



Lee Kong Chian
School of
Business

Operations Management Summer Camp 2014

Date: Friday, 15 August 2014

Venue: Singapore Management University
Lee Kong Chian School of Business
Level 2, Seminar Room 2.8

Programme

8.30am- 8.45am

Registration

8.45am- 9.00am

Opening Speech by Professor Howard THOMAS, Dean of Lee Kong Chian School of Business, Singapore Management University

9.00am- 10.00am

Paper 1

Presenter: Shantanu BHATTACHARYA, SMU

Discussant: Harry GROENEVELT, University of Rochester

Title: Single Sourcing versus Multisourcing: The Role of Effort Interdependence, Metric-Outcome Misalignment, and Incentive Design

Abstract:

We compare two strategies for outsourcing the development of information services projects: multisourcing and single-sourcing. We model these sourcing strategies when incentive contracts are based on a verifiable project metric that may or may not be aligned with the project outcome. We also model the interdependence of client and vendor efforts so that the verifiable metric may or may not be separable in these efforts. When the verifiable metric and the project outcome are aligned, single-sourcing performs better than multisourcing if the client and vendor efforts are interdependent, and as well as multisourcing if the efforts are independent. When the metric and outcome are misaligned: (i)

	<p>multisourcing performs better than single-sourcing if the client effort is independent of the vendor efforts; (ii) the choice of sourcing strategy is nuanced based on the trade-off between the degree of misalignment and moral hazard if the client and vendor efforts are interdependent.</p>
<p>10.00am- 10.15am</p>	<p>Tea Break @ Catering area 2A/2B, near SR 2.8, Level 2</p>
<p>10.15 am- 11.15am</p>	<p>Paper 2</p> <p>Presenter: Pascale CRAMA, SMU</p> <p>Discussant: Tava OLSEN, University of Auckland</p> <p>Title: Designing Resource Competitions for Research Projects</p> <p>Abstract:</p> <p>Academic research is funded by governments to promote innovation and economic growth. Research universities with access to sizable endowments administer their own research funds (UARF) to attract and retain their scientists. The first type of funding, which is well studied, is based on arm's length, competitive peer reviews of project proposals, whereas the second type of funding, less studied, is decentralized and relationship-based. We evaluate the impact these funding institutions and their differing rules have on the type of science projects being funded---their degree of novelty---and the productivity of scientists. As novel and early stage projects have a large tacit component which is hard to communicate, we argue that tacit information is best evaluated by decentralized decision makers with the most information on the deservingness of the project. This seed funding can then be used to mature the project to make it more attractive to the centralized decision makers. We build a model using the intuition from a sample of research projects having received nationally competitive funding from the federal government and/or UARF from 1970 to 2005 at a large research university in the U.S. This model shows that the value created by the UARF is not simply an artifact of double screening. It also allows to distinguish between the value created through staging the funding in a situation with uncertainty or through the exploitation of the tacit knowledge of the research project. We find that when projects have heterogenous levels of tacitness, the value increase due to the UARF's tacit knowledge dominates. Highly tacit projects – early stage projects or projects led by early career scientists – that would not otherwise have been selected by the centralized funding benefit particularly strongly and show high productivity. Our research points to the importance of designing this two-level funding system with rules tailored to the strength of each funding level rather than applying the rules of the centralized level at the decentralized level, which ignores the UARF's knowledge advantage.</p>

<p>11.15am- 12.15pm</p>	<p>Paper 3</p> <p>Presenter: Yun Fong LIM, SMU</p> <p>Discussant: : Karthik NATARAJAN, SUTD</p> <p>Title: Inventory Management Based on Target-Oriented Robust Optimization</p> <p>Abstract:</p> <p>We propose a target-oriented robust optimization approach to solve a multi-product, multi-period inventory management problem subject to ordering capacity constraints. We assume the demand for each product in each period is characterized by an uncertainty set, which depends only on the demand's mean and bounds. Under a pre-specified cost target, we determine an ordering policy that maximizes the sizes of all demand uncertainty sets. We prove that a static policy is optimal for our formulation, which significantly reduces the computational burden. By tuning the cost target, the resultant policy can achieve a balance between the expected cost and the associated cost variance. Numerical experiments suggest that, although only limited demand information is used, the proposed approach performs comparably to traditional methods based on dynamic programming and stochastic programming. More importantly, our approach significantly outperforms the traditional methods if the latter assume inaccurate demand distributions. We demonstrate the applicability of our approach using two case studies from different industries.</p>
<p>12.15pm- 1.45pm</p>	<p>Lunch @ Catering area 2A/2B, near SR 2.8, Level 2</p>
<p>1.45pm- 2.45pm</p>	<p>Paper 4</p> <p>Presenter: Daniel ZHENG Zhichao, SMU</p> <p>Discussant: Serguei NETESSINE, INSEAD</p> <p>Title: Dynamic Inventory Pooling Policies to Deliver Differentiated Service</p> <p>Abstract:</p> <p>Inventory pooling is an important operational strategy that has been widely used in the industries to match supply with demand. However, effective implementation of this strategy can be challenging. A major problem is to integrate the heterogeneous service level requirements of different customers into the inventory pooling model, to determine the minimum inventory level required and the associated allocation policy, using a common stock of inventory. We consider both Type 1 (stock out probability) and Type 2 (fill rate) service level requirement. We derive a set of necessary conditions on the optimal inventory level needed to meet customized service level requirement for each customer.</p>

For a system with fill rate (Type 2) service requirements, we prove that the necessary conditions are also sufficient using Blackwell's Approachability Theorem. This allows us to show that the optimal inventory needed is at most a small constant above the theoretical minimum, demonstrating the full benefits of inventory pooling in this setting. These results hold for arbitrary demand distribution and correlation.

For system with stock out probability (Type 1) requirements, we derive bounds on the optimal pooled inventory needed, and develop efficient policies to allocate the pooled inventory among the customers. Numerical studies show that our allocation policy can accurately deliver the desired service levels to different customers using the minimal level of common inventory.

Finally, we use these results to show that a pricing schedule based on actual fill rate performance can be used to allocate the profits in the centralized system to all members of the supply chain, leading to a Pareto improvement over the traditional supply chains using wholesale-price-only contracts.

2.45pm- 3.45pm

Paper 5

Presenter: Xin FANG, SMU

Discussant: Ravi ANUPINDI, University of Michigan

Title: Managing Suppliers: Joint Audit and Shared Supplier Information

Abstract:

Product safety incidents in recent years have compelled many manufacturers to rethink approaches to manage product quality of their suppliers. In this paper, we investigate two cooperative approaches that are used in practice: auditing common suppliers jointly ("joint audit") and sharing independently collected information with other manufacturers ("shared supplier information"). We develop a model that captures both competitive and cooperative interactions among manufacturers. Our analysis reveals that cooperation does not necessarily improve product safety. The effectiveness of these approaches depends crucially on the externality of product safety of one manufacturer on other manufacturers. Further, we find that, when the risk of product safety failure is high, shared supplier information is more effective than joint audit; otherwise, joint audit is more effective. We also investigate the incentives of competing manufacturers to cooperate by analyzing a cooperative game in partition function form. We find that, in some cases, manufacturers may voluntarily cooperate with each other without complex transfers of profits among them. This is true even when some manufacturers have better information about product quality than others. However, in other cases, manufacturers with better information need to be compensated properly, and we design an allocation that

	<p>is ideal for motivating sharing. Since product safety has a significant impact on the well-being of consumers, industries and governments should assess the level of externality and risk of product safety failure in specific market settings in order to design effective and stable cooperative programs.</p>
3.45pm- 4.00pm	Tea Break @ Catering area 2A/2B, near SR 2.8, Level 2
4.00pm- 5.00pm	<p>Paper 6</p> <p>Presenter: Onur BOYABATLI, SMU</p> <p>Discussant: Yossi AVIV, Washington University in St Louis</p> <p>Title: Capacity Management for Oilseeds Processors</p> <p>Abstract:</p> <p>This paper studies the capacity investment decisions of a processor (an oilseed pressing plant) that uses a commodity input (oilseed) to produce a commodity output (crude vegetable oil) and a byproduct. The input and the output are traded in the spot markets. We model the processor's decisions in a multi-period framework. At the beginning of the planning horizon, the processing capacity for the input and the storage capacity for the output are chosen. In each period, given these capacity levels, the input processing volume is chosen in the presence of input and output spot price and output production yield uncertainty, whereas the output storage volume is chosen after the yield uncertainty is realized. We identify that, in general, the optimal capacity investment portfolio involves a safety capacity either for processing or for storage. Focusing on the palm industry, we provide some rules of thumb for the capacity management: The processor should decrease its capacity investment portfolio with an increase in the spot price correlation; and with an increase (decrease) in the input or the output spot price variability when this variability is sufficiently lower (higher) than the other variability. To study the impact of using heuristic capacity investment policies (such as ignoring the production yield uncertainty or byproduct in capacity investment) on profitability, we conduct computational experiments using a calibration based on a palm oil mill using data from Malaysian Palm Oil Board, complemented by the industry supply and demand studies based on Southeast Asia. We find that these heuristic capacity investment policies lead to significant losses in profit.</p>
5.00pm- 5.15pm	Concluding Remarks by Professor Brian RODRIGUES, Deputy Dean of Lee Kong Chian School of Business, Singapore Management University

Discussants' Profile:

Ravi ANUPINDI teaches elective courses in Global Supply Chain Management and Innovations in Global Healthcare Delivery. His main research and teaching interests include global supply chain management, strategic sourcing, supply chain risk management, social and environmental sustainability, value chains for economic development, and health care delivery. His research work has appeared in several leading journals. He has authored numerous case studies in the above topics and is a co-author of *Managing Business Process Flows*, a textbook in operations management. He is a member of the advisory board & executive committee for the People That Deliver Initiative for Global Health. At the University of Michigan, he is Chair of the President's Advisory Committee on Labor Standards and Human Rights.

Yossi AVIV is the Dan Broida Professor of Operations and Manufacturing Management, and the Area Chair of Operations and Manufacturing Management at the Olin Business School of Washington University in St. Louis. Aviv develops and applies operations research models and methods to study problems related to supply chain management and revenue management. His research has focused on strategic inventory positioning in distribution networks, collaborative forecasting, and dynamic pricing. He holds several editorial positions, and has served as a Department Editor for *Management Science*. Aviv has consulted in the defense and electronics industries. He has been teaching courses on quantitative decision modeling, operations management, and supply chain management, at the undergraduate, MBA, EMBA, and Ph.D. levels. Aviv has also taught at INSEAD (Singapore), Fudan University (Shanghai), Stern School of Business (NYU), and the Hong Kong University of Science and Technology.

Harry GROENEVELT has been on the faculty at the Simon Business School of the University of Rochester for 30 years. His research interests include supply chain management (including closed loop supply chains, supply chain financing and supply chain analytics) and logistics, health care operations, service system management and design, and sports analytics. He has consulted with a variety of public organizations and businesses and taught a wide variety of operations management and analytics courses in masters, MBA and executive programs in Rochester and as a guest instructor for INSEAD, Rotman School of Management (U of Toronto), Nijenrode University and the Indian School of Business. He received a B.S. and M.S. from the Free University in Amsterdam and a Ph.D. from Columbia University.

Karthik NATARAJAN is an Associate Professor at the Engineering Systems and Design pillar at the Singapore University of Technology and Design. He completed his PhD in the Singapore-MIT Alliance program at NUS and has held faculty positions at the National University of Singapore and the City University of Hong Kong. His research interests broadly lie in the area of operations research and optimization under uncertainty with a focus on applications including finance, marketing and transportation.

Serguei NETESSINE is the Timken Chaired Professor of Global Technology and Innovation and the Research Director of INSEAD-Wharton Alliance. Previously, he was a faculty at the Wharton School, University of Pennsylvania which he joined in 2001.

Prof. Netessine current research focuses on strategic aspects of supply chain management, incentives and contracting in supply chains. His current industry projects include adoption of performance-based logistics in US defense industry, retail store execution strategies as well as studies of supply chains in the automotive industry.

Tava OLSEN holds the Ports of Auckland chair in Logistics and Supply Chain Management at the University of Auckland Business School. Prior to joining Auckland, she was Professor of Operations and Manufacturing Management in the Olin Business School at Washington University in St. Louis, which she joined after serving in the Department of Industrial and Operations Engineering at the University of Michigan, Ann Arbor. Tava received her BSC (honours) from The University of Auckland and her PhD from Stanford University. Tava's research interests include supply-chain management, pricing and inventory control and stochastic modelling of manufacturing, service and healthcare systems. Tava is a Past President of the Manufacturing and Service Operations (MSOM) society.