The Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Research Seminar

Optimal Seeding Policy under Rainfall Uncertainty

by

Prof. Jayashankar M. SWAMINATHAN
GlaxoSmithKline Distinguished Professor of Operations
Kenan-Flagler Business School
The University of North Carolina at Chapel Hill

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Time: 10:30am - 11:30am
Venue: R501, Shirley Chan Building
The Hong Kong Polytechnic University

(Conducted in English)

Abstract:

Increased agricultural productivity is often cited as a solution to the impending global food shortage problem. In this paper, we develop a model to determine the optimal seeding policy under rainfall uncertainty using a finite-horizon stochastic dynamic program. In our model, a farmer needs to decide whether to plant a seed in each period given the soil moisture. We show that the optimal planting policy is a time dependent threshold- type policy where the farmer should plant when the seed amount on hand is above the optimal threshold. This threshold is non-increasing in the soil moisture. We further extend this model to mechanization where the farmer can plant up to m (m > 1) seeds in each period. The optimal planting policy is still a time dependent plant-down-to policy. The optimal plant-down-to threshold is non-increasing in the planting capacity. Utilizing field weather data from Southern Africa, we investigate the impact of climate conditions on the relative yield advantage of the optimal planting schedule over commonly used heuristics in practice. We find that the relative yield advantage increases as the climate condition becomes more severe for planting. For a real-size planting problem, our computational study demonstrates significant relative yield advantage of the optimal planting schedule over commonly used heuristics in practice.

Bio:

Jayashankar M. Swaminathan is the GlaxoSmithKline Distinguished Professor of Operations at the Kenan-Flagler Business School, University of North Carolina (UNC) at Chapel Hill. Dr. Swaminathan has published over fifty journal articles on topics that include product variety, global supply chain management, retail, sustainability and global health operations. His edited book *Indian Economic Superpower: Fiction or Future?* focuses on the emergence of India and its implications for businesses. He has co-edited special issues on Retail Operations, Non-profit Operations for POM journal and is currently co-editing a special issue on Responsible Operations for M&SOM journal. He currently serves as a Department Editor of Management Science.

He has received numerous awards for his research including the NSF Career Award, George Nicholson Prize, Obama Singh Knowledge Initiative Award, Schwabacher Fellowship at UC Berkeley and Weatherspoon Distinguished Research and Teaching awards at UNC Chapel Hill. His articles and expert remarks have appeared in media outlets including *Financial Times, National Public Radio* and *Business Week*. He is an inducted lifetime Fellow of Production and Operations Management Society (POMS) and is a founding Department Editor of Supply Chain Management for the POM journal. He has also served as Vice President of INFORMS and MSOM society and as President of the POMS College for Supply Chain Management. Dr. Swaminathan joined Kenan-Flagler Business School, UNC as Associate Professor in 2000 where he has held many roles including the Chair of the Operations area, Associate Dean for Global EMBA programs, Director of Global Business Center and Senior Associate Dean for Academic Affairs at the school. He is one of the youngest Distinguished Professor in the history of UNC Chapel Hill. He started his academic career as an Assistant Professor at Walter A. Haas School of Business, University of California, Berkeley after his doctoral studies in Industrial Administration from GSIA (now Tepper) at Carnegie Mellon University. He obtained his bachelors degree in Computer Science and Engineering from Indian Institute of Technology, Delhi.

Please email to <u>winnie.wy.tang@polyu.edu.hk</u> for enquiries.

All are welcome!