Lawrence M. Seiford

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EDUCATION

Ph.D., 1977, The University of Texas, Austin, Texas

M.A., 1972, The University of Texas, Austin, Texas

B.A., 1969, The University of St. Thomas, Houston, Texas

PROFESSIONAL EXPERIENCE

Goff Smith Co-Director of the Tauber Institute for Global Operations, *The University of Michigan*, Ann Arbor, MI, 2010 to present.

Program Director and Faculty Advisor for Engineering Global Leadership Honors Program, *The University of Michigan*, Ann Arbor, MI, 2011 to present.

Professor of Industrial and Operations Engineering, *The University of Michigan*, Ann Arbor, MI, Department of Industrial and Operations Engineering, 2000 to present.

Visiting Professor, *The University of Auckland*, Auckland, New Zealand, Department of Engineering Science, 2010 and 2016.

Department Chair of Industrial and Operations Engineering, *The University of Michigan*, Ann Arbor, MI, Department of Industrial and Operations Engineering, 2000 to 2009.

Program Director for Operations Research and Production Systems, *National Science Foundation*, Arlington, VA, Division of Design, Manufacture, and Industrial Innovation, 1997 to 2000.

Professor of Mechanical and Industrial Engineering, *The University of Massachusetts*, Amherst, MA, Department of Mechanical and Industrial Engineering, (Associate Professor, 1986–1991); **Adjunct Professor of Management**; **Adjunct Professor of Mathematics**; 1986 to 2000.

Associate Professor of Operations Research, Statistics, and Information Systems, *The University of Texas*, Austin, TX, Graduate School of Business, (Assistant Professor, 1980–1983; on leave 1986–1988), 1983 to 1988.

Assistant Professor of Operations Research and Statistics, *The University of Kansas*, Lawrence, KS, School of Business, 1979–1980.

Post-Doctoral Fellow, *York University*, Toronto, Ontario, Faculty of Administrative Studies, 1977–1979. Conducted research and taught graduate courses in management science.

Research Associate, *The University of Texas*, Austin, TX, Center for Cybernetic Studies, 1977. Conducted research in the areas of information-theoretic statistical estimation, mathematical programming and game theory.

Assistant or Extension Instructor, *The University of Texas*, Austin, TX, Department of Mathematics, 1970–1976. Taught courses in College Algebra, Trigonometry, Precalculus, Calculus, Probability and Linear Programming.

Consultant, *Land Value Dynamics*, Houston, TX, 1970. Developed computer programs for the analysis of income property which LVD marketed. Provided technical assistance to the programming staff.

Mathematics Teacher, *Jefferson Davis High School*, Houston, TX, Spring, 1970. Taught high school students.

Technical Specialist, *Academy Computing Corporation*, Houston, TX, 1968–1970. Member of technical support group. Instructed customer classes in Programming Languages and System Commands. Trained machine operators in procedures and controls.

EDITORIAL POSITIONS

Associate Editor *Operations Research* (2000—present)

Editorial Board *The Mathematica Journal* (1992—present)

Editorial Board *American Journal of Operations Research* (2011—present)

Editorial Board *Journal of Modelling in Management (JM2)* (2014—present)

Senior Editor *The DEA Journal* (2010—2014)

Associate Editor *Journal of Productivity Analysis* (1991—2011)

Advisory Editor *Global Management Research* (2003—2006)

Editorial Board *Health Care Management Science* (1997—2005)

Area Editor *Interfaces* (1999—2004)

Editor-in-Chief *OMEGA, the International Journal of Management Science* (2000—04)
Past Editor-in-Chief and Editorial Advisory Board (2004—present)

Associate Editor *OR Letters* (1997—2000)

Editor Special Issue of *Annals of Operations Research*

Editor Special Issue of *OMEGA, The International Journal of Management Science* (Vol. 41, No. 1, 2013) on *Data Envelopment Analysis: The Research Frontier*

Editor Special Issue of *INFOR* (Vol. 36, No. 3) on *Performance Evaluation and Benchmarking*

Editor Special Issue of *Studies in Regional and Urban Planning*

Editor Special Issue of *European Journal of Operational Research*

Associate Editor *INFOR: Information Systems and Operational Research*

Technical Manuscript Reviewer: Addison-Wesley, Inc., Duxbury Press, Elsevier, Harcourt Brace Jovanovich, Inc., D. C. Heath and Company, Richard D. Irwin Inc., McGraw Hill, Kluwer Academic Publishers, Charles E. Merrill Publishing Co., Morgan Kaufman, Prentice Hall, Random House, and Springer.

Technical Reviewer: National Science Foundation:
Division of Social and Economic Science
— Decision, Risk, and Management Science Program
Division of Design, Manufacture, and Industrial Innovation
— Operations Research
— Production Systems
— Manufacturing Enterprise Systems
— Service Enterprise Engineering Programs
Division of Civil, Mechanical and Manufacturing Innovation
— Operations Engineering Program

Referee for numerous journals; a partial list of the most frequent refereeing requests includes: *Decision Sciences, European Journal of Operational Research, Health Care Management Science, IIE Transactions, INFOR, International Journal of Computer and Information Sciences, International Journal of Game Theory, Journal of Econometrics, Journal of Mathematical Analysis and Applications, Journal of the Operational Research Society, Journal of Optimization Theory and Applications, Management Science, Mathematical Programming, Mathematics of Operations Research, OMEGA, the International Journal of Management Science, Operations Research, Operations Research Letters, Socio-Economic Planning Sciences.*

ADMINISTRATIVE EXPERIENCE and SERVICE

Goff Smith Co-Director of The Tauber Institute for Global Operations, The University of Michigan, 2010 to present.

Program Director and Faculty Advisor, Engineering Global Leadership Honors Program, The University of Michigan, 2011 to present.

Chair, Department of Industrial and Operations Engineering, The University of Michigan, 2000–2009.

Member of Board of Directors, Seth Bonder Foundation, 2012 to present.

Chair, Industry Academic Collaborations Committee , Institute for Operations Research and the Management Sciences (INFORMS), 2018 to present.

Committee of Visitors, External Review Committee, Directorate of Engineering, National Science Foundation, 2019.

External Review Committee, Department of Industrial Engineering, University of Southern California, 2015.

External Review Committee, Department of Management Sciences, University of Waterloo, 2011.

Panel Chair, Aalto University Research Assessment, Helsinki, Finland, 2009

External Review Committee, Department of Industrial Engineering, University of Washington, 2008.

External Review Committee, Department of Mechanical and Industrial Engineering, University of Toronto, 2007.

External Review Committee, Centre of Excellence Programme, Academy of Finland, Helsinki, Finland, 2006.

External Review Committee, IEOR Department, UC Berkeley, 2005.

External Review Committee, Department of Management Sciences, University of Waterloo, 2005.

Chair, Membership and Member Services Committee, Institute for Operations Research and the Management Sciences (INFORMS), 1999–2004.

Interim Director, Finanical Engineering Program, The University of Michigan, October 2002–August, 2003.

External Review Committee, Department of Industrial Engineering, University of Minnesota, 2002.

Program Director, Operations Research and Production Systems Programs, National Science Foundation, 1997–2000.

Founder and Director of Systems Quality and Productivity Laboratory, University of Massachusetts, 1990–2000.

Engineering Management Graduate Program Coordinator, College of Engineering, University of Massachusetts, 1986–1995.

Founder and Co-director of Systems Modeling Laboratory, University of Massachusetts, 1986–1997.

Chair, Personnel Committee, Industrial Engineering and Operations Research, University of Massachusetts, 1991–1993.

Graduate Program Director, Industrial Engineering and Operations Research, University of Massachusetts, 1991–1992.

Area Coordinator, Statistics, Operations Research and Information Systems, College of Business Administration, University of Texas.

DPA 310 Coordinator, Department of MSIS, University of Texas (director of laboratory and coordinator of 16 sections, 1500 students per semester, Introduction to Management Information Systems course).

AWARDS AND HONORS

Fellow, Institute for Operations Research and the Management Sciences (INFORMS).

Fellow, Institute of Industrial Engineers (IIE).

Fellow, American Society for Quality (ASQ) .

The Albert G. Holzman Distinguished Educator Award, Institute of Industrial Engineers (IIE) (2014).

Doctor Honoris Causa, Université de la Méditerranée Aix-Marseille (2000).

Lilly Faculty Mentor, University of Massachusetts (1999).

Outstanding Advisor Award, College of Engineering and Joint Student Engineering Societies , University of Massachusetts, (1997).

Nominated for the **University Distinguished Teaching Award**, University of Massachusetts, 1994, 1995, 1996, 1997, and 1998.

General Electric Outstanding Teaching Award, College of Engineering, University of Massachusetts (1990).

Lilly Endowment Teaching Fellow, University of Massachusetts (1987-88).

Nominated for the **College of Business Administration Foundation Award for Teaching Innovation**, University of Texas (1986).

College of Business Administration Foundation Award for Research Excellence, University of Texas (1984).

Founding Member of Omega Rho, University of Texas Chapter and University of Massachusetts Chapter.

Canadian National Research Council Post-Doctoral Fellowship

PROFESSIONAL SOCIETY MEMBERSHIPS

Institute of Industrial Engineers (IIE)
Institute for Operations Research and the Management Sciences (INFORMS)
American Society for Quality (ASQ)
Production and Operations Management Society (POMS)
MSOM Society of (INFORMS)
Health Applications Society of (INFORMS)
Optimization Society of (INFORMS)
Multiple Criteria Decision Making Section of (INFORMS)
Quality, Statistics and Reliability Subdivision of (INFORMS)
Service Science Section of (INFORMS)
Sigma Xi
Productivity Analysis Research Network (PARN)
American Society for Engineering Education (ASEE)

TEACHING EXPERIENCE

The following course titles reflect a variety of disciplines that I have taught at both graduate and undergraduate levels of instruction in environments ranging from seminars to large auditorium classes. The courses span Operations Managment, Quality Engineering, Engineering Economics, Mathematics, Decision Theory, and MIS.

Benchmarking, Productivity, and Performance Measurement; Business Statistics; Calculus; Computer Programming; Decision Analysis; Deterministic Models in OR; Economic Decision Making; Engineering Economy; Introduction to Computer Graphics; Introductory Statistics for Business; Integer Programming; Linear Programming; Management Information Systems; Management Science; Managerial Decision Making; Microcomputers for Management; Operations Research; Principles of Operations Research for Management; Probability and Statistics for Engineers; Quality Control and Reliability; Quantitative Decision Making; Robust Design; Statistical Process Control; Stochastic Models in OR.

RESEARCH FUNDING

My research support has been provided by a number of organizations ranging from government agencies to private industry. Over the years my involvement with industry has provided interesting problems that focused my development of applications-driven theory. When possible I have encouraged direct student involvement/support with industry sponsors, including having my graduate students develop and submit proposals for research projects directly to industry.

Agency for Health Care Policy Research, Washington, DC; Alceon Corporation, Cambridge, MA; Canadian Imperial Bank of Commerce, Toronto, Ontario; Center for Operations Research and Economics (CORE), Belgium; Davidson Instrument Panel TEXTRON, Dover, NH; Friendly's Ice Cream, Springfield, MA; Graduate School, University of Massachusetts; IBM, Austin, TX; IBM, White Plains, NY; Massachusetts Department of Public Works, Boston, MA; Metrica, Inc., San Antonio, TX; Ministry of Transportation, Province of Ontario, Canada; MRCA Information Services, Stamford, CT; Natural Sciences and Engineering Research Council of Canada; National Science Foundation, Arlington, VA ; National Technical University, Fort Collins, CO; Planmatics, Inc., Rockville, MD; Raytheon Corporation, Boston, MA; Seton Hospital, Austin, TX; Southland Corporation, Dallas, TX; Surgeon General's Office, USAF, Washington, DC; Synchronous Performance, Clifton, VA; The Magellan Group, Austin, TX; U. S. Air Force, Air Mobility Command, Scott AFB, St Louis, MO; U. S. Army Natick RD&E Center, Natick, MA; Union College, Schenectady, NY; University of Massachusetts System, Boston, MA; University of Michigan, Ann Arbor, MI; Wolfram Research, Inc., Champaign, IL; York University, Toronto, Ontario

RESEARCH PUBLICATIONS

Books:

Calculus II: A Correspondence Course, Extension Teaching and Field Service Bureau, The University of Texas, Austin,TX, 1975.

Proceedings of the First Industrial Engineering Research Conference, Institute of Industrial Engineers, Chicago, May 20-21, 1992. (with G.-A. Klutke, D. Mitta and B. Nnaji)

Data Envelopment Analysis: Theory, Methodology and Applications, Kluwer Academic Press, Boston, 1994. (with A. Charnes, W.W. Cooper, and Arie Y. Lewin)

Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References and DEA-Solver Software, Kluwer Academic Publishers, Boston, 2000. (with W.W. Cooper, and K. Tone)

Handbook on Data Envelopment Analysis, Kluwer Academic Publishers, Boston, 2004. (with W.W. Cooper, and Joe Zhu)

Introduction to Data Envelopment Analysis and Its Uses with DEA-Solver Software and References, Springer, New York, 2006. (with W.W. Cooper, and K. Tone)

Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References and DEA-Solver Software, Second Edition, Springer, New York, 2007. (with W.W. Cooper, and K. Tone)

Book Chapters:

"Gradient States for Some Dualities with the C^2 Extremal Principle," in *Quantitative Planning and Control,* (Y. Ijiri and A. Whinston, eds.), Academic Press, New York, 1979. (with A. Charnes)

"Multistage Decision Problems with Multicriteria," in *Multiple Criteria Analysis: Operational Methods,* (P. Nijkamp and P. Spronk, eds.) Gower Publishing Co. Ltd., Hampshire, England, 1981. (with P. L. Yu)

"Benchmarking Programming Languages," in *Encyclopedia of Microcomputers,* (A. Kent and J. Williams, eds.), Marcel Dekker, New York, 1988. (with Richard S. Barr)

"Foundations of Data Envelopment Analysis for Pareto-Koopmans Efficient Empirical Production Functions," in *New Approaches to Modeling, Specification Selection and Econometric Inference,* (William A. Barnett and A. Ronald Gallant, eds.), Cambridge University Press, 1989. (with A. Charnes, W. W. Cooper, B. Golany and J. Stutz)

"Contributions of Abraham Charnes to the Area of Statistical Analysis," in *Systems and Management Science by Extremal Methods,* (A. Ben-Israel, A. Ben-Tal, B. Golany, K. Kortanek and J. Rousseau, eds.), Kluwer Academic Publishers, The Netherlands, 1991. (with Patrick Brockett)

"Sensitivity of DEA to Models and Variable Sets in a Hypothesis Test Setting: The Efficiency of University Operations," *Creative and Innovative Approaches to the Science of Management,* (Yuji Ijiri, editor), Quorum Books, New York, 1993. (with T. Ahn)

"The Mathematical Programming Approach to Efficiency Measurement" in *The Measurement of Productive Efficiency: Techniques and Applications,* H. Fried, K. Lovell, and S. Schmidt, editors, Oxford University Press, Oxford, 1993. (with I. Ali)

"An Envelopment-Analysis Approach to Measuring the Managerial Quality of Banks," in *Financial Engineering,* H. Konno, D.G. Luenberger, and J.M. Mulvey, editors, AOR(45), J.C. Baltzer AG, 1993. (with R.S. Barr and T.F. Siems)

"A DEA Bibliography (1978–1992)," in *Data Envelopment Analysis: Theory, Methodology and Applications,* A. Charnes, W.W. Cooper, Arie Y. Lewin, and Lawrence M. Seiford, editors, Kluwer Academic Press, Boston, 1994.

From Efficiency Calculations to a New Approach for Organizing and Analyzing Data: Data Envelopment Analysis Fifteen Years Later, Baltzer Sciewnce Publishers, Netherlands, 1997. (with Arie Y. Lewin)

"Panorama de DEA: LA methode pour mesurer la performance dans le secteur des services," in *La Methode DEA: analyse des performances,* P.-Y. Badillo and J.C. Paradi, editors, Hermes, Paris, 1999. (in French)

"Data Envelopment Analysis: theorie, methodologiy et applications," in *La Methode DEA: analyse des performances,* P.-Y. Badillo and J.C. Paradi, editors, Hermes, Paris, 1999. (in French) (with A. Charnes, W.W. Cooper, and A.Y. Lewin)

"Data Envelopment Analysis: Twenty Years Out." in *Data Envelopment Analysis in the Service Sector,* G. Westermann, editor, Gabler, Leverkusen, Germany, 1999.

"Classification Invariance in Data Envelopment Analysis," in *Uncertainty and Optimality: Probability, Statistics & Operations Research,* J.C. Misra, editor, World Scientific, Singapore, 2002. Chapter 10, pp. 331-342. (with Joe Zhu)

"Data Envelopment Analysis: History, Models and Interpretations," in *Handbook on Data Envelopment Analysis,* W.W. Cooper, L.M. Seiford and J. Zhu, editors, Chapter 1, pp. 1-39, Kluwer Academic Publishers, Boston. 2004. (with W.W. Cooper and Joe Zhu)

"Returns to Scale in DEA," in *Handbook on Data Envelopment Analysis,* W.W. Cooper, L.M. Seiford and J. Zhu, editors, Chapter 2, pp. 41-73, Kluwer Academic Publishers, Boston. 2004. (with R.D. Banker, W.W. Cooper, and Joe Zhu)

"Sensitivity Analysis in DEA," in *Handbook on Data Envelopment Analysis,* W.W. Cooper, L.M. Seiford and J. Zhu, editors, Chapter 3, pp. 75-97, Kluwer Academic Publishers, Boston. 2004. (with W.W. Cooper, Shanling Li, and Joe Zhu)

"Congestion: Its Identification and Management with DEA," in *Handbook on Data Envelopment Analysis,* W.W. Cooper, L.M. Seiford and J. Zhu, editors, Chapter 7, pp. 177-201, Kluwer Academic Publishers, Boston. 2004. (with W.W. Cooper, H. Deng, and Joe Zhu)

"Data Envelopment Analysis: The Research Frontier - Special Issue dedicated to the memory of William W. Cooper 1914-2012," *Omega, The International Journal of Management Science,* Volume 41, Issue 1, Pages 1-158 (January 2013). (with Wade D. Cook and Joe Zhu)

"Benchmarking Using Data Envelopment Analysis: Application to Stores of a Post and Banking Business,? in *Multiple Criteria Decision Making and Aiding,* edited by Sandra Huber, Martin Josef Geiger and Adiel T. de Almeida, International Series in Operations Research and Management Science 274, Springer, Switzerland, 2019. (with A. Raith and P Rouse)

Refereed and Invited Publications:

"Extremal Principles and Optimization Dualities for Khinchin–Kullback–Leibler Estimation," *Mathematische Operationsforschung und Statistic, Series Optimization ,* Vol. 9, No. 1, 1978. (with A. Charnes and W. W. Cooper)

"Priority Ranking and Consensus Formation," *Management Science,* Vol. 24, No. 16, 1978. (with W. D. Cook)

"Complements, Mollifiers and the Propensity to Disrupt," *International Journal of Game Theory,* Vol. 17, Issue 1, 1979. (with A. Charnes and J. Rousseau)

"Potential Solutions of Linear Systems: The Multi-Criteria Multiple Constraint Levels Program," *Journal of Mathematical Analysis and Applications,* Vol. 69, No. 2, 1979. (with P. L. Yu)

"Production Runs for Multiple Products: The Full Capacity Heuristic," *Journal of the Operational Research Society,* Vol. 31, No. 5, 1980. (with W. D. Cook and A. Saipe)

"Models for Optimal Project Grouping in Highway Maintenance," *International Journal of Urban Systems,* Vol. 31, No. 5, 1980. (with W. D. Cook)

"On the Borda-Kendall Consensus Method for Priority Ranking Problems," *Management Science,* Vol. 28, No.6, 1982. (with W. D. Cook)

"Priority Ranking and Consensus Formation: The Case of Ties," *Management Science,* Vol. 28, No. 6, 1982. (with R. Armstrong and W. D. Cook)

"Mollifiers for Games in Normal Form and the Harsanyi-Selten Valuation Function," *International Journal of Game Theory,* Vol. 11, Issue 3/4, 1982. (with A. Charnes and J. Rousseau)

"Scheduling Production Runs for N Products on a Single Machine: A Coverage Model," *Cahiers du Centre d'Etude de Recherche Opérationnelle,* Vol. 24, No. 1, 1982. (with W. D. Cook and A. Saipe)

"R & D Project Selection in a Multidimensional Environment: A Practical Approach," *Journal of the Operational Research Society,* Vol. 33, No. 5, 1982. (with W. D. Cook)

"Priority Rankings and Minimal Disagreement: A Weak Ordering Model," *R.A.I.R.O Recherche opérationnelle/Operations Research,* Vol. 16, No. 4, 1982. (with R. D. Armstrong, W. D. Cook and M. T. Kung)

"A Multiplicative Model for Efficiency Analysis," *Socio-Economic Planning Sciences,* Vol. 16, No. 5, 1982. (with A. Charnes, W. W. Cooper, and J. Stutz)

"Ordinal Ranking and Consensus Measures: A Survey," *Management Science/ Recherche Opérationnelle,* Vol. 3, Part 2, 1982. (with W. D. Cook and M. Kress)

"The Geometry of Rank-Order Tests," *The American Statistician,* Vol. 37, No. 4, 1983. (with W. D. Cook)

"Preference Ranking Models: Conditions for Equivalence," *Journal of Mathematical Sociology,* Vol. 9, 1983. (with W. D. Cook and S. L. Warner)

"Invariant Multiplicative Efficiency and Piecewise Cobb-Douglas Envelopments ," *Operations Research Letters,* Vol. 2, No. 3, August, 1983. (with A. Charnes, W. W. Cooper, and J. Stutz)

"Pareto-Optimality, Efficiency Analysis and Empirical Production Functions, *Proceedings of the RGK Foundation Economic Conference,* May 1984. (with A. Charnes, W. W. Cooper, B. Golany, and J. Stutz)

"An Ordinal Ranking Model for the Highway Corridor Selection Problem," *Computers, Environment and Urban Systems,* Vol. 9, No. 4, 1984. (with W. D. Cook)

"Foundations of Data Envelopment Analysis for Pareto-Koopmans Efficient Empirical Production Functions," *Journal of Econometrics,* Vol. 30, No. 1/2, 1985. (with A. Charnes, W. W. Cooper, B. Golany and J. Stutz)

"An Axiomatic Approach to Distance on Partial Orderings," *R.A.I.R.O. Recherche opérationnelle/Operations Research,* Vol. 20, No. 2, 1986. (with W. D. Cook and M. Kress)

"Information and Preference in Partial Orders: A Bimatrix Representation," *Psycometrika,* Vol. 51, No. 2, 1986. (with W. D. Cook and M. Kress)

"Linear Programming and l_1 Regression: A Geometric Interpretation," *Computational Statistics and Data Analysis,* Vol. 5, No. 4, 1987. (with J. Brennan)

"A DSS for Managing EEO/Affirmative Action Requirements," *Journal of Information and Optimization Sciences,* Vol. 9, No. 2, 1988. (with B.E. Graham-Moore)

"Computer Personalities: A New approach to User Compatibility," *Journal of Business and Psychology,* Vol. 3, No. 1, 1988. (with John M. Penrose, Jr.)

"Microcomputer Users' Preferences for Software Documentation: An Analysis," *Journal of Technical Writing and Communication,* Vol. 18, No. 4, 1988. (with John M. Penrose, Jr.)

"Models, Extensions, and Applications of Data Envelopment Analysis," *Computers, Environment, and Urban Systems,* Vol. 14, No. 2, 1990.

"Translation Invariance in Data Envelopment Analysis," *Operations Research Letters,* Vol. 9, No. 5, 1990. (with A.I. Ali)

"Recent Developments in DEA: The Mathematical Programming Approach to Frontier Analysis," *Journal of Econometrics,* Vol. 46, 1990. (with R. Thrall)

"Strict vs Weak Ordinal Relations for Multipliers in Data Envelopment Analysis," *Management Science,* Vol. 37, No. 6, 1991. (with A.I. Ali and W.D. Cook)

"A Data Envelopment Approach to Measuring Relative Efficiency: Case Analysis of Highway Maintenance Patrols," *Journal of Socio-Economics,* Vol 20, No. 1, 1991. (with W.D. Cook, A. Kazakov and Y. Roll)

"Modeling Ordinal Preferences and Consensus," in *Operational Research '90,* (Hugh Bradley, ed.), Pergamon Press, Oxford, 1991. (with W.D. Cook and M. Kress)

"Transient Behavior of Tandem Queues: Finite Capacity Systems with Blocking," *International Journal of Systems Science,* Vol. 22, No. 11, 1991. (with G.-A. Klutke)

"Prioritization Models for Frontier Decision Making Units in DEA," *European Journal of Operational Research,* Vol. 59, No. 2, 1992. (with W.D. Cook and M. Kress)

"Data Envelopment Analysis: Learning from Outliers," *Proceedings of the First Industrial Engineering Research Conference,* Chicago, May 20-21, 1992

"Computational Accuracy and Infinitesimals in Data Envelopment Analysis," *INFOR,* Vol. 31, No. 4, 1993. (with A.I. Ali)

"On the Use of Ordinal Data in Data Envelopment Analysis," *Journal of the Operational Research Society,* Vol. 44, No. 2, 1993. (with W. D. Cook and M. Kress)

"An Envelopment-Analysis Approach to Measuring the Managerial Quality of Banks," *Annals of Operations Research,* Vol. 45, 1993, pp. 1-19. (with R. Barr and T. Siems)

"Forecasting Bank Failure: A Non-parametric Frontier Estimation Approach," *Recherches Economiques de Louvain,* Vol. 40, No. 4, 1994, pp. 417-429. (with R. Barr and T. Siems)

"Components of Efficiency Evaluation in Data Envelopment Analysis," *European Journal of Operational Research,* Vol. 80, No. 3, 1995, pp. 462-473. (with A.I. Ali and C. Lerme)

"Data Envelopment Analysis in the Presence of Both Quantitative and Qualitative Data," *Journal of the Operational Research Society,* Vol. 47, No. 7, 1996, pp.945-953. (with W. D. Cook and M. Kress)

"A General Framework for Distance–Based Consensus in Ordinal Ranking Models," *European Journal of Operational Research,* Vol. 96, No. 2, 1996, pp. 392-397. (with W.D. Cook and M. Kress)

"Data Envelopment Analysis: The Evolution of the State-of-the-Art (1978–1995)," *Journal of Productivity Analysis,* Vol. 7, No. 2/3, 1996, pp. 99-137.

"Extending the Frontiers of Data Envelopment Analysis," *Annals of Operations Research,* Vol. 73, 1997, pp. 1-11. (with A.Y. Lewin)

"A Bibliography for Data Envelopment Analysis (1978-1996)," *Annals of Operations Research,* Vol. 73, 1997, pp. 393-438.

"Identifying Excesses and Deficits in Chinese Industrial Productivity (1953-1990): A Weighted Data Envelopment Analysis Approach," *Omega-International Journal of Management Science,* Vol. 26, No. 2, 1998, pp. 279-296. (with Joe Zhu)

"Sensitivity Analysis of DEA Models for Simultaneous Changes in All the Data," *Journal of the Operational Research Society,* Vol. 49, No. 10, 1998, pp. 1060-1071. (with Joe Zhu)

"Identifying Excesses and Deficits in Chinese Industrial Productivity (1953-1990): A Weighted Data Envelopment Analysis Approach (Correction)," *Omega-International Journal of Management Science,* Vol. 26, No. 6, 1998, pp. 786. (with Joe Zhu) [Seiford misspelled as Seifert]

"On Piecewise Loglinear Frontiers and Log Efficiency Measures," *Computers & Operations Research,* Vol. 25, No. 5, 1998, pp. 389-395. (with Joe Zhu)

"Market Entity Behavior of Chinese State-Owned Enterprises," *Omega-International Journal of Management Science,* Vol. 26, No. 2, 1998, pp. 263-278. (with S.C. Ray and Joe Zhu)

"Stability Regions for Maintaining Efficiency in Data Envelopment Analysis," *European Journal of Operational Research,* Vol. 108, No. 1, 1998, pp. 127-139. (with Joe Zhu)

"On Alternative Optimal Solutions in the Estimation of Returns to Scale in DEA," *European Journal of Operational Research,* Vol. 108, No. 1, 1998, pp. 149-152. (with Joe Zhu)

"An Acceptance System Decision Rule With Data Envelopment Analysis," *Computers & Operations Research,* Vol. 25, No. 4, 1998, pp. 329-332. (with Joe Zhu)

"Infeasibility of Super-Efficiency Data Envelopment Analysis Models," *INFOR,* Vol. 37, No. 2, 1999, pp. 174-187. (with Joe Zhu)

"Data Envelopment Scenario Analysis for Setting Targets to Electricity Generating Plants," *European Journal of Operational Research,* Vol. 115, No. 3, 1999, pp. 413-428. (with A.D. Athanassopoulos and N. Lambroukos)

"An Investigation of Returns to Scale in Data Envelopment Analysis," *Omega-International Journal of Management Science,* Vol. 27, No. 1, 1999, pp. 1-11. (with Joe Zhu)

"Sensitivity and Stability of the Classifications of Returns to Scale in Data Envelopment Analysis," *Journal of Productivity Analysis,* Vol. 12, No. 1, 1999, pp. 55-75. (with Joe Zhu)

"Characteristics on Stochastic DEA Efficiency - Reliability and Probability of Being Efficient," *Journal of Operations Research Society of Japan,* Vol. 42, No. 4, 1999, pp. 389-404. (with H. Morita)

"Profitability and Marketability of the Top 55 US Commercial Banks," *Management Science,* Vol. 45, No. 9, (1999), pp. 1270-1288. (with Joe Zhu)

"Preface," in *La Methode DEA: analyse des performances,* P.-Y. Badillo and J.C. Paradi, editors, Hermes, Paris, 1999. (in French)

"A Unified Additive Model Approach for Evaluating Inefficiency and Congestion with Associated Measures in DEA," *Socio-Economic Planning Sciences,* Vol. 34, No. 1, (2000) pp. 1-25. (with W.W. Cooper and Joe Zhu)

"Sensitivity and Stability Analysis in DEA: Some Recent Developments," *Journal of Productivity Analysis,* Vol. 15, (2001), pp. 217-246. (with W.W. Cooper, S. Li, R.M. Thrall and Joe Zhu)

"Slacks and Congestion: Response to a Comment by R. Fare and S. Grosskopf," *Socio-Economic Planning Sciences,* Vol. 35, No. 3, (2001), pp. 205-215. (with W.W. Cooper and Joe Zhu)

"GOALI: A National Science Foundation University–Industry Liaison Program," *INTERFACES,* Vol. 32, No. 2, (2002), pp. 56-62. (with L. Martin-Vega and D. Senich)

"Modeling Undesirable Factors in Efficiency Evaluation," *European Journal of Operational Research,* Vol. 142, (2002), pp. 16-20. (with Joe Zhu)

"Value Judgment versus Allocative Efficiency: A Case of Tennessee County Jails," *Journal of Management Sciences and Regional Development,* Issue 4, (2002), pp. 89-98. (with Joe Zhu)

"Context-dependent Data Envelopment Analysis: Measuring Attractiveness and Progress," *OMEGA,* Vol. 31, Issue 5, (2003), pp. 397-480. (with Joe Zhu)

"Returns to Scale in Different DEA Models," *European Journal of Operational Research,* Vol. 154, (2004), pp. 345-362. (with Banker, R.D., W.W. Cooper, R.M. Thrall and Joe Zhu)

"Models for Performance Benchmarking: Measuring the Effect of e-commerce Activities on Banking Performance," *OMEGA,* Vol. 32, Issue 4 (2004), pp. 313-322. (with W. Cook and Joe Zhu)

"DEA and its uses in different countries," *European Journal of Operational Research,* Vol 154, Issue 2, 16 April 2004, pp. 337-344. (with W. Cooper, E. Thanassoulis, and S. Zanakis)

"A Response to Comments on Modeling Undesirable Factors in Efficiency Evaluation," *European Journal of Operational Research,* Vol. 161, Issue 2, (2005), pp. 579-581. (with Joe Zhu)

"Notes on Sensitivity and Stability of the Classifications of Returns to Scale in Data Envelopment Analysis: A Comment," *Journal of Productivity Analysis,* Vol. 23, No. 3, 2005, pp. 315-316. (with Joe Zhu)

"IFORS' Operational Research Hall of Fame: Abraham Charnes," *International Transactions in Operational Research,* Vol. 13, No. 3, 2006, pp. 273-277. (with Fred Phillips)

"Some Models and Measures for Evaluating Performances with DEA: Past Accomplishments and Future Prospects," *Journal of Productivity Analysis,* Vol. 28, No. 3 (2007), pp. 151-163. (with W. Cooper. K. Tone, and Joe Zhu)

"Data envelopment analysis (DEA) - Thirty years on," *European Journal of Operational Research,* Volume 192, Issue 1, (2009), pp. 1-17. (with Wade D. Cook)

"Data Envelopment Analysis: The Research Frontier," *Omega, The International Journal of Management Science,* Vol. 41, Issue 1, 2013, pp. 1-2. (with Wade D. Cook and Joe Zhu)

"Foreward," in *Data Envelopment Analysis in the Financial Services Industry: A Guide for Practitioners and Analysts Working in Operations Research Using DEA,* Joseph C. Paradi, H. David Sherman and Fai Keung Tam, editors, Springer, Switzerland, 2018.

Non-refereed Publications:

"A Review of PC-MATLAB," *OR/MS Today,* Vol. 12, No. 6, 1985.

"MathCAD: The Engineer's Scratchpad," *OR/MS Today,* Vol. 14, No. 2, 1987.

"Capturing and Representing Decision Processes in the Design of an Information System," *Proceedings of the* 35^{th} *Annual Meeting of the Human Factors Society,* September, 1991. (with B. Coury and S. Motte)

"Benchmarking and Performance Improvement Tools for Manufacturing and Service Processes," Proceedings of the 1995 NSF Design and Manufacturing Grantees Conference, La Jolla, CA, January, 1995.

"Benchmarking and Performance Improvement Models for Manufacturing and Service Processes," Proceedings of the 1996 NSF Design and Manufacturing Grantees Conference, Alberquerque, NM, January, 1996.

"Benchmarking and Performance Improvement Models for Manufacturing and Service Processes," Proceedings of the 1997 NSF Design and Manufacturing Grantees Conference, Seattle, WA, January, 1997.

Technical Reports:

"Foundations of Computer-Based Empirical Pareto-Optimal Efficiency Analysis," Research Report CCS 459, Center for Cybernetic Studies, The University of Texas, Austin, TX. (with A. Charnes, W. W. Cooper, B. Golany, and J. Stutz)

"A Dimensionless Efficiency Measure for Departures from Pareto-Optimality," Research Report CCS 480, Center for Cybernetic Studies, The University of Texas, Austin, Texas. (with A. Charnes, W. W. Cooper, B. Golany, and J. Stutz)

"Siting of Appropriated Fund Enlisted Dining Facilities: Problem/Model Description," Technical Report, Department of Industrial Engineering and Operations Research, University of Massachusetts, Amherst, MA. (with J. MacGregor Smith and Julie DelVecchio Smith)

"The Geometry of Mathematical Programming Models in Data Envelopment Analysis," Technical Report 88-OR-091, Department of Industrial Engineering and Operations Research, University of Massachusetts, Amherst, MA.

"The Incorporation of Ordinal Relationships Among Multipliers in Data Envelopment Analysis," Technical Report 89-OR-011, Department of Industrial Engineering and Operations Research, University of Massachusetts, Amherst, MA.

"A Bibliography of Data Envelopment Analysis (1978–1992) Version 6.0," Technical Report, Department of Industrial Engineering and Operations Research, University of Massachusetts, Amherst, MA.

"Data Envelopment Analysis: A State-of-the-Art Survey," Technical Report, Department of Industrial Engineering and Operations Research, University of Massachusetts, Amherst, MA.

"Data Envelopment Analysis Models: A Discussion," Technical Report, Department of Industrial Engineering and Operations Research, University of Massachusetts, Amherst, MA.

Work in Progress:

"A Geometric Interpretation of DEA Models: Returns to Scale and Other Implicit Assumptions," Technical Report

"Resource Reallocation in Data Envelopment Analysis," Technical Report

"Identifying Inefficient Organizational Levels Using a Multistage Data Envelopment Analysis," Technical Report

DOCTORAL DISSERTATIONS CHAIRED

Samantha Meister (Ph.D, expected completion 2021)

Warren Sutton Ph.D (2010) *Network Migration Strategies: Evaluating Performance with Extensions of Data Envelopment Analysis*, currently Research Analyst at CNA, Alexandria, VA.

Peter D. Kraus, Ph.D (1999) *Enhancements to Experimental Design Analysis Techniques*, currently Raytheon Engineering Fellow, Raytheon Integrated Defense Systems, Boston, MA

Joe Zhu, Ph.D (1998) *Productivity Modeling and Service Delivery Configuration in Bank Branches*, currently Professor of Operations Analytics, Worcester Polytechnic Institute, Worcester, MA.

Neal Mackertich, Ph.D (1998) *Virtual Process Capability*, currently Raytheon Engineering Fellow, Raytheon Integrated Defense Systems, Boston, MA

James Benneyan, Ph.D (1997) *Some Approaches to Quality in the Presence of Inspection Error: With Application to Optimal Laboratory Cancer Screening Policies* , currently Professor and Executive Director of Healthcare Systems Institute, Northeastern University, Boston, MA.

Sanford Cohn, Ph.D (1995) *A Dynamic Programming Approach to Maintenance-Inspection Models for a Single Machine Under Stochastic Deterioration*

Kathryn T. Heimerman, Ph.D (1993) *Efficient Set Relations Among Data Envelopment Analysis Models and Resource Use Efficiency in Manufacturing*, currently Data Scientist, Radiant-Blue Technologies, Alexandria, VA.

DISSERTATION COMMITTEE MEMBER

I have served as a member of numerous Dissertation Committees across a range of academic departments at the University of Michigan, the University of Massachusetts, and the University of Texas. In addition I have served as the external examiner for several dissertations at the University of Toronto.

MASTERS THESES CHAIRED

Paul Cino, M.S.; Kui Xu, M.S.; John O'Leary, M.S.; Minoo Patel, M.S.; Richard A. Strauss, M.S.; James Morrione, M.S.; Christoph Hofbeck, M.S.; Cheryl Nicholas, M.S.; Robert Sawin, M.S.; Amy Petcen, M.S.; Ramchander Sukumar, M.S.; Alejandro M. Munoz, M.S.; Ana Maria Garcia, M.S.

MASTERS PROJECTS

I have served as the Goff Smith Co-Director of the Tauber Institute for Global Operations since 2010. In this role I have been responsible for "supervising" **861 graduate students** *across* **318 projects** *(intensive 3.5 month summer team projects at industry sites) which resulted in cost savings of over* **$ 4.5 Billion** *for the sponsoring companies. In 2012, the Institute was awarded the first UPS George D. Smith Prize by INFORMS for effective and innovative preparation of students to be good practitioners of operations research, management science, or analytics. We accomplish this through a multidisciplinary action-oriented curriculum, engaged industry partners, and innovative program elements including a comprehensive set of methodical modules and workshops, facility tours, international treks, and a Leadership Speaker series paired with an annual (student-organized) Global Operations Conference.*