Prod Analysis**)
- (Past member Editorial Board, **Computers and Operations Research**)
- Advisory Board Member, **American Journal of Operational Research**
- Editorial Board Member, **EJOR**
- International Advisory Board member for **Journal of Centrum Cathedra, Peru**

**OTHER AFFILIATIONS**

Vice-President, Harmony Place Support Services (Day Program for Disabled Adults)  
President, Wade D. Cook & Associates Ltd., Management Consultants

**PROFESSIONAL/CONSULTING ACTIVITIES**

Have served in an advisory/consulting capacity to various private organizations and government departments. Many of the projects carried out over the past 30 years have involved forecasting, optimization, statistical modelling and analysis, financial planning, computer system development, vehicle scheduling and project planning and selection. Have also given seminars on statistics and modelling to such organizations as the Society of Management Accountants.

Clients include:

- Canadian Tire Corporation
- Canadian Imperial Bank of Commerce
- Simpsons Sears

- Kelloggs/Salada Canada Ltd.
- Nucro Technics Ltd.
- Ministry of Transportation of Ontario
- Transport Canada
- Department of National Defence
- Town of Haldimand
- Ontario Northland Transportation Commission (ONTC)
- Dominion Marine Association
- Canadian Transportation Commission
- City of St. Catharines
- Ministry of The Attorney General
- Hostess Frito Lay
- Glavin Associates
- Ontario Hydro

**PUBLICATIONS** (Note that the bolded number in brackets after a publication is the citation count for that article or book. *Total Citations as of March 21, 2014 5890 citations*)

**I. Books, Monographs, Edited Journal Volumes, & Major Studies**

*Books*

**1.Data Envelopment Analysis: A Handbook on Modelling of Internal Structures and Networks**, 2014, Springer Science (with Joe Zhu).

**2.Data Envelopment Analysis: Balanced Benchmarking**, 2013, Amazon.com (with Joe Zhu).

**3.Data Envelopment Analysis:Modelling Operational Processes and Measuring Productivity**, 2008, Amazon.com, 262 pages (with J. Zhu). **(42)**

**4.Modelling Data Irregularities and Structural Complexities in DEA**, 2007, Springer Science, Boston (with J. Zhu). **(43)**

**5.Modeling Performance Measurement: Applications and Implementation Issues in DEA**, 2005, Kluwer Academic Publishers/ Springer Science, Boston (with J. Zhu). **(76)**

**6.Ordinal Information and Preference Structures: Decision Models and Applications** Prentice Hall, 1992 (with M. Kress).**(94)**

**7.Planning Processes in Developing Countries: Techniques and Achievements**, Wade D. Cook & Tillo E. Kuhn, Editors, North Holland Publishing Co., 1982. **(4)**

*Edited Journal Volumes*

**8.Data Envelopment Analysis: The Research Frontier – OMEGA Special Issue dedicated to the memory of William W. Cooper 1914-2012** , Edited by Wade D. Cook, Lawrence M. Seiford and Joe Zhu (Forthcoming 2013)

**9.Research in DEA: In Honor of W.W. Cooper**, Guest Editor, Special Issue of *Annals of Operations Research*, 2006 (with J. Zhu).

**10.Performance Evaluation and Benchmarking**, Guest Editor, Special Issue of *INFOR*, Vol. 36, No. 3, August, 1998 (with L. Seiford) **(2)**

*Major Studies*

**11."Measurement of the Relative Efficiency of Highway Maintenance Patrols in Ontario"** Wade D. Cook, Alex Kazakov & Ya'akov Roll, Ministry of Transportation Research Report #ECN-88-01, October, 1988.

**12.Plant Level Productivity: A Comparison of Actual and Potential Performance**, Wade D. Cook, Ya'akov Roll & Uri Zohar, Report submitted to National Research Council of Canada (funded under NRC Contract #1ST83-00244), 1985.

**13.A Forecast of the Canadian Dry-Bulk Vessel Requirements on the Great Lakes in 1990**, Wade D. Cook and Gordon C. Shaw, Research Report #83, Univ. of Toronto/York Univ. Joint Program in Transportation, March, 1982.

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## II. Refereed Journal Articles

1. Modeling Efficiency in the Presence of Multiple Partial Input to Output Processes”, forthcoming, 2016 in **Annals of Operations Research** (with W.H. Li, L. Liang, S. Aviles-Sacoto, R. Imanirad, and J. Zhu)
2. "Units Invariant DEA when Weight Restrictions are Present: Ecological Performance of US Electricity Industry," forthcoming, 2016 in **Annals of Operations Research** (with J Zhu and J. Du).
3. "Bounded and Discrete Data and Likert Scales in Data Envelopment Analysis: Application to Regional Energy Efficiency in China," forthcoming, 2016 in **Annals of Operations Research** (with J Zhu and J. Du).
4. “Two-Stage Network DEA: When Intermediate Measures can be Treated as Outputs from the Second Stage”, **Journal of the Operational Research Society**, Vol. 66 (11), 2015, pp 1868-1877 (with S Aviles, R. Imanirad and J. Zhu).
5. “Partial Input to Output Impacts in DEA: The Case of DMU-Specific Impacts”, **European Journal of Operational Research** Vol. 244 (3), 2015, pp 837-844 (with S. Aviles, R. Imanirad and J. Zhu)
6. “Time-Staged Outputs in DEA”, **OMEGA**, Vol. 55, September 2015, pp 1–9 (with S. Aviles, D. Guemes Castorena, and H. Cantú Delgado)
7. “DEA Models for Parallel Systems: Game-Theoretic Approaches”, **Asia Pacific Journal of Operations Research**, Vol. 32 (2), 2015, pp 455-468 (with J. Du, J. Huo and J. Zhu)
8. "DEA Cobb-Douglas Frontier and Cross Efficiency", **Journal of the Operational Research Society** Vol 65, March, 2014, pp 265–268 (with J. Zhu)

9. “Competitiveness Among Higher Education Institutions: A Two-Stage Cobb-Douglas Model for Efficiency Measurement of Schools of Business”, **Journal of Centrum Cathedra: The Business and Economics Research Journal**, Vol 7(1), March, 2014, pp 210-220 (with S. Aviles Sacoto, and D. Güemes-Castorena).
10. “Data Envelopment Analysis: Prior to choosing a model”, **OMEGA**, Vol 44, April, 2014, pp 1–4 (with K. Tone and J. Zhu)
11. “Fixed Cost and Resource Allocation Based on DEA Cross Efficiency”, **European Journal of Operational Research**, Vol 235(1), May, 2014, pp 206–214 (with J. Du, L. Liang and J. Zhu)
12. “Data Envelopment Analysis with Non-Homogeneous Decision Making Units”, **Operations Research**, May/June, Vol 61(3), 2013; pp 666-676. (with R. Imanirad, J. Harrison, P. Rouse and J. Zhu).
13. “Data Envelopment Analysis: The Research Frontier”, **OMEGA**, Vol 41(1), 2013: pp 1-2 (with L. Seiford and J. Zhu)
14. “Network DEA Pitfalls: Divisional Efficiency and Frontier Projection”, **European Journal of Operational Research**, Vol 226, May, 2013, 507-515 (with Y. Chen, C. Kao and J. Zhu). (12)
15. “Partial Input to Output Impacts in DEA: Production Considerations and Resource Sharing Among Business Sub-Units”, **Naval Research Logistics**, Vol 60(3), April, 2013: pp 190-207 (with R. Imanirad and J. Zhu).
16. “Relative Efficiency Measurement: The Problem of a Missing Output in a Subset of Decision Making Units”, **European Journal of Operational Research**, Vol 220, Issue 1, July, 2012: pp 79-84 (with J. Harrison, P. Rouse and J. Zhu). (3)
17. “Additive Super-efficiency in Integer-valued Data Envelopment Analysis”, **European Journal of Operational Research**, Vol 218(1), April, 2012: pp 186-192 (with J. Du, C-M Chen, Y. Chen and J. Zhu). (5)
18. “Output-Specific Input Assurance Regions in DEA”, **Journal of the Operational Research Society**, Vol 62, 2011: pp 1881-1887 (with J. Zhu).
19. “DEA in the Presence of Partial Output to Input Impacts”, **Journal of Centrum Catolica**, Vol 4(2), 2011: pp 182-196 (with R. Imanirad).

20. "DEA Efficiency in Two-Stage Networks with Feed Back," **IIE Transactions**, Vol 43, 2011: pp 309-322 (with J. Zhu, Z Li and L. Liang). (12)
21. "Multiple Variable Proportionality in DEA", **Operations Research**, Vol 59(4), July–August 2011, pp. 1024–1032 (with J. Zhu)
22. "A Bargaining Game Model for Measuring Performance of Two-stage Network Structures", **European Journal of Operational Research**, Vol 210(2), 2011: pp 390-397 (with J. Du, L. Liang, Y. Chen, and Zhu). (21)
23. "Aggregating Incomplete Lists of Journal Rankings: An Application to Academic Accounting Journals", **Accounting Perspectives**, Vol 9(3), 2010: pp 217-235 (with T. Raviv and A. Richardson). (6)
24. "Deriving the DEA Frontier for Two-Stage Processes", **European Journal of Operational Research**, Vol 202(1), 2010: pp 138-142 (with Y. Chen and J. Zhu). (56)
25. "Network DEA: Additive Efficiency Decomposition", **European Journal of Operational Research**, Vol 207(2), 2010: pp 1122-1129 (with J. Zhu, G. Bi, and F. Yang). (39)
26. "Measuring Performance of Two-Stage Network Structures by DEA: A Review and Future Perspective", **OMEGA**, Vol 38(6), 2010: pp 423-430 (with J. Zhu and L. Liang). (97)
27. "An Empirical Study of IT as a Factor of Production: The Case of Net-Enabled IT Assets", **Information System Frontiers**, Vol 12(3), 2010: pp 323-335 (with M. Wade and S. Nevo). (11)
28. "Context-Dependent Performance Standards in DEA", **Annals of Operations Research**, Vol 173, 2010: pp 163-175, (with J. Zhu). (2)
29. "Nonlinear Inputs and Diminishing Marginal Value in DEA", **Journal of the Operational Research Society**, Vol 60, 2009: pp 1567-1574 (with F. Yang and J. Zhu). (1)
30. "Piecewise Linear Output Measures in DEA", **European Journal of Operational Research**, Vol 197, 2009: pp 312-319, (with J. Zhu). (5)
31. "Additive efficiency decomposition in two-stage DEA", **European Journal of Operational Research**, Vol 196 (3), 2009: pp 1170-1176, (with J. Zhu, Y. Chen and N. Li.). (126)

32. "Data Envelopment Analysis (DEA)-Thirty Years On", (*invited review*), **European Journal of Operational Research**, Vol 192 (1), 2009: pp 1-17, (with L. Seiford) **(467)**
33. "A Modified Super-efficiency DEA Model for Infeasibility", **Journal of the Operational Research Society**, Vol 60, 2009: pp 276-281, (with L. Liang, Y. Zha and J. Zhu) **(29)**
34. DEA Models for Two-stage Processes: Game Approach and Efficiency Decomposition, **Naval Research Logistics**, Vol. 55, 2008: pp 643-653, (with J. Zhu and L. Liang) **(67)**
35. "DEA Game Cross Efficiency Model and Its Nash Equilibrium", **Operations Research**, Vol. 56 (5) 2008, 1278-1288. (with J. Zhu, L. Liang and J. Wu). **(71)**
36. "Alternative Secondary Goals in DEA Cross Efficiency Evaluation", **Int. J. Production Economics** Vol.113, 2008: pp 1025–1030 (with L. Liang, J. Wu and J. Zhu) **(89)**
37. "Context – Dependent Assurance Regins in DEA", **Operations Research**, Vol. 56 (1) 2008: pp 69-78 (with J. Zhu). **(24)**
38. "Classifying Inputs and Outputs in Data Envelopment Analysis", **European Journal of Operational Research**, Vol. 180, 2007: pp 692-699. (with J. Zhu). **(57)**
39. "Creating a Consensus Ranking of Proposals from Reviewers' Partial Ordinal Rankings", forthcoming in **Computers and Operations Research**, Vol. 34(4), 2007, pp.954-965 (with B. Golany, M. Penn and T. Raviv). **(38)**
40. "Performance Measurement and Classification in DEA: Input – Oriented Model", **OMEGA**, Vol. 35, 2007: pp 39-52, (with K. Bala). **(23)**
41. "Within – Group Common Weights in DEA: An Analysis of Power Point Efficiency", **European Journal of Operational Research**, Vol. 178, 2007, pp 207-216, (with J. Zhu). **(29)**
42. "An Examination of the Trade-off between Internal and External IT Capabilities", forthcoming in **The Journal of Strategic Information Systems**, 16, 2007: pp 5-23 (with S. Nevo and M. Wade). **(41)**
43. "Preface for the Special Issue" on *Performance Evaluation and Beyond: Data Envelopment Analysis Research Frontiers*, in Honor of William W. Cooper, **Annals of Operations Research**, Vol. 145(1), 2006, pp.1-3 (with J. Zhu).
44. "DEA Models for Supply Chain Efficiency Evaluations", **Annals of Operations Research**, Vol. 145, 2006: pp 35-49 (with L. Liang, F. Yang, and J. Zhu). **(144)**



45. “Dual – Role Factors in DEA”, **IIE Transactions**, Vol. 38, 2006, pp 1-11, (with R.H. Green and J. Zhu). **(43)**
46. “Rank Order Data in DEA: A General Framework”, **European Journal of Operational Research**, Vol. 174, 2006, 1021-1038 (with J. Zhu). **(70)**
47. “ The Efficiency of Joint Decision Making in Buyer-Supplier Relationships”, **Annals of Operations Research**, Vol. 145, 2006: pp 15-34 (with M. Biehl, and D. Johnston). **(23)**
48. “Incorporating Multi-Process Performance Standards into the DEA Framework”, **Operations Research**, Vol. 54(4), 2006, 656-665 (with J. Zhu). **(4)**
49. “Distance-Based and ad hoc Consensus Measures in Ordinal Preference Ranking”, (*Invited article*), **European Journal of Operational Research**, Vol.172(2), 2006. **(91)**
50. “Financial Liberalization and Efficiency in the Tunisian Banking Industry:DEA Test, forthcoming in **International Journal of Information Technology and Decision Making**, Vol. 4, No. 3, 2005: pp 455-475 (with M. Hababou and L. Liang). **(16)**
51. “Optimal Allocation of Proposals to Reviewers to Facilitate Effective Ranking”, **Management Science**, Vol. 51(4), 2005: pp 655-661 (with B. Golany, M. Kress, M. Penn and T. Raviv). **(64)**
52. “Allocation of Shared Costs among Decision Making Units: A DEA Approach”, **Computers and Operations Research**, Vol 32, 2005: 2171-2178 (with J. Zhu). **(67)**
53. “Building Performance Standards into Data Envelopment Analysis Structures”, **IIE Transactions**, 2005, Vol. 37, pp:267-275 (with J. Zhu). **(13)**
54. “Evaluating Power Plant Efficiency: A Hierarchical Model”, **Computers and Operations Research**, Vol. 32(4), 2005: pp 813-823 (with R.H.Green). **(65)**
55. “Ranking”, (*Invited article*) **The Encyclopedia of Social Measurement**, Vol 3, 2005: 275-284.
56. “Models for Performance Benchmarking: Measuring the Effect of E-business Activities on Banking Performance”, **OMEGA- International Journal in Management Science** Vol. 32(4), 2004: pp 313-322 (with L. Seiford and J. Zhu).**(82)**
57. “ A Free Coordination Hull Approach to Efficiency Measurement”, **Journal of the Operational Research Society**, Vol. 55, 2004: pp 1059-1063 (with R.H.Green). **(6)**

58. "Multicomponent Efficiency Measurement and Core Business Selection in Multiple-Plant Firms: a DEA Model", **European Journal of Operational Research**, Vol 157(3), 2004: pp 540-551 (with R.H. Green).(25)
59. "Performance Measurement with Classification Information: An Enhanced Additive DEA Model", **OMEGA- International Journal in Management Science**, Vol. 31(6), 2003: pp 439-450 (with K.Bala) (54)
60. "Output Deterioration with Input Reduction in Data Envelopment Analysis", **IIE Transactions**, Vol. 35. 2003: pp 309-320 (with J. Zhu).(18)
61. "Selecting Sites for New Facilities using Data Envelopment Analysis", **Journal of Productivity Analysis**, Vol. 19, 2003:pp 77-91 (with R.H. Green).(13)
62. "A Linear Value Function in Mixed MCDM Problems with Incomplete Preference Data: An Extreme Point Approach", **INFOR**, Vol. 43(4), 2002: pp 331-346 (with M. Kress). (2)
63. "Sales Performance Measurement in Bank Branches", **OMEGA -International Journal in Management Science**, Vol. 29, 2001:pp. 299-307 (with M. Hababou). (102)
64. "Prioritizing Highway Accident Sites: A Data Envelopment Analysis Model," **Journal of the Operational Research Society**, Vol. 52(3), 2001:pp. 303-309 (with A. Kazakov & B. Persaud).(18)
65. "Multicomponent Efficiency Measurement and Shared Inputs in Data Envelopment Analysis: An Application to Sales and Service Performance in Bank Branches," **Journal of Productivity Analysis**, Vol. 14(3), 2000:pp. 209-224 (with M. Hababou and H. Tuenter). (151)
66. "Project Prioritization: A Resource Constrained Data Envelopment Analysis," **Socio-Economic Planning Sciences**, Vol. 34, 2000:pp. 85-99 (with R. Green). (47)
67. "Characterizing an Equitable Allocation of Shared Costs: A DEA Approach," **European Journal of Operational Research**, Vol. 119(3), 1999:pp. 652-661 (with M. Kress). (93)
68. "Technology Implementation: A Comparative Study of Canadian and U.S. Factories," **INFOR**, Vol. 36(3), 1998: pp 142-150 (with J. Linton). (11)
69. "Setting Performance Targets for New Decision Making Units in DEA," **INFOR**, Vol. 36(3), 1998:pp 177-188 (with A. Kazakov and R. Green). (5)

70. "Hierarchies and Groups in DEA," **Journal of Productivity Analysis**, Vol. 10(2), 1998: pp 177-198 (with D. Chai, R. Green & J. Doyle). (57)
71. "Resource Allocation in R&D Departments," **INFOR**, Vol. 36(1/2), 1998: pp 41-56 (with A. Chung and M. Kress). (7)
72. "A Note on the Additive DEA Model," **Journal of Operational Research Society**, Vol. 48, 1997: pp 446-448 (with J. Doyle & R. Green). (11)
73. "Multiple Criteria Modeling and Ordinal Data: Evaluation in Terms of Subsets of Criteria," **European Journal of Operational Research**, Vol. 93(3), 1997: pp. 602-609 (with J. Doyle, R. Green & M. Kress). (29)
74. "A General Framework for Distance-Based Consensus in Ordinal Ranking," **European Journal of Operational Research**, Vol. 96(2), 1997: pp. 392-397 (with M. Kress and L. Seiford). (1)
75. "Efficiency Bounds in DEA," **European Journal of Operational Research**, Vol. 89(3), 1996: pp 482-490 (with R. Green and J. Doyle). (32)
76. "An Extreme-Point Approach for Obtaining Weighted Ratings in Ordinal Multi-Criteria Decision Making," **Naval Research Logistics**, Vol. 43, 1996:pp 519-531 (with M. Kress).(15)
77. "Data Envelopment Analysis in the Presence of Both Quantitative and Qualitative Factors," **Journal of the Operational Research Society**, Vol. 47, 1996:pp. 945-953 (with M. Kress and L. Seiford). (169)
78. "Ranking Players in Multiple Tournaments," **Computers and Operations Research**, Vol. 24, 1996: pp. 392-397 (with J. Doyle, R. Green and M. Kress). (15)
79. "Preference Voting and Project Ranking Using DEA and Cross Evaluation," **European Journal of Operational Research**, Vol. 90(3), 1996:pp.461-472 (with J. Doyle and R. Green) (218)
80. "Upper and Lower Bound Evaluation of Multi-Attribute Objects: Comparison of Models Using Linear Programming," **Organizational Behavior and Human Decision Processes**, Vol. 64(3), 1995:pp 261-273, (with R. Green and J. Doyle). (15)
81. "A Multiple Criteria Composite Index Model for Quantitative and Qualitative Data," **European Journal of Operational Research**, Vol. 78(3), 1994:pp. 367-379 (with M. Kress). (61)

82. "A Multicriteria Approach to Country Risk Evaluation: With An Example Employing Japanese Data," **International Review of Economics and Finance**, Vol. 2(4), 1993: pp. 327-348 (with K. Hebner).(20)
83. "On the Use of Ordinal Data in Data Envelopment Analysis," **Journal of the Operational Research Society**, Vol. 44(2), 1993: pp. 133-140 (with M. Kress and L. Seiford). (112)
84. "A Multicriteria Approach to Mutual Fund Selection," **Financial Services Review**, Vol. 2(1), 1993: pp. 1-20 (with K. Hebner). (11)
85. "Selecting a New Technology Strategy Using Multiattribute, Multilevel Decision Trees," **Journal of Multi-Criteria Decision Analysis**, Vol. 2, 1993: pp. 129-144 (with D. Johnston and M. Kress) (4)
86. "Partial Efficiencies in Data Envelopment Analysis," **Socio-Economic Planning Sciences**, Vol. 27(3), 1993: pp. 171-179 (with Y. Roll). (11)
87. "Implementation of Robotics: Identifying Efficient Implementors," **OMEGA – International Journal in Management Science**, 1992 (with D. Johnston & D. McCutcheon). (25)
88. "Evaluating Suppliers of Complex Systems: A Multiple Criteria Approach," **Journal of the Operational Research Society**, Vol. 43(11), 1992: pp. 1055-1061 (with D. Johnston). (28)
89. "Prioritization Models for Frontier Decision Making Units in DEA," **European Journal of Operational Research**, Vol. 59(2), 1992: pp 319-323 (with M. Kress & L. Seiford). (71)
90. "A Multiple Criteria Decision Model with Ordinal Preference Data," **European Journal of Operational Research**, Vol. 54(2), 1991: pp 191-198 (with M. Kress). (126)
91. "A Data Envelopment Approach to Measuring Efficiency: Case Analysis of Highway Maintenance Patrols," **Journal of Socio-Economics**, Vol. 20(1) 1991: pp 83-103 (with Y. Roll, L. Seiford and A. Kazakov).(34)
92. "Strict vs Weak Ordinal Relations for Multipliers in Data Envelopment Analysis," **Management Science**, Vol. 37(6) 1991: pp. 733-738 (with I. Ali and L. Seiford). (76)
93. "Controlling Factor Weights in Data Envelopment Analysis", **IIE Transactions**, Vol. 23(1), 1991: pp 2-9 (with B. Golany & Y. Roll). (285)

94. "A DEA Model for Measuring the Relative Efficiency of Highway Maintenance Patrols", **INFOR** Vol. 28(2), 1990: pp 113-124 (with Y. Roll & A. Kazakov). **(96)**
95. "A Data Envelopment Model for Aggregating Preference Rankings," **Management Science**, Vol. 36(11), 1990: pp. 1302-1310 (with M. Kress). **(210)**
96. "An  $m^{\text{th}}$  Generation Model for Weak Ranking of Players in a Tournament," **Journal of the Operational Research Society**, Vol. 41(12), 1990: pp 1111-1119 (with M. Kress). **(16)**
97. "Measurement of Highway Maintenance Patrol Efficiency: Models and Factors", **Transportation Research Record**, Vol.1216, 1990: pp 39-45 (with A. Kazakov & Y. Roll).**(11)**
98. "Risk Considerations in Financial Planning for Pavement Rehabilitation", **Transportation Research Record**, Vol.1200, 1989: pp. 53-58 (with A. Kazakov). **(1)**
99. "A Case Study of a Noncompensatory Approach to Ranking Transportation Projects", **Journal of the Operational Research Society**, Vol. 39(11), 1988: pp. 901-910 (with I. Golan, A. Kazakov & M. Kress).**(20)**
100. "Deriving Weights from Pairwise Comparison Ratio Matrices: An Axiomatic Approach", **European Journal of Operations Research**, Vol. 37(3), 1988:pp.355-362 (with M Kress).**(69)**
101. "R & D Project Selection: Productivity Considerations", **R & D Management**, Vol. 18(3), 1988:pp. 251-256 (with Y. Roll).**(5)**
102. "Heuristics for Ranking Players in a Round Robin Tournament", **Computers and Operations Research**, Vol. 15(2), 1988:pp. 135-144 (with M. Kress).**(21)**
103. "Partial and Multiple Match Tournaments", **Mathematical Social Sciences**, Vol. 15(3), 1988:pp. 303-306 (with M. Kress).**(3)**
104. "Tournament Ranking and Score Difference", **Center d'Etudes de Recherche Operationnelle**, Vol. 29(4), 1987:pp. 215-222 (with M. Kress).
105. "Consistent Weights for Judgement Matrices of the Relative Importance of Alternatives", **Operations Research Letters**, Vol. 6(3), 1987:pp. 131-134 (with J. Barzilai and B. Golany). **(162)**

106. "Measuring the Quality of an Airline Schedule", **Canadian Aeronautics and Space Journal**, Vol. 33(1), 1987:pp. 26-30 (with G.C. Shaw & D.M. Wallace).(1)
107. "A Generalized Network Formulation of the Pairwise Comparison Consensus Ranking Model", **Management Science**, Vol. 32(8), 1986:pp1007-1014 (with J. Barzilai & M. Kress). (11)
108. "Ordinal Ranking & Intensity of Preference: A Linear Programming Approach", **Management Science**, Vol. 32(12), 1986: pp. 1642-1647 (with I. Ali & M. Kress). (21)
109. "An Axiomatic Approach to Distance on Partial Orders", **Revue Automatique, Informatique et Recherche Operationnelle**, Vol. 20(2), 1986:pp. 115-122, (with M. Kress & L. Seiford). (29)
110. "Ordinal Ranking and Preference Strength", **Mathematical Social Sciences**, Vol. 11(3), 1986:pp. 295-306, (with M. Kress).(9)
111. "Information and Preference in Partial Orders: A Bimatrix Representation", **Psychometrika**, Vol. 51(2), 1986:pp. 197-207, (with M. Kress & L. Seiford). (32)
112. "On the Minimum Violations Ranking of a Tournament", **Management Science**, Vol. 32(6), 1986:pp. 660-672, (with I. Ali & M. Kress). (68)
113. "Relationships Between L1 Metrics on Rankings: The Case of Ties", **SIAM J. Algebraic & Discrete Methods**, Vol. 7(3), 1986:pp. 445-451, (with M. Kress). (1)
114. "Ordinal Ranking with Intensity of Preference", **Management Science**, Vol. 31(1), 1985:pp. 26-32 (with M. Kress). (107)
115. "PARS: Program Analysis of Rehabilitation System", **Transportation Forum**, Vol. 1-1, 1984:pp. 55-62 (with H. Bernhart & R. Kher).
116. "An Ordinal Ranking Model for the Highway Corridor Selection Problem", **Computers, Environment & Urban Systems**, Vol. 9(4), 1984:pp. 271-276 (with L. Seiford).(9)
117. "Relationships Between L1 Metrics on Linear Ranking Spaces", **SIAM Journal of Applied Mathematics**, Vol. 44(1), 1984:pp. 209-220 (with M. Kress). (13)
118. "Goal Programming and Financial Planning Models for Highway Rehabilitation", **Journal of the Operational Research Society**, Vol. 35(3), 1984:pp. 217-223. (32)

119. "The Geometry of Rank-Order Tests," **The American Statistician**, Vol. 37(4), 1983:pp. 307-311 (with L. Seiford). (5)
120. "Preference Ranking Models: Conditions for Equivalence", **Journal of Mathematical Sociology**, Vol. 9, 1983:pp. 125-137 (with L. Seiford & S. Warner).(6)
121. "R&D Project Selection: Correction", **Journal of the Operational Research Society**, Vol. 34(2), 1983:pp. 159-160.
122. "R & D Project Selection in a Multidimensional Environment: A Practical Approach", **Journal of the Operational Research Society**, Vol. 33(5), 1982:pp. 397-405 (with L. Seiford). (31)
123. "Capital Budgeting and Lagrangean Relaxation: A Case Study", **OMEGA-International Journal in Management Science**, Vol. 10(3), 1982:pp. 321-327 (with R. Armstrong and D. Kung). (3)
124. "Scheduling Production Runs for N Products on a Single Machine: A Coverage Model", **Cahiers du Centre d'Etude de Recherche Operationnelle**, Vol. 24(1), 1982:pp. 39-48 (with A. Saïpe and L. Seiford).
125. "The Borda-Kendall Consensus Method for Priority Ranking Problems", **Management Science**, Vol. 28(6), 1982:pp. 621-637 (with L. Seiford). (108)
126. "Priority Ranking and Consensus Formation: The Case of Ties", **Management Science**, Vol. 28(6), 1982:pp. 638-645 (with R. Armstrong and L. Seiford). (35)
127. "The Contract Formation Problem in Preventive Pavement Maintenance: A Fixed-Charge Goal Programming Model", **Computers, Environment & Urban Systems**, Vol. 6(3), 1981:pp. 147-155 (with R. Armstrong).(4)
128. "Project Selection and Priority Planning in Developing Countries: The Impact of MS Models", in **Planning Processes in Developing Countries: Techniques and Achievements**, Wade D. Cook and Tillo E. Kuhn, Editors, North Holland Pub. Co., 1981.(4)
129. "Development Perspectives", in **Planning Processes in Developing Countries: Techniques and Achievements**, Wade D. Cook and Tillo E. Kuhn, Editors, North Holland Pub. Co., 1981 (with T. Kuhn).

130. "A Committee Ranking Problem Using Ordinal Utilities", **Belgian J. of Statistics, Information and Operational Research**, Vol. 21(4), 1982:pp. 3-23 (with R. Armstrong). (5)
131. "Priority Ranking and Minimal Disagreement: A Weak Ordering Model", **Revue Automatique, Informatique et Recherche Operationnelle**, Vol. 16(4), 1982:pp. 309-318 (with R. Armstrong, M. Kung and L. Seiford). (2)
132. "Production Runs for Multiple Products: The Full Capacity Heuristic", **Journal of the Operational Research Society**, Vol. 31(5), 1980:pp. 405-412 (with A. Saïpe and L. Seiford).(17)
133. "Models for Optimal Project Grouping in Highway Maintenance", **Computers, Environment & Urban Systems**, Vol. 5(1-2), 1980:pp. 69-76 (with L. Seiford). (1)
134. "A Study of Schedule Quality: The NORONTAIR System", **Logistics and Transportation Review**, Vol. 16(2), 1980:pp. 723-754 (with G.C. Shaw).
135. "An Algorithm for a Nonlinear Discontinuous Knapsack Problem", **Management Science**, Vol. 25(9), 1979:pp. 884-894 (with R. Armstrong and F. Palacios-Gomez).(5)
136. "Assignment of Military Officers to Groups: A Multiattribute Team Balancing Problem", **INFOR**, Vol. 17(2), 1979:pp. 114-123 (with W.S. Sheilds).
137. "Goal Programming Models for Assigning Search and Rescue Aircraft to Bases", **Journal of the Operational Research Society**, Vol. 30(7), 1979:pp. 555-561 (with R. Armstrong) (20)
138. "Optimal Batching in a Semi-Automated Order Picking System", **Journal of the Operational Research Society**, Vol. 30(8), 1979:pp. 711-720 (with R. Armstrong and A. Saïpe).(48)
139. "Capital Budgeting Problems in Pavement Maintenance", **Computers, Environment and Urban Systems**, Vol. 4, 1979:pp. 175-181 (with R. Armstrong).(7)
140. "Priority Ranking and Consensus Formation", **Management Science**, Vol. 24(16), 1978: pp. 1721-1732 (with L. Seiford). (219)
141. "A Structured Nonlinear Programming Problem", **Belgian Journal of Statistics, Computer Science and Operational Research**, Vol. 25(3), 1978:pp. 43-55 (with M.J.L. Kirby and S.L. Mehndiratta).



142. "Unifying Group Decisions Relating to Cardinal Preference Ranking: With an Application to the Operation of a Military Promotions Board", **Cahiers du Centre d'Etude de Recherche Operationnelle**, Vol. 20(1), 1978:pp. 59-73 (with S. A. Brightwell).(7)
143. "Stochastic Models for Competitive Advertising", **New Zealand Operational Research**, Vol. 6(1), 1978:pp. 35-57.
144. "Decomposition and Sensitivity Analysis in an Aircraft Tasking Problem", **INFOR**, Vol. 15(3), 1977:pp. 332-343 (with R. Armstrong and G. Martin). (2)
145. "A Model for the Evacuation of Casualties from a Field Hospital During a Crisis", **Operational Research Quarterly**, Vol. 28(4), 1977:pp. 963-974.(3)
146. "Zero Sum Games with Multiple Goals", **Naval Research Logistics Quarterly**, Vol. 23(4), 1976:pp. 615-621.(25)
147. "Committee Approach to Priority Planning: The Median Ranking Method", **Cahiers du Centre d'Etude de Recherche Operationnelle**, Vol.18(3), 1976:pp.337-351 (with A. Saïpe).(14)
148. "Optimal Linking of Tasks and Schedule Development for Military Air Transport", **INFOR**, Vol. 14(1), 1976:pp. 13-31 (with R. Armstrong). (1)
149. "Priority Assignment to Command Construction Projects", **INFOR**, Vol. 13(3), 1975:pp. 270-286 (with S.A. Brightwell and S.L. Mehndiratta). (8)
150. "A Game Theoretic Approach to a Two-Firm Bidding Problem", **Naval Research Logistics Quarterly**, Vol. 22(4), 1975:pp. 721-739 (with M.J.L. Kirby and S.L. Mehndiratta). (5)
151. "Infinite Linear Programming in Games with Partial Information", **Operations Research**, Vol. 23(5), 1975:pp. 996-1010 (with C.A. Field and M.J.L. Kirby).(6)
152. "A Linear Fractional Max Min Problem", **Operations Research**, Vol. 23(3), 1975:pp. 511-521 (with M.J.L. Kirby and S.L. Mehndiratta). (5)
153. "Models for the Optimal Allocation of Funds over N Constituencies During an Election Campaign", **Public Choice**, Vol. 3(4), 1974:pp1-16 (with M.J.L. Kirby and S. Mehndiratta). (5)

154. "Caratheodory's Theorem with Linear Constraints", **Canadian Mathematics Bulletin**, Vol. 18(4), 1974:pp. 189-191.(3)

155. "Caratheodory's Theorem", **Canadian Mathematics Bulletin**, Vol. 16(2), 1972:pp. 293 (with R.J. Webster).(6)

156. "Pseudo Convexity and Quasiconcavity in Optimal Discrete Time Control Systems", **Int. J. Control**, Vol. 13(1), 1971:pp. 189-198 (with B.J. Kirby).(1)

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### III Refereed Conference Proceedings Articles and Book Chapters

1. "Chapter 1: Data Irregularities in DEA", in **Modelling Data Irregularities and Structural Complexities in Data Envelopment Analysis**, W. Cook and J. Zhu, Editors, Springer Science, Boston, 2007, (with J. Zhu)

2. "Chapter 2: Rank Order Data in DEA", in **Modelling Data Irregularities and Structural Complexities in Data Envelopment Analysis**, W. Cook and J. Zhu, Editors, Springer Science, Boston, 2007, (with J. Zhu) (3)

3. "Chapter 11: DEA Models for Supply Chain or Multi-Stage Structures", in **Modelling Data Irregularities and Structural Complexities in Data Envelopment Analysis**, W. Cook and J. Zhu, Editors, Springer Science, Boston, 2007, (with L. Liang, F. Yang and J. Zhu) (9)

4. "Chapter 14: Flexible Measures-Classifying Inputs and Outputs in DEA", in **Modelling Data Irregularities and Structural Complexities in Data Envelopment Analysis**, W. Cook and J. Zhu, Editors, Springer Science, Boston, 2007, (with J. Zhu)

5. "Qualitative Data in Data Envelopment Analysis", **Handbook on DEA**, W. W.Cooper, L. Seiford, and J. Zhu, Editors, Kluwer Publishers, 2003. (19)

6. "Financial Liberalization and Efficiency in the Banking Industry in Tunisia", **Proceedings of the Colloquium 'Ouverture et Developpment Economique'**, Tunis, 2000 (with M. Hababou).(14)

7. "Modelling Ordinal Preferences and Consensus," Invited National paper, **Proceedings of the IFORS Conference**, Athens, 1990 (with M. Kress and L. Seiford).

8. "The Analytic Hierarchy Process: Structure of the Problem and its Solutions", in **Systems and Management Science by Extremal Methods**, Kluwer Academic Publishers, Boston, 1992 (with J. Barzilai and B. Golany). (20)

9. "Rating Players in a Tournaments; An mth Generation Approach", in **Systems and**

**Management Science by Extremal Methods**, Kluwer Academic Publishers, Boston, 1992 (with M. Kress). (3)

10. "On the Measurement of the Relative Efficiency of a set of Decision Making Units", in **Studies in X-Efficiency**, University of Michigan Press, 1990, edited by K. Weirmair & M. Pearlman (with Y. Roll & A. Kazakov).

11. "Problems with Ordinal Data and Multiple Criteria", in **Complex Location Problems: Interdisciplinary Approaches**, Edited by B. Massam, Inst. for Social Research, York U. (Jan./88).

12. "Pavement Performance Prediction and Risk Modelling in Rehabilitation Budget Planning: A Markovian Approach", **Proceedings 2nd North American Conference on Managing Pavements**, Toronto, Vol. 2, 1987, pp. 2.63-2.75 (with A. Kazakov). (12)

13. "Recent Developments and Potential Future Directions in Ranking and Optimization Procedures for Pavement Management", **Proceedings 2nd North American Conference on Managing Pavements**, Toronto, Vol. 2, 1987, pp. 2.135-2.155, (with R.L. Litton).

14. "PARS: The MTC Model for Program and Financial Planning in Pavement Rehabilitation", **Proceedings of the North American Pavement Management Conference**, March 18-21, 1985, Toronto (with R. Kher).

15. "Ordinal Ranking: A Survey", **Proceedings of the Administrative Sciences Association of Canada**, Vol. 3, Part 2, 1982, pp. 8-18 (with M. Kress and L. Seiford).

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#### **IV Submitted for Publication**

1. "Measuring 'Proper Envelopment' in DEA, submitted to **Operations Research Letters**, (with J. Storbeck).

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#### **V Conference Presentations**

Numerous presentations at national and international conferences.

#### **VI Research Grants and Contracts**

1. N.R.C. Grant (1974-1975) - \$3,500.  
Project - **Theory and Application of Games with Dependent Strategy Spaces.**
2. D.S.S. Research Contract (1974-1975) - \$2,000.

3. Project - **Models for the Optimal Assignment of Tasks to Aircraft.**  
N.R.C. Grant (1975-1976) - \$6,500.
4. Project - **Multiple Criteria Decisions Models: Competitive and Non-Competitive.**  
N.R.C. Grant (1976-1977) - \$9,000.
5. Project - **Models for Multiple Criteria Decision Making.**  
N.R.C. Grant (1977-1978) - \$11,000.
6. Project - **Multiple Goal Decision Models - Theory and Applications.**  
Department of National Defence Research Contract (1977-1978) - \$1,000.  
Project - **An Allocation Model for Optimal Distribution of Search and Rescue Resources with Respect to Air and Marine Cases.**
7. Ontario Ministry of Transportation and Comm. Research Contract (1977-1978) - \$13,000.  
Project - **A Financial Planning Model for Highway Rehabilitation.**
8. Transport Canada Research Contract (1977-1978) - \$4,750.  
Project - **An Evaluation of Models for Measuring the Impact of Navigation Season Extension of the Great Lakes/Saint Lawrence Seaway (with G.C. Shaw).**
9. NSERC Grant (1978-1978) - \$13,200.  
Project - **Multiple Goal Decision Models - Theory and Applications.**
10. Ontario Ministry of Transportation and Comm. Research Contract (1978-1979) - \$15,000.  
Project - **A Financial Planning Model for Highway Rehabilitation (continuation).**
11. NSERC Grant (1979-1982 - (3 year grant)) - \$52,500.  
Project - **Multiple Goal Decision Models - Theory and Applications.**
12. Ontario Ministry of Transportation and Comm. Research Contract (1980-1981) - \$19,400.  
Project - **Implementation of a Priority Analysis for Rehabilitation Strategies System (PARS) (continuation).**
13. Transport Canada/Dominion Marine Ass./CTC Research Contract (1980-1981) - \$40,000.  
Project - **An Analysis of Great Lakes Shipping Needs to the Year 1990 (with G.C. Shaw).**
14. Ontario Ministry of Transportation and Comm. Research Contract (1981-1982) - \$21,000.  
Project - **Implementation of a Priority Analysis for Rehabilitation Strategies Systems (PARS) (continuation).**
15. President's NSERC Support Grant (1979) - \$2,200.  
Project - **Capital for Purchase of Computer Terminal.**
16. President's NSERC Support Grant (1982-1983) - \$2,500.  
Project - **Purchase of Apple Computer.**
17. NSERC Grant (1982-1983 - 1 year grant)) - \$21,500.  
Project - **Multiple Goal Decision Models - Theory and Applications.**
18. Ontario Ministry of Transportation & Comm. Research Contract (1982-1983) - \$50,000.  
Project - **Implementation of PARS.**

19. University of Toronto/York University Joint Program in Transportation Grant (1982-1983) - \$23,000.  
Project - **Transport Pricing and Scheduling Strategies** (with G.C. Shaw and S. Warner).
20. University of Toronto/York University Joint Program in Transportation Grant (1983-1984) - \$12,000.  
Project - **An Investigation of the Importance of Fleet Size in Improving the Utilization of Canadian Dry-Bulk Vessels on the Great Lakes** (with G.C. Shaw).
21. Ontario Ministry of Transportation & Comm. Research Contract - (1983-1984) - \$32,000.  
Project - **PARS Improvements: Part I.**
22. Ont. Ministry of Trans. & Comm. Research Contract (1983-1984) - \$20,000.  
Project - **PARS Improvements: Part II.**
23. NSERC Grant (1983-1986) - \$94,200.  
Project - **Multiple Goal Decision Models - Theory and Applications.**
24. NSERC Grant (1986-1989) - \$120,000.
25. NSERC Grant (1989-1992) - \$124,500.
26. NSERC Grant (1992-1996) - \$120,000.
27. NSERC Grant (1996-2001) - \$160,000.
28. CRD Grant (1996-1999) - \$450,000. (Funded jointly by NSERC and the Canadian Imperial Bank of Commerce) Project: "Productivity Modelling and Forecasting, and Delivery Configuration in Bank Branch Networks."  
  29. NSERC Grant (2001-2006) - \$275,000.
  30. NSERC Grant (2006-2009) – \$90,000