

Friday, 8:30-10:00 Sessions

1	Friday, May 1, 8:30-10:00 Room: Cloister North Session: Panel on Logistics Research in the Public Sector	Track: LAPS, 1	Chair: Stephen Swartz
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011-0007: Panel on Logistics Research in the Public Sector

Jeffrey Ogden, Air Force Institute of Technology, USA
Stephen Swartz, University of North Texas, USA
Wesley Randall, Auburn University, USA
Pamela Donovan, Air Force Institute of Technology, USA
Stephen Brady, Pennsylvania State University, USA

Transportation Research Opportunities at Local, State, and Federal Levels This panel will bring together academics who have experienced success (and difficulties!) in conducting transportation related research for governmental agencies. Issues to be discussed include: finding appropriate problems, lining up sponsors, executing funded projects, and finding outlets beyond the required government reports.

2	Friday, May 1, 8:30-10:00 Room: Cloister South Session: Panel Discussion: Emerging Research Directions in Service Supply Chains	Track: SCM, 1	Chair: Rohit Verma
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011-0450: Emerging Research Issues in Service Supply Chains

Rohit Verma, Cornell University, United States
Ken Boyer, Ohio State University, United States
Ananth Iyer, Purdue University, United States
Glen Schmidt, University of Utah, United States
Rachna Shah, University of Minnesota, United States

The panelists in this discussion session will address their views about emerging research issues in service supply chains. They will also discuss the similarities and differences between supply chains for tangible goods and intangible services.

3	Friday, May 1, 8:30-10:00 Room: Captain Session: SC Performance	Track: SCM, 15	Chair: Pietro De Giovanni
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011-0265: An Empirical Investigation on Supply Chain Management and Economic Performance

Pietro De Giovanni, Essec Business School, France
Fouad El Ouardighi, Essec Business School, France

Inspired by several gaps in the theory and a number of practical implications, this research examines the empirical relationship between Supply Chain Management (SCM) and economic performance. The effectiveness of SCM is investigated by probing three major areas of performance: operational, customer, and economic performance. Using a large sample of French firms, this study develops an empirical analysis by means of Structural Equation Modelling as well as multi-group analysis distinguishing between firms having or not having a dedicated structure for SCM, presence/absence of assistance mechanisms, and leadership in the down/up stream of the chain. Supported by empirical results, the findings have both theoretical insights and practical implications.

011-0232: Supply Chain Management Characteristics Moderating the Supply Chain Practice-Performance Link

Roberto Chavez, University College Dublin, Ireland
Brian Fynes, University College Dublin, Ireland

Over the past decade there has been increasing interest in supply chain management (SCM) as a strategic tool. Despite this growing interest, many companies are not fully aware of which supply chain (SC) practices have direct impact on their performance. Many studies take for granted this link between "best" practices and positive performance, failing to examine it in depth. On the performance side, although performance indicators have long been considered key elements for firms, there has been mixed views on commonly accepted performance indicators. This constitutes a theoretical gap that should be investigated more closely. Consequently, Contingency theory has provided a lucid strategy to conceptualize our hypotheses that incorporate two moderating variables: Industry Clockspeed and Product Type. Accordingly, we posit two research questions: 1. What is the relationship between SC practices and SC performance? 2. To what extent do Industry Clockspeed and Product Type moderate the SC practice-performance relationship?

011-0376: The Impact of Lead Time on the Complex Behavior of a Single-Echelon Supply Chain

Chong Zhang, Southeast University, China
Haiyan Wang, Southeast University, China

This paper analyzes the impact of lead time on the complex behavior of a single-echelon supply chain system. Due to the assumption that return policy is not permitted, the supply chain turns out to be an autonomous switched system, corresponding to order policy of the retailer. A discrete time state space model is developed to analyze the system, in order to optimize the system with respect to the following performance objectives: recovery of the inventory level, and attenuation of demand rate fluctuations with the ordering rate. Studies have shown that orders and inventories exhibit significant variability from stability to chaos when lead time becomes larger. To reduce the amplification of the order and inventory, the adjustment parameters for both inventory and supply line discrepancies should be more comparable in magnitude. Some useful insights are proposed for managing lead time performance so as to stabilize the supply chain system.

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011-0378: On the Relationship Between Forecasting, BOM, Lead Times and Decoupling Points

Ton de Kok, Eindhoven University of Technology, Netherlands

Joakim Wikner, Jönköping University, Sweden

In the last three decades various authors have contributed to planning and control concepts based on hierarchical decomposition of decision making. Typologies such as VAT (Goldratt) and Customer Order Decoupling Point (Hoekstra and Romme) intend to structure the control problem, such that the main control decisions can be distinguished from auxiliary control decisions. In the literature it is often suggested to structure the control decisions such that complexity is reduced most. An example is the idea of selecting the BOM level of least diversity as the MPS level. In our presentation we present a constructive methodology, based on BOM and lead time data, that prescribes the appropriate hierarchical decomposition of the planning and control concept for a given manufacturing/distribution situation. In addition it prescribes what forecast information is necessary to make decisions over time to satisfy the market against agreed customer service levels.

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Friday, May 1, 8:30-10:00 Room: Yeoman
Session: Case Studies 1

Track: SUST, 1

Chair: Joao Neto

011-0711: How Capabilities in Operations Can Influence "Green Production"

Steve Brown, University of Exeter Business School, United Kingdom

Tim Baines, Cranfield University, United Kingdom

This research presents case material of companies within the UK that are attempting to be "Green" in their operations processes. We assess their aspirations by plotting capabilities through their supply networks under five key headings: Strategy; Production planning and procurement; In-house production; Logistics; and Human resource management within operations. We build upon the work of Azzone and Noci, 1998 and Azzone et al., 1997 and we present insights into companies whose commitment to Green Production ranges from "the company tries to delay the adoption of green programs" through to the company adopts a "radical approach to environmental issues." In doing so we see how operations capabilities in a range of parameters can play a central and pivotal role in achieving some of the aspirations of Green Production within companies.

011-0483: A Case Study of an Agribusiness Company in Peru

Patricia Quiroz, Pontificia Universidad Catolica del Peru, Peru

The paper shows an agribusiness Peruvian company specialized in conserves of asparagus, artichoke and piquillo pepper, with sustainable operations in the farm and in the plant.

This company is distinguished for being a reliable supplier of many countries, it has a consistent quality of products, and it works with an approach of Social Responsibility: labour, community and environmental.

The paper shows the challenges that faces this company in order to be competitive and sustainable in the global industry.

011-0142: A Study of Reverse Logistics Flow Management in Vehicle Battery Industries in the Midwest of the State of São Paulo (Brazil)

Jovita Baenas, UNESP- Universidade Estadual Paulista Julio de Mesquita Fº, Brazil

Rosani Castro, UNESP- Universidade Estadual Paulista Julio de Mesquita Fº, Brazil

Rosane Battistelle, UNESP- Universidade Estadual Paulista julio de Mesquita Fº, Brazil

Besides being a priority for the environment, battery recycling is also profitable due to its countless applications, such as in reducing energy costs and saving raw materials for new products. The objective of this study is to address the importance of recycling in the interior of the state of São Paulo, demonstrating that about 79% of all vehicle batteries are returned to the production cycle. This percentage is adequate for the national parameter, which intends to reach the world's level of 95%. By describing reverse logistics flows, it is possible to show the existing problem in small industries with the assembly of batteries in a semi-artisanal manner, which compromises worker health and the environment. It is possible to obtain information from the results to develop a proposal for managing a reverse logistics flow, seeking continuous improvement for manufacturers of small batteries.

011-0103: An Analysis of the Socio-Environmental Requirements for the Capacitation of Supply Network of a Cosmetic Company

João Neto, University of São Paulo, Brazil

The new market requirements consider corporate social and environmental responsibility as a key performance indicator for companies willing to grow and achieve long-lasting success. However, products and services are recognized as socially responsible only if all rings of their supply chain behave sustainably. In this context, the concept of a socially responsible company, product or service becomes a duty of a whole chain, and not a duty of a single company. Aligned to these new requirements, company "X" decided to invest in the improvement of its suppliers' performance in terms of social and environmental responsibility. The present work delineates policies and standards in terms of social and environmental responsibility that have to be respected by the whole company's supply chain. To achieve this aim, this work analyses the "X" suppliers' profile, manages documental data, and addresses field surveys.

011-0045: Analysis of the Post-Consumption Reverse Channel

Tatiene Coelho, São Paulo State University/Department of Production Engineering, Brazil

Rosani Castro, São Paulo State University/Department of Production Engineering, Brazil

Rosane Battistelle, São Paulo State University/Department of Production Engineering, Brazil

This paper intends to introduce and discuss the challenges that exist in operating the post-consumption reverse channel for PET bottles in Brazil using theoretical concepts to discuss the possibilities of reverse logistics in the PET bottle recycling chain. The importance of this study consists in raising important information about the sector and the opportunities for taking advantage of this waste through recycling, and the interests and difficulties found in their reverse flow. The successful structuring of the PET bottle reverse channel is found by including the multiple players involved, whether of the public or private initiative, in order to achieve the desired result in the Brazilian environmental scenario.

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U	Friday, May 1, 8:30-10:00 Room: Scribe Session: Legislative Issues	Track: SUST, 5	Chair: Gokce Esenduran
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011-0715: On the Link between Environmental and Market Performance under Market-Based Environmental Regulation

Ramanath Subramanyam, University of Illinois - Urbana Champaign, United States

Ravi Subramanian, Georgia Tech, United States

James Kroes, University of Rhode Island, United States

We empirically study the link between firms' environmental performance and market performance under market-based regulation based on permits for emissions. A popular view is that environmentally beneficial investments more than pay for themselves through improved efficiency, reduced compliance costs, and favorable market perception. A differing view is that environmental investments are limited in their economic benefit and could therefore erode shareholder value. Along the lines of the latter view and given the typical costs of engaging in environmental compliance activities, we hypothesize that the market would penalize cleaner firms when the regulatory program offers the opportunity to cost-effectively choose a compliance strategy and, additionally, cushions firms from compliance costs by employing policy concessions such as grandfathering. Data from the US Acid Rain Program supports our hypothesis.

011-0340: A Cost-Comparison of Three Collection Schemes under Take-Back Legislation

Gokce Esenduran, Kenan Flagler Business School, United States

Eda Kemahlioglu-Ziya, Kenan-Flagler Business School, United States

Take-back legislations hold manufacturers responsible for collecting and properly disposing of their products when their useful lives end. In this paper we model and compare three collection schemes (i.e. the individual, collective and collaborative collection schemes) that the manufacturers follow to comply with legislation. We model each collection structure as a two-stage Nash game. We find the key market and operating conditions that make one scheme preferable to the others from the producer's point of view. We also answer the following questions: Is the recycling level higher under the individual or the collective/collaborative collection scheme? Is the incentive to produce green products higher under the individual or the collective/collaborative collection scheme? When will a group of producers following the collective/collaborative scheme allow a new producer to join the collection scheme?

011-0322: Optimal Governmental Subsidies and Fees on Closed-Loop Supply Chains

K. Min, Iowa State University, United States

Karla Valenzuela, Iowa State University, United States

Subsidies and fees by the government to encourage the collection of used products and the subsequent remanufacturing have significantly increased in recent years. For example, advance recovery fees are collected from manufacturers and customers and reimbursements are made to collectors, recyclers, and remanufacturers. In the context of closed-loop supply chains, however, the economic efficiency of these governmental interventions is far from clear. In this paper, we first evaluate such efficiency of a supply chain for a single product consisting of a manufacturer who also remanufactures, a collector, and customers. Based on this evaluation, the total surplus levels of this supply chain with and without subsidies and fees are compared and contrasted. We then propose an alternative set of subsidies and fees, and show that this alternative actually maximizes the total surplus level of the supply chain. An illustrative numerical example will be utilized for economic implications and managerial insights.

011-0521: The Environmental Gains of Remanufacturing

Joao Quariguasi Frota Neto, Bradford University School of Management, Great Britain

Jacqueline Bloemhof, Rotterdam School of Management, Erasmus University, Netherlands

Remanufacturing has long been perceived as an environmentally-friendly initiative. The question of how remanufacturing leverages the relation between environmental footprint and economic returns remains, however, partially unanswered. In this paper, we focus our attention on the electronics industry. In particular, we take a close look at this activity in the mobile and personal computers industries. We also perform a benchmark analysis of remanufacturing's eco-efficiency, by comparing it with the eco-efficiency of other important economic activities.

U	Friday, May 1, 8:30-10:00 Room: Knave Session: Strategic Healthcare Planning	Track: HLTH, 1	Chair: Otávio José Oliveira
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011-0407: An Application of Variable Neighborhood Search to Hospital Call Scheduling of Infant Formula Promotion

Hsiang-Yuan Lin, Lunghwa University of Science and Technology, Taiwan, Republic of China

Ching-Jong Liao, National Taiwan University of Science and Technology, Taiwan, Republic of China

Chao-Tang Tseng, Chaoyang University of Technology, Taiwan, Republic of China

In the infant formula industry, products must rely on the prescription or recommendation from health care physicians (HCPs). Therefore, it is the most important activity in sales promotion to call on the identified HCPs in the prospected hospitals by the territory promotional sales representatives (PSRs). The PSRs have to establish their monthly hospital-call schedule according to several constraints. In this paper, we investigate the hospital call scheduling of PSRs. To reduce the cost, the objective is minimizing the travel time of each PSR's monthly hospital call schedule. This paper deals with a real-world case provided by an international infant formula company operating in Taiwan. First, we present a four-phase heuristic to quickly generate a feasible schedule. We then apply variable neighborhood search (VNS) to improve the solution quality. Through extensive computational experiments, it is shown that the proposed solution approach is quite effective in terms of solution quality and computation time.

011-0898: Increasing the Efficiency of the Surgical Center in a Brazilian Hospital using Computer Simulation

Friday, 8:30-10:00 Sessions

Roberto Protil, Pontifical Catholic University of Parana, Brazil

Gerson Bichinho, Pontifical Catholic University of Parana, Brazil

Joelson Stroparo, Pontifical Catholic University of Parana, Brazil

The purpose of this document is to employ the use of computer simulation for increasing surgical center occupation rates at a University Hospital, located in the city of Curitiba (Brazil). For the attainment of this work three scenarios were created. The first scenario is one of the six existing surgical rooms. It was possible to improve the orthopedic surgical occupation rate specially through changing some input variables. The two following scenarios demonstrated the impact of amplification on existing rooms, as the second scenario acknowledges input data of the model as in the real system, making it possible to obtain a better occupation rate, and the third scenario showed an improved amount of occupancy using the input data. The resulting analysis provided subsidies for the reduction of idleness in this sector.

011-0073: Occupational Health and Safety in Automotive Battery Manufacturing Companies: Case Analyses in the State of São Paulo - Brazil

Otávio Oliveira, UNESP - São Paulo State University, Brazil

Renan Almeida, UNESP - São Paulo State University, Brazil

The companies have been pressured to modernize their management mechanisms aimed at reducing costs and adapting product and production process characteristics to market needs. Occupational health and safety management systems have been an increasingly more adopted alternative by organizations to adapt to this reality. These systems gain even further importance when we consider the automotive battery manufacturing sector due to the risks to employee health inherent to the characteristics of the production process. For this reason, the main objective of this paper is to present and analyze the main practices related to occupational health and safety in two automotive battery manufacturing companies in the state of São Paulo, Brazil, identifying which management tools are used as well as their positive aspects and the main obstacles to their implementation.

7	Friday, May 1, 8:30-10:00 Room: EC-D1 Session: Planning and Control	Track: EMPR, 1	Chair: Erik Soepenber
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011-0313: An Action Research Project to Improve Customer Responsiveness in a Bespoke Manufacturing Company

Mark Stevenson, Lancaster University, United Kingdom

Linda Hendry, Lancaster University, United Kingdom

Yuan Huang, Lancaster University, United Kingdom

Workload Control (WLC) is a planning and control concept for manufacturers of bespoke products. Much of the WLC literature has focussed on improving theoretical aspects of the concept through simulation but recent attention has shifted to aligning theory with the characteristics of bespoke production environments in practice. Hence, through comparative case study analysis, a framework of 17 issues affecting WLC implementation has been developed. This paper explores the use of this framework in an action research project to implement WLC in a precision engineering SME. A decision support system has been implemented, improving: traceability, responsiveness to customer queries, understanding of constraints and cross-functional collaboration. The research has found 15 of the 17 issues in the existing framework to be important in this company, while new issues have also been identified. In implementing the concept, aspects of the WLC theory underpinning the system have also been enhanced.

011-0352: Workload Control Performance in Practice

Erik Soepenber, University of Groningen, Netherlands

Martin Land, University of Groningen, Netherlands

Gerard Gaalman, University of Groningen, Netherlands

Workload Control (WLC) is a production planning and control concept that aims at controlling the logistical performance of small make-to-order companies. Although many studies on WLC have been performed, empirical research is rather limited. The aim of this study is to gain empirical evidence on the effects of applying WLC principles. The research is based on a longitudinal action research project in a company in which both quantitative and qualitative data have been obtained and analysed. The support of analytical techniques such as throughput diagrams and order progress diagrams enables relation of many aspects of the performance changes to the implemented principles. The findings show positive performance effects, but also limitations of the WLC principles. In particular, the size of the order pool is proven to be decisive for the level of control that can be realised in a practical setting.

011-0143: Collaborative Planning in Engineer-to-Order Manufacturing: Implications on Uncertainty, Schedule Stability, and Delivery Performance

Antti Tenhiala, Helsinki University of Technology, Finland

This paper reports a longitudinal analysis of a project in which a manufacturer of customized machinery implemented a collaborative planning scheme to support the cross-functional information processes among the sales personnel, product engineers, and production planners. On the basis of media richness theory, the implementation is hypothesized to have positive effects on the manufacturer's performance. Furthermore, the collaboration is hypothesized to influence performance in two ways: by reducing uncertainty and by stabilizing production schedules. The hypotheses are tested with 65 weeks of process data. The results support the overall performance effects and show that the schedule stability has much stronger influence than the reduction of uncertainty. The finding is encouraging for practitioners because it means that collaborative planning can be beneficial even in inherently uncertain task environments. On a more general level, the results elaborate the information processing view of organization design and the theory of swift, even flow.

011-0144: Applicability of Different Capacity Planning Methods: Practical Implications from Contingency Theory

Antti Tenhiala, Helsinki University of Technology, Finland

Friday, 8:30-10:00 Sessions

Most practitioners use considerably simpler production planning methods than what is recommended in the literature. This article employs the contingency theory of organizations to explain the gap between the practice and the academic models of production planning. The arguments about the contingency effects of process complexity lead to a hypothesis that expects simple capacity planning methods to be most effective in certain production processes. A strong inference research setting is used to test the contingency hypothesis against a conventional hypothesis that expects the most sophisticated planning techniques to be always most effective. Multisource data from machinery manufacturing support the contingency hypothesis and reject all manifestations of the conventional universalistic hypothesis. The findings are explained with the concepts of task interdependence and bounded rationality. The results have several managerial implications, and they elaborate how classic organization-theoretical concepts can bring practically relevant insights to operations management research.

9	Friday, May 1, 8:30-10:00 Room: EC-C Session: Developing the Global Supply Chain Curriculum (Invited)	Track: EDUC, 1	Chair: Brian Neureuther
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011-0051: Global SCM Education Benchmarking

Heather Lutz, Syracuse University, United States

Laura Birou, Louisiana Tech University, United States

This session will discuss the findings of a global benchmarking study of supply chain management courses. Data gathered on a global basis with regard to the content of SCM courses will be shared. To date, we have collected 209 syllabi from 11 countries and 57 universities. We have syllabi from 76 courses in supply chain management, 64 in logistics/transportation/warehousing, 39 from operations management, and 25 from purchasing/sourcing classes. The discussion will cover topics, assignments, and evaluation techniques. In addition, a review of topic importance to practitioners will demonstrate the opportunities based upon gaps in coverage. Time will be allotted for audience participation and suggestions for future research. Participants new to the academic profession will have a database of information to draw upon when developing their own courses.

011-0443: Implications of Occupational Characteristics for Supply Chain Professionals on Curriculum Design

Clyde Holsapple, University of Kentucky, United States

David Marshall, University of Kentucky, United States

Milton Shen, University of Kentucky, United States

The importance of Supply Chain Management has prompted widespread development of SCM programs and curricula. Analyzing an extensive archive (O*NET), we identify key occupational characteristics of SCM professions. These characteristics are compared to traits of curricula exhibited by SCM programs at a sample of AACSB-accredited universities. Our findings can be used to streamline supply chain program development to fit unique occupational characteristics identified for SCM professionals. We also examine the status of SCM professions in the US to highlight future prospects and job security for SCM professionals.

011-0699: Designing Curriculum for Undergraduate Supply Chain Management Programs

Brian Neureuther, SUNY Plattsburgh, United States

Kevin O'Neill, SUNY Plattsburgh, United States

Supply Chain Management has grown in significance over the past decade. Historically, institutions of higher education have developed supply chain management programs at the graduate and the executive education levels. However, many institutions of higher education are looking at supply chain management as a program that is valuable to undergraduate students as well; therefore there has been a surge of undergraduate programs devoted to supply chain management. This research addresses supply chain management programs and how best to develop a viable program, from a curriculum and operational perspective, for undergraduate students.

10	Friday, May 1, 8:30-10:00 Room: Gallery Session: Modeling Disruptions in Supply Chains	Track: DSPT, 1	Chair: Laird Burns
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011-0367: A Structured Approach to Supply Chain Flexibility Measures and Strategies in Case of Uncertainty

Wolfgang Kersten, Hamburg University of Technology, Germany

Carolin Singer, Hamburg University of Technology, Germany

According to recent surveys, an increased supply chain flexibility is not only a success factor but also essential for companies to survive due to the current fast-changing business environment. Related to a single company or to a function within a company, i.e. manufacturing, flexibility has been widely researched. Therefore, this contribution takes a broader perspective and considers the concept in a supply chain context. Since different practitioners and researchers do not perceive "flexibility" and "supply chain flexibility" consistently, the terms are at first discussed and distinguished from supposed concepts. As a next step, the paper gives an overview of supply chain flexibility measures and strategies in case of uncertainty, risk or threatening disruption. Results were gained through expert interviews and literature research. In order to meet different kinds of uncertainties, criteria are derived to structure measures and strategies in a framework.

011-0498: A Conceptual Framework for the Analysis of Disruption Risks in Supply Chains

Monika Weishaeupl, Vienna University of Economics and Business Administration, Austria

Werner Jammernegg, Vienna University of Economics and Business Administration, Austria

Friday, 8:30-10:00 Sessions

In recent years the analysis of disruptions in supply chains has gained considerable importance. Thus, we develop a conceptual framework for the analysis, evaluation and mitigation of disruption risks for supply chain processes. A disruption is an event with low probability and severe impact resulting in a radical transformation of the supply chain. The framework consists of three steps: generation of a risk map, derivation of mitigation strategies and their performance evaluation by means of simulation.

This framework is applied to a case study in the food industry. The specialty of the supply chain under consideration is the raw material's transformation to a durable good after processing and the existence of production campaigns due to raw material perishableness and availability.

011-0006: Adaptive Search Methods for Ordering Decisions in Multi-Stage Supply Chains under Disruptions and Random Customer Demand

Sanjay Kumar, Pennsylvania State University, USA

Fred Glover, OptTek Systems, Inc., USA

Thomas Schmitt, University of Washington, USA

Kathryn Stecke, University of Texas at Dallas, USA

Uncertain demand and periodic disruptions pose critically important challenges to effective supply chain management. Disruptions along with complexity of modern supply chains pose significant challenges in devising exact methods to make ordering decisions. To avoid this, we propose methods based on embedding adaptive search within simulation. We propose various adaptive search methods and compare their suitability in making ordering decisions in complex supply chains. We demonstrate significant cost and time advantages of using our approach in place of classical non-adaptive methods, and report the cost benefits by comparison to traditional order-up-to methods that use forecasting. We use several new advancements in adaptive search methods for supply chain applications.

11	Friday, May 1, 8:30-10:00 Room: EC-A Session: Routing/OR Applications	Track: EMRG, 1	Chair: Hugo Yoshizaki
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011-0958: A Heuristic to Solve Large Scale Shipper Collaboration Problems

Hugo Yoshizaki, Universidade de São Paulo, Brazil

Enrico Ferri, Universidade de São Paulo, Brazil

Cost and sustainability imperatives are compelling reasons to make companies collaborate in order to operate more efficiently and with a lower carbon footprint. The shipper collaboration problem can be defined as how to identify tours in the set of lanes of all shippers that minimize truck repositioning (deadheads), as the sub-set of routes of a single shipper may have lanes that complement routes of another shipper. Thus, combined shippers may offer to carriers a set of tours with regularly executed truckload movements with minimum asset repositioning. This problem can be translated into a particular type of set covering formulation with constrained cycles, the cardinality constrained lane covering problem (CCLCP), which is NP-hard. We present an alternative heuristic which solves much larger instances than previous literature and also show its performance in high unbalanced flows, typical of large developing economies with large concentration of freight in some few regions.

12	Friday, May 1, 8:30-10:00 Room: EC-E Session: Performance and Resilience	Track: LGST, 1	Chair: Jack Crumby
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011-0411: Building Supply Chain Resilience through Logistics Capabilities

Serhiy Ponomarov, University of Tennessee, United States

Mary Holcomb, University of Tennessee, United States

Supply chain management involves a multitude of processes and related activities that have potential inherent risks that can result from unexpected disruptions in physical flows. Disruptions such as the loss of a critical supplier, a major fire at a manufacturing plant, or even an act of terrorism could adversely affect both revenue and cost. To reduce this risk, supply chains must be designed to incorporate event readiness, provide an efficient response, and be capable of recovering to their original state or even better post the disruptive event. This is the essence of supply chain resilience. This paper examines the links between risks and the implications for supply chain management. The research also examines the role that logistics capabilities play in enabling the firm to develop supply chain resilience that allows it to mitigate risk.

011-0552: Practical Challenges in Managing the Reverse Logistics Process

Joseph Huscroft, Auburn University, United States

Joe Hanna, Auburn University, United States

Dianne Hall, Auburn University, United States

Casey Cegielski, Auburn University, United States

Reverse logistics is an essential capability for any business that operates in today's global marketplace. It has a large potential impact on customer relations, and development of effective reverse logistics capabilities and its integration throughout the supply chain should be considered managerial priorities. The reverse logistics process has many attributes that are purported to promote effective operations and service quality. The objective is to use input from a panel of practicing logistics managers from a variety of industries and government agencies to identify a set of critical reverse logistics challenges. These challenges will serve as the foundation for future research regarding the reverse logistics process. This effort utilizes a Delphi procedure to establish key practitioner related challenges that will provide both academicians and practitioners with a method of determining what areas to focus on and possible allocation of resources when developing an effective reverse logistics process.

011-0108: Measuring Logistics Performance: The Effectiveness of MMOG-LE as Perceived by Suppliers in the Automobile Industry

Friday, 8:30-10:00 Sessions

Alexandre Graemi, *Positivo University/Federal Technological University of Parana - Brazil, Brazil*

Jurandir Peinado, *Positivo University, Brazil*

In spite of logistics having grown in importance lately, which includes the discussion of concepts such as integrated logistics and supply chain management in the business agenda, little has been said about how to measure logistics performance. This paper analyses the perception of logistics professionals about the effectiveness of MMOG-LE, a logistics performance evaluation tool on which they were trained and which they implemented in their organizations. Participants filled in a survey with Likert scale questions that was sent to them via e-mail. Among other findings, it was noticed that the impact of the MMOG-LE recommendation is stronger with respect to activities that had not been previously addressed by quality norms and recommendations. Most respondents also considered that their organizations were already efficient in integrating their activities with their customers (car assemblers) but rarely with their suppliers, which was acknowledged to be the bottleneck of their logistics systems.

011-0419: The Impact of Pricing Strategies on New Service Development Performance of Third Party Logistics Providers

Jack Crumbly, *Jackson State University, United States*

Harold Lundy, *Jackson State University, United States*

Baruch Lundy, *Jackson State University, United States*

Christopher Torrence, *Jackson State University, United States*

Clients of Third Party Logistics Providers (3PLs) are looking for proactive services that will increase efficiency and decrease costs within their supply chain. 3PLs on the other hand have focused on solving current issues of clients. A reason for this polarity may lie in the pricing strategies between 3PLs and 3PL users. The researchers will conduct case studies of 3PL providers and 3PL users about their experience in providing new service development process and the impact of pricing strategies on this process.

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Friday, May 1, 8:30-10:00 Room: EC-F
Session: Benchmarking/Best Practices

Track: BNCH, 1

Chair: Susana Azevedo

011-0379: Using Lean Performance Metrics: Benchmarking the Aerospace Industry with the Automotive Industry

Federico Bulato, *Delft University of Technology, Netherlands*

Nicolaas Elferink, *Delft University of Technology, Netherlands*

Wouter Beelaerts van Blokland, *Delft University of Technology, Netherlands*

Sicco Santema, *Delft University of Technology, Netherlands*

Lean manufacturing is in development within the automotive industry, especially at Toyota, for many years now. Recently, the aerospace industry has also shown interest in the concept's potential, looking for better, faster and cheaper performance.

Following research by Beelaerts van Blokland and others, this paper seeks to benchmark the aerospace and automotive industries based on their lean performance, using so-called lean metrics. Lean metrics are found to be a suitable measure of companies' performance with respect to the 3C's; continuation, conception and configuration. Using the metrics and the 3C-model, it is quantitatively shown that the aerospace industry is performing increasingly leaner. Because of the automotive industry's longer collective experience in lean, the automotive industry is performing leaner. However, the aerospace industry is following suit. Furthermore, the use of lean metrics and industry-composed lean performance indices has been demonstrated and support for their validity in evaluating lean performance is given.

011-0575: Development of a Web-based Information System for Managing Performance of SME Clusters

Luiz Carpinetti, *University of Sao Paulo - School of Engineering of sao Carlos, Brazil*

Rafael Lima, *University of Sao Paulo - School of Engineering of Sao Carlos, Brazil*

Edwin Galdamez, *University of Sao Paulo, Brazil*

Previous research works have proposed frameworks for managing the performance of clusters of SMEs. It includes a model of a performance measurement system with perspectives related to the cluster and a benchmarking information system with metrics and best practices of the SMEs of the cluster. Thus, this paper aims to present a web-based information technology resource for managing performance of a cluster of SMEs, both by the governance agents and the SMEs in the cluster. It is justified by the recognition of the importance of performance management and clustering as means to boost growth and competitiveness of SMEs. The paper reviews the subjects of clustering, performance management and decision support systems. It describes the organization and functionalities of the proposed system. A first conceptual version of the system is presented. Since this project is in its early stages of development, the paper ends with a discussion on expected outcomes.

011-0582: An Empirical Test of the Validity and Impact of the Adoption of Logistics Best Practices

Angel Diaz, *IE Business School, Spain*

Bjorn Claes, *IE Business School, Spain*

Oswaldo Lorenzo, *IE Business School, Spain*

Well-determined and adequately implemented logistics best practices are considered to have a positive effect on the supply chain performance of companies. Whereas the optimization of stock levels has been the object of extensive academic interest from a modeling perspective, to our knowledge, apart from practitioner publications little work has been done on the managerial best practices that facilitate this optimization. The research presented in this paper tests the validity of best practices identified in the literature by using survey data and a selected number of cases. More specifically, we empirically test the model proposed by Diaz, Lorenzo and Jimenez (2006) which suggests a relation between contextual variables, best practices and firms' results. Preliminary analyses suggests that both the current and intended utilization of several of these advanced logistics best practices are related to improved performance, and, moderated by firm size, are also positively related to sales.

Friday, 8:30-10:00 Sessions

14	Friday, May 1, 8:30-10:00 Room: EC-G Session: Operations and Marketing Strategies	Track: MKTG, 1	Chair: Elliot Rabinovich
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011-0187: Mail-In Rebates in Newsvendor Models

Qin Geng, Robert Morris University, United States

Suman Mallik, School of Business, University of Kansas, United States

Mail-in Rebates (MIR) are common in retailing. Using a newsvendor framework, we examine the impact of MIR in a single-manufacturer-single-retailer supply chain. Three scenarios are considered: the manufacturer offers the MIR; the retailer offers the MIR; and both manufacturer and retailer offer MIR simultaneously. We identify the condition to offer rebate in each scenario. We find that the manufacturer offering rebate always benefits the retailer; the retailer offering rebate may or may not benefit the manufacturer. Under certain conditions, there exists a unique Nash Equilibrium when rebates are offered simultaneously by the retailer and the manufacturer. Various supply chain implications of MIR are also studied.

011-0211: Unlimited Shelf Space in Internet Supply Chains: Treasure Trove or Wasteland?

Elliot Rabinovich, Arizona State University, United States

Timothy Laseter, University of Virginia, United States

Rajiv Sinha, Arizona State University, United States

Internet retailing offers merchants limitless shelf space. This has led experts to highlight the existence of a “long tail” of offerings on the web and assert that the future of online business is “selling less of more.” Unfortunately, Internet retailing has not made it easier for buyers to physically inspect products prior to purchase. Moreover, the blessing of limitless shelf space can impose a burden on buyers to sort through a large breadth of offerings. When that burden becomes excessive, it can lead to bad purchase decisions and many product returns. Not surprisingly, researchers have struggled to find an optimal breadth of offerings online. We shed light on this issue through an analysis of consumer search costs on a pre-purchase versus post-purchase basis. Using empirical data, we then assess the relative importance of these search costs and the influence on these costs by different product return reasons and product characteristics.

011-0207: A System Dynamics Model of Market Entry Strategy of Bio-Tech Pharmaceutical Industry in Great Chinese Region

Kung-Jeng Wang, National Taiwan University of Science and Technology, Taiwan, Republic of China

Yun-Huei Lee, Tamkang University, Taiwan, Republic of China

Until 2009, the bio-pharmaceutical market has an output value of US\$800 billion globally, and China’s pharmaceutical market is growing rapidly and shows great potential. However, entering overseas markets needs comprehensive considerations, and the China market especially has unique structural characteristics (for example, regional characteristics, consumer behavior, rare and special diseases). Therefore, developing a contingency market entry strategy is a critical activity for global bio-pharmaceutical companies. This paper builds a system dynamics model with structural characteristics based on a team of marketing managers. By the simulation method, we present the system’s logic and results. This model can be employed by marketing managers to help them understand the interactions of various affecting factors that entering the market, and examines the effectiveness of different market entry strategies. The research contributes substantially to the bio-tech pharmaceutical companies with respect to their decision-making ability about formulating appropriate and flexible market entry strategy.

011-0522: Developing a Conceptual Model of the Impacts of Business Environment and Firm Resources on Operations Strategy and Performance

Wantao Yu, Nottingham University Business School, United Kingdom

Ramakrishnan Ramanathan, Nottingham University Business School, United Kingdom

We develop a conceptual model from the literature that integrates business environmental factors and firm resources to examine their impacts on operations strategy choices and firm performance. Operations strategy affects and is affected by many organizational groups inside and outside the firm. A comprehensive operations strategy should combine elements of both the “resource-based view” and “market-driven view”. Our model seeks to understand the influence that specific business environmental factors (hostile and dynamic business environments) and firm resources (human resources, business resources, and technology resources) have on the operations strategy choices of low cost, quality, flexibility, and delivery performance. We shall outline the development of our model during the presentation. We have collected data from five retail firms in China, and will test our model at the later stage.

15	Friday, May 1, 8:30-10:00 Room: EC-H Session: Quality Applications	Track: QUAL, 1	Chair: Christine Alexander
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011-0862: Innovative Operations and Technological Commitment

Sonya Hsu, University of Louisiana Lafayette, United States

Christine Alexander, Texas A&M University - Commerce, United States

Expanded from previous studies, this research project will focus on the uses of information system (IS) and information sharing among different parties in the reverse logistics processes – vendors, retailers and the Central Return Center (CRCs). Foremost, how do ISs facilitate the reverse logistics processes along different supply chain parties? How does information sharing occur? How does technological commitment enhance the operational quality? The tentative research model includes technological commitment, mediated by innovation in reverse logistics processes that is proposed to be positively related to strategic performance and operational service quality. The rationales will be provided as well as propositions. The contribution of this conceptual model intends to promote the transactional information sharing to the level of “knowledge sharing.” In other words, knowledge extracted from transactional information is proposed to be a better decision tool to increase operational quality in the reverse logistics processes.

Friday, 8:30-10:00 Sessions

011-0912: Quantitative Methods Applied to Assess the Hospital Quality Services in a Network: The Case of CHQP

João Chang Junior, Centro Universitário da FEI, Brazil

Suzana Souza Santos, Universidade Paulista - UNIP, Brazil

Celi Gonzales, Universidade Paulista - UNIP, Brazil

The project objective is to study which quantitative methods should be used for assessment of quality services in a hospital network based on their effective contribution to their development. A series of interconnected indicators has been used in order to achieve hospital quality. These indicators form a complex set of variables that may assist business management and decision making processes. However, the statistical treatment given to these indicators is extremely simple and only provides a hospital rank to each of the 25 indicators selected. Therefore, the CHQP – Commitment with Hospital's Quality Program – was chosen as the object of this work. This program was created in 1991 and aimed to implant in Brazil a National Program for the Accreditation Hospital, with the support of PAHO – Pan American Health Organization. The CPHQ relies on voluntary membership of a network of approximately 100 hospitals located in the Sao Paulo State.

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Friday, May 1, 8:30-10:00 Room: EC-I
Session: Sourcing Decision Making 1

Track: SRCG, 1

Chair: Xiao Wenli

011-0005: Extending the Model of Supply Management Orientation and its Effect on Supplier-Buyer Performance

T.A.S. Vijayaraghavan, Xavier Labour Relations Institute, India

Priyal Singh, Xavier Labour Relations Institute,

Supplier management through long term relationships is becoming a strategically important area and its link to firm performance has been witnessed by lot many firms. In this context, it would be important to study the performance and risk parameters that can help to explain the co-operation in supplier buyer relations. The paper tries to address this gap by extending the model that propped by Shin et al (2000) and Vijayaraghavan et al (2008). The model includes both benefit and reliability measures to map the supply relationships. The purpose of the model is to develop scales for supply management orientation as well as supplier and buyer performance in Indian context and then to subsequently test how the relationships are defined in Indian context.

011-0822: An Examination of Issues and Strategies in Global Outsourcing: Insights from the Canadian Retail Industry

Kalinga Jagoda, Mount Royal College, Canada

Skylar Anderson, Mount Royal College, Canada

Today, it has become increasingly popular to decrease operational costs by outsourcing parts of the supply chain that have traditionally been performed in-house. Developments in logistics and technology have increased the options available for managers to tailor the design and management of their supply chain to fit their business objectives. Recent literature on outsourcing indicates that managers use outsourcing as a "quick and easy" fix to their operational problems. Incorrect decisions to outsource key operations may have negative impacts on the long-term capability of a firm to continue to compete in a competitive global business environment. This paper will discuss the outsourcing practices of a Canadian retail firm. A management decision-making framework to determine the best outsourcing strategies will also be presented. This integrated framework is used to analyze the case. Recommendations for management improvement in the outsourcing process are also highlighted.

011-0938: Sourcing Patterns and Product Configuration as a Means to Identify Technology Gaps in Mexico

Omar Salgado, ITESM, EGADE, Mexico

In the era of globalization companies seem to be rootless, showing an expertise of transferring production lines or complete factories across borders. These activities go beyond the initial strategic goals of what market to serve and where it is cheaper to produce; there are complex operational challenges such as finding the right source in the location, being able to develop a technological capability, dealing with local legislation, facing logistic and infrastructure patterns altogether with attaining the corporate strategy. This paper aims to undercover technology gaps within the Mexican automotive industry by analyzing the product configuration and sourcing patterns of products assembled in the country; bills of materials of products with highest production volumes per brand were decomposed on its components and their sources analyzed to find the rationale which responds to product complexity and manufacturing cost issues.

011-0147: Dual Sourcing and Supplier Competition

Arnab Basu, Indian Institute of Management, India

Jishnu Hazra, Indian Institute of Management, India

We consider a situation where a buyer is sourcing a component from two suppliers. Our time horizon is two periods and the buyer's total requirement over the two periods is Q . Before the start of the first period, the buyer guarantees a fixed quantity to each supplier to be allocated in the first and second periods. The balance amount is awarded, in the second period, to the winner of a price bidding competition between the two suppliers. In the second period, each supplier will have a lower unit manufacturing cost. This is achieved by a production learning curve which is a function of quantity allocated to him in the first period and through process improvements which are dependent on the amount of investment the supplier makes in the first period to reduce costs. We solve the buyer's allocation decision and analyze the supplier competition problem.

011-0389: The Effect of Learning on Manufacturing Outsourcing Decisions: A Game Theoretic Approach

Wenli Xiao, Georgia Institute of Technology, United States

Cheryl Gaimon, Georgia Institute of Technology, United States

Friday, 8:30-10:00 Sessions

We introduce a two-period game in which a customer determines the portion of demand of a product or component to manufacture in-house versus outsource in each period and the supplier determines the fixed price to charge over both periods. Consistent with the traditional approach, we explore the impact of learning that reduces the manufacturing cost incurred by the customer as well as the supplier. Furthermore, we explore the impact of learning that enhances the customer's ability to generate revenue by improving product quality or design features. Naturally, each firm benefits from learning in relation to their respective volumes of production. We compare the situations where the product or component to be manufactured has a long versus short life cycle. The key questions that arise in this context include how volume-based learning and the product life cycle influence the customer's outsourcing decisions and the supplier's price.

Friday, 10:30-noon Sessions

19	Friday, May 1, 10:30-noon Room: Cloister North Session: Service Performance Measurement	Track: SRVC, 1	Chair: David Hartsuiker
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011-0800: Geographical Reference Supporting Fraud Detection in the Telecom Industry

Wagner Damiani, FGV - EAESP / BYU - MARRIOTT, Brazil
Flavio Pereira, FGV - EAESP, Brazil

Fraud detection in the Telecom industry is a continuous effort to identify and stop unauthorized use. This real case shows how geographical tools helped one of the world's largest telecom companies to better identify and prevent fraud using daily operations data layered over geographical maps in conjunction with on-line performance dashboards.

011-0448: Is the PAD Scale an Appropriate Aid in the Design of Experience Service Delivery Systems?

David Hartsuiker, Radboud University Nijmegen, Netherlands
Philip Barbonis, Radboud University Nijmegen, Netherlands

This paper answers a call in Service Operations Management (SOM) literature for more research into experiences, experience servicescapes and the arousal of emotions in customers of an experience service concept. It does so by linking environmental psychology with SOM. Advantages and challenges are discussed for applying the "P(leasure) A(rousal) D(ominance)" scale to "measure" emotions evoked within customers in different types of experience servicescapes. Different values of emotions measured by this scale are tentatively linked to different types of experience service delivery systems used to arouse these emotions within customers. In this way, a forward step is made towards establishing a contingency approach for designing experience service delivery systems based on a quintessential element of experiences, namely the emotions that are evoked in the target market customers of such service delivery systems. This could provide SOM researchers and practitioners with initial guidelines for the design of "experience service delivery systems."

20	Friday, May 1, 10:30-noon Room: Cloister South Session: Supply Chain Logistics and Transportation	Track: SCM, 2	Chair: Ann Campbell
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011-0222: Dynamic Freight Routing on Air-Road Intermodal Network using Real-Time Congestion Information

Alper Murat, WAYNE STATE UNIVERSITY, United States
Farshid Azadian, WAYNE STATE UNIVERSITY, United States
Ratna Chinnam, WAYNE STATE UNIVERSITY, United States

This paper addresses routing of time-sensitive freight shipments subject to congestion on the road network and flight departure delays. We propose a stochastic dynamic routing model on the road-air inter-modal network. Routing decisions include selecting between alternative airports and flights based on real-time data on road traffic and flight delays. We illustrate the application of our model with an air cargo routing in the Michigan-Ohio road-air inter-modal network.

011-0397: Intermodal Hub Networks - Managerial Insights

Rafay Ishfaq, University of Alabama, Operations Management, United States
Charles Sox, University of Alabama, Operations Management, United States

This research highlights the role of intermodal logistics in the global marketplace. The research is motivated by the extraordinary increase in the use of intermodal in recent years for both inland and global movement of freight. Three mathematical models are presented which explore the dynamics of hub-and-spoke networks for intermodal shipments. The objective is to compare the conventional over-the-road (OTR) networks with intermodal logistics networks in terms of economical, operational and service requirements. These models describe with varying levels of abstraction, the implementation and operation of real life hub-and-spoke intermodal logistics network. We model non-linear transportation costs, fixed location costs, and modal connectivity costs for three modes of transportation: road, rail and air. In light of discussions with industry professionals and using real world data, network structure is explored to gain managerial insights into the intermodal logistics network.

011-0959: Optimal Scheduling of Component Parts Production and Deliveries

Renato de Matta, University of Iowa, United States
Vernon Hsu, George Mason University, United States
Chung Lee, Hong Kong University of Science and Technology, Hong Kong

We consider a JIT manufacturer that receives periodic shipments of unique component parts produced by different suppliers. Each supplier either delivers parts directly to the manufacturer or indirectly through a third party logistics firm which consolidates and ships the parts to the manufacturer in kits. We cast the suppliers' production and delivery scheduling decisions as a cost minimization, deterministic production lot-sizing and distribution problem. We model the problem as a mixed integer program, and develop an efficient procedure to find near optimal solutions.

011-0913: Network Design for Time-Constrained Delivery

Ann Campbell, University of Iowa, United States
Hui Chen, Northwest Airlines, United States
Barrett Thomas, University of Iowa, United States

Friday, 10:30-noon Sessions

To meet customer demand, delivery companies are offering an increasing number of time-definite services. We examine the strategic design of delivery networks which can efficiently provide these services. Given a restriction on the number of direct connections in the network, it may not be possible to identify a network that satisfies all of the delivery guarantees. Thus, we allow these guarantees to be violated but seek to minimize the sum of violations. We establish the complexity of the problem, exploit the solution structures to identify efficient solution methods, and provide helpful managerial insights.

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2 Friday, May 1, 10:30-noon **Room:** Captain **Track:** SCM, 16 **Chair:** Jin Kyung Kwak

Session: Information sharing

011-0877: An International Study on Supply Chain Restructuring: A Coordination Theory Approach

James Roh, Penn State Brandywine, United States

Paul Hong, University of Toledo, United States

Ma Ga Yang, University of Toledo, United States

The current dynamic business environment demands firms to reconsider the efficiency and effectiveness of their supply chains. As a result, firms constantly make efforts to restructure their supply chains. The concept of supply chain restructuring appeared in the mid-1990s, but the past studies did not provide what antecedents of supply chain restructuring are and how they help firms to increase their market responsiveness. This study, based on coordination theory, constructs a research framework that shows causal links among coordination with suppliers, information sharing with suppliers, supply chain restructuring, and market responsiveness. Empirical results from International Manufacturing Strategy Survey IV confirm the coordination theory that coordination mechanisms and information sharing with suppliers drive supply chain restructuring, which enhances market responsiveness. Theoretical and managerial implications are discussed as well.

011-0119: Impact of Information Errors on Supply Chain Performance

Jin Kyung Kwak, Cornell University, United States

Srinagesh Gavirneni, Cornell University, United States

This study illustrates how information errors affect supply chain performance when supply chain members share the end-customer demand information. We compare (both analytically and via simulation) three different scenarios – no information sharing, information sharing without errors, and information sharing with various magnitudes of errors. The benefit of information sharing is shown to decrease in a concave manner as the magnitude of errors increases. We observe, in a robust manner, that when the variance of information errors exceeds the variance of end-customer demands, the detrimental impact of the errors is greater than the beneficial impact of information sharing and therefore it is best to operate as if the information is not available. Information errors have a relatively bigger impact when the end-customer demands are less variable, or when the retailer's order interval is longer. For an effort to reduce information errors, the guideline of investment decision is provided.

011-0756: Improved Collaboration and Information Sharing by Using Supply Chain Contracts

Bjorn Albrigtsen, Norwegian University of Science and Technology, Norway

Erlend Alfnes, Norwegian University Of Science and Technology, Norway

Heidi Dreyer, Norwegian Universit of Science and Technology, Norway

The main purpose of this paper is to analyze and propose how supply contracts can be the foundation for better collaboration and information sharing between a manufacturer and wholesaler. A literature review has been carried out to identify the main collaborative areas that can be supported by a contract. A framework is proposed to analyze the contractual aspects of collaboration. This framework has been tested in a case study in the Norwegian HVAC sector. The experience from the case is that the framework can contribute to better collaboration and information sharing between partners in the supply chain, and thus strengthen the strategic position in the market for participants.

011-0833: The Value of Information Sharing in a Multi-Stage Supply Chain under ARMA Demand

Avi Giloni, Sy Syms School of Business, Yeshiva University, United States

Clifford Hurvich, Stern School of Business, New York University, United States

Sridhar Seshadri, University of Texas, IROM Dept., McCombs School of Business, United States

We consider a multi-stage supply chain with a retailer that observes ARMA demand. We assume that each supply chain player uses an order-up-to-policy. We show that when a player's demand is not invertible with respect to the shocks utilized by the previous player in computing its order, information sharing is valuable. We further show that the value of information can be unbounded.

011-0237: RFID Enabled Information to Manage Perishables

Michael Ketzenberg, Texas A&M University, United States

Rob Zuidwijk, Erasmus University, Netherlands

Jacqueline Bloemhof, Erasmus University, Netherlands

We study the value of RFID enabled information to manage perishable inventory. The product lifetime is random and is influenced by the time/temperature history of the product as it flows through the supply chain. RFID sensors can provide this information and we develop new inventory policies that utilize the information in decision making. We also explore the additional benefit arising from information that enables the supplier to observe the remaining lifetime of product available for purchase.

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2 Friday, May 1, 10:30-noon **Room:** Yeoman **Track:** SUST, 2 **Chair:** Rosani De Castro

Session: Case Studies 2

Friday, 10:30-noon Sessions

011-0905: Stakeholder Management and Organizational Sustainability Process: A Brazilian Case Study Shows a Possible Way

Mariana Lyra, Universidade Federal do Espírito Santo, Brazil

Ricardo Gomes, Universidade Federal de Vicosa, Brazil

Laercio Jacovine, Universidade Federal de Vicosa, Brazil

Sustainability is at the top of the agenda of high impact organizations since ecological concerns have raised the attention of the media.

This paper presents an investigation which has been carried out through a case study with one Brazilian organization at the forestry sector in order to devise viable indicators of sustainable production (ISP) for measuring sustainability, and to try to generate strategic information for managing the relations with the key stakeholders.

In this way, we intend to describe each stakeholder involved with the organization and focus on how to manage the relationships with them.

Furthermore, we intend to test some ISPs in order to figure out whether this specific type of organization can walk toward sustainability.

The theoretical framework comprises three international models: a five-level ISP tool, a model for identifying the most important stakeholders, and a model for identifying how to manage the relationship with key stakeholders by threat or cooperation.

011-0172: Public Management of Urban Solid Residues in Lençóis Paulista City

Benedito Martins, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

Jair Souza Manfrinato, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

Fabio Esguicero, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

This work approaches the management of urban solid residues in Lençóis Paulista City. Incorrect management of residues and social precariousness of a group of people that survives from these materials had imposed the need to organize an Integrated Management Plan of Urban Solid Residues (PGIRSU), conceived in a partnership between City Hall and Universidade Estadual Paulista (UNESP). Results were obtained with the redesign of the Composting and Sorting Plant, selective garbage disposal, the formation of a garbage pickers cooperative in a partnership with an association of the handicapped, which allowed social inclusion, an increase of recycling material separation and of the sanitary landfill lifetime--and thus allowing the implementation of the composting process. New possibilities arose with the collection of used kitchen oil and tree remains, used in energy generation, making it possible for other cities to replicate the plan.

011-0171: Use of Construction and Demolition Residues in New Material for Construction

Fabio Esguicero, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

Jair Souza Manfrinato, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

Benedito Martins, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

The construction sector is responsible for the greatest amount of residue generation in the whole production chain, from natural resources extraction to disposal of remains during the life-cycle of products, causing social and environmental problems to cities. Due to the exposed problem, this work presents a study about reuse of Construction and Demolition Residue (Resíduos de Construção e Demolição - RCD) in new material for construction. Recycling RCD can generate sand and stone, which can be used to manufacture concrete with no structural purpose, concrete artifacts such as pipes to water galleries, blocks, including reuse in basis and sub-basis to asphalt. With recycling, RCD offers an environmentally correct solution, and also decreases natural resources extraction through the construction chain.

011-0170: Economic and Environmental Analysis in Recycling Plant Implementation of RCC (Remains of Civil Construction) – Case Study

Fabio Esguicero, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

Jair Souza Manfrinato, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

Benedito Martins, UNIVERSIDADE ESTADUAL PAULISTA - UNESP, Brazil

The construction sector generates the greatest amount of residues in the whole production chain, from natural resources extraction, production process until remains disposal during product life-cycle, causing social and environmental problems to cities. Due to the exposed problem, this work presents a case study in Lençóis Paulista city, through a public investment project to install a construction residues recycling plant. Statistical data and economical viability analysis were utilized to execute the project. Through recycling, construction remains are triturated and transformed into recycled sand and stone, allowing the residue to return to the productive chain as new materials. It was verified that the project is viable, because it presents financial benefits and also resolves residues disposal.

011-0044: Proposal for a Reverse Logistics Model Horticulture Produce Warehouse in the Brazilian Market

Plínio Julioti, São Paulo State University/Department of Production Engineering, Brazil

Rosani Castro, São Paulo State University/Department of Production Engineering, Brazil

Horticulture warehouses in Brazil lack equipment and packaging that minimize the physical and economic losses of commercialized produce. The current needs for cost reductions and environmental awareness have made a package's specification and handling an activity that demands the implementation of public and private policies aimed at the improved optimization of its production chain. The objective of this paper is to introduce a reverse logistics model for horticulture produce used by the Uberlândia (MG), Brazil warehouse, which manages a Package Center through a Crate Bank system, responsible for their sanitization and for the closing of the logistic chain's reverse flow. The model's success is related to the adoption of plastic crates that replace the wooden ones.

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Friday, May 1, 10:30-noon **Room:** Scribe

Track: SUST, 6

Chair: David Drake

Session: Measuring Impact of Sustainable Operations

011-0132: A Tutorial on Closed-Loop Supply Chains with Remanufacturing

Gilvan Souza, University of Maryland, United States

Friday, 10:30-noon Sessions

We present an overview of closed-loop supply chains, which are supply chains where there are flows of products (post-purchase) back to manufacturers. Examples include supply chains with consumer returns, and leasing options. We start by defining basic terms: differences with respect to forward chains, sources of product returns, disposition options for product returns (scrap, recycling, reuse, cannibalization for spare parts, and remanufacturing), strategic, tactical, and operational issues, along with regulatory and legislative issues. We then provide a brief overview of current practices, particularly regarding the state of remanufacturing in select industries: PCs and peripherals, B2B IT equipment, tires, and construction equipment (Caterpillar). We review the extant academic literature on closed-loop supply chains, particularly as it regards business and management aspects, with less of a focus on environmental practices, and conclude with directions for future research.

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Friday, May 1, 10:30-noon **Room:** Knave
Session: Surgical Workload Planning

Track: HLTH, 2

Chair: James Francis O'Kane

011-0158: Service Quality Measurement: A Study of Appointments Systems in General Practice Surgeries in the UK

James O'Kane, *Staffordshire University, United Kingdom*

Martyna Sliwa, *University of Newcastle, United Kingdom*

A recurring problem in service quality literature is the question of measurement – i.e., knowing which aspects of quality should be measured, and in what ways. This paper proposes an approach to service quality measurement with a focus on the quality of appointments systems in general practice surgeries. This research uses a case study methodology integrating qualitative and quantitative methods, including interviews with organisational stakeholders as well as data regarding the temporal aspect of the systems of appointments.

This study offers insights into the subjective, processual and context-dependent nature of service quality as reflected in the perceptions of the organisational stakeholders within a primary health care setting, as well as into the objective and quantifiable aspects of service quality, revealing its dynamic, processual nature. The study demonstrates the scope for measuring service quality based upon data collected from different stakeholder groups, and for linking internal measures with stakeholders' evaluations.

011-0644: Using Queueing Theory to Relate Inpatient Ward Workload to the Operating Theatre Program

Peter Vanberkel, *University of Twente, Netherlands*

Richard Boucherie, *University of Twente, Netherlands*

Erwin Hans, *University of Twente, Netherlands*

Nelly Litvak, *University of Twente, Netherlands*

Johann Hurink, *University of Twente, Netherlands*

No other department influences the workload of the remaining hospital more than the Department of Surgery. The activities of the Department of Surgery are governed by the Operating Theatre Program (OTP) which states what patient types receive surgery on which day. In this presentation we describe an analytical approach (including stochasticity) to project the workload for downstream departments based on this OTP. Specifically the queueing model computes ward occupancy distributions, patient admission/ discharge distributions and the distributions for ongoing interventions/ treatments. Recovering after surgery requires the support of multiple departments, such as physiotherapy, rehabilitation and long term care. With our model, managers from these departments can determine their workload by aggregating activities associated with recovering surgical patients. As the OR is often described as the engine that drives the hospital, this paper describes an analytical model to relate the rest of the hospital to that engine.

011-0841: Scheduling and Capacity Planning in Cath Labs: A Real-World Analytical Study

John Fowler, *Arizona State University, USA*

Antonios Pritezis, *Arizona State University,*

Qing Li, *Arizona State University, USA*

Mohan Gopalakrishnan, *Arizona State University, United States*

Srimathy Mohan, *Arizona State University, United States*

Cardiac catheterization is a diagnostic procedure that comprehensively examines the functioning of the heart and its blood vessels. Managers of catheterization labs (cath labs) deal with different types of patients and frequently juggle the schedules in order to slot emergencies and urgent cases between scheduled ones. Cath labs have high fixed costs, mainly due to the cost of facilities and staff salaries. The focus of our study is to develop a modeling framework that can be used to illustrate the tradeoffs inherent in the process of scheduling patients with different priority levels into cath labs, and improve the efficiency of cath labs through better scheduling as measured by (i) lab utilization, (ii) staff overtime and (iii) patient delay. We explain the study in the cath labs of a local hospital and also conduct sensitivity analysis to arrive at pareto optimal results.

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Friday, May 1, 10:30-noon **Room:** EC-D1
Session: Strategic Integration

Track: EMPR, 2

Chair: Martin Springinklee

011-0401: Assessing Strategic Consensus: When Does Consensus Affect Performance?

Steven Melnyk, *Michigan State University, United States*

John Hanson, *University of San Diego, United States*

Douglas Stewart, *University of New Mexico, United States*

Sarah Wu, *Fordham University, United States*

Friday, 10:30-noon Sessions

Strategic consensus is a research conundrum. It has long been viewed as being critical to corporate survival and growth, yet empirical evidence for the link has been mixed at best. This paper addresses this conundrum by extending strategic consensus to include the customer. This model focuses on consensus within and among three groups (marketing, operations, and the customer). The impact of consensus is evaluated using the rwg index (a measure of within-group agreement). Using a three-step research methodology (detailed case study, survey, and post-survey debriefing) involving a major industrial pump manufacturer, the study finds evidence for the impact of consensus (especially between operations and customers). However, there is evidence to indicate the consensus framework is incomplete, and overlooks three major elements: (1) consensus only pertains to agreement and overlooks the capabilities necessary for implementation; (2) the performance of competitors; and (3) opportunities for strategic differentiation.

011-0179: Goal Distortion at the Marketing-Operations Interface: Where Demand Signals Get Lost in Manufacturing Firms

Merieke Stevens, University of Cambridge, Judge Business School, United Kingdom

Thomas Staeblein, University of Applied Sciences Ulm, Germany

This paper seeks to uncover the problem of goal distortion at the marketing-operations interface within manufacturing firms. While demand fulfillment objectives guide strategic goal formulation in most industries, distortions of these goals often occur at the operational level. We examine reasons for such organizational distortion using a case study conducted at an automotive manufacturer. In this case, we found path dependency, poor cross-functional integration, and unsynchronized performance indicators as the main causes of goal distortion. Examining a systemic tradeoff consciously encouraged by the organization, we argue that cross-functional goal alignment can be more important for lasting competitiveness than achieving superior performance in individual processes such as speed or efficiency.

011-0118: Functional Integration and Customization of ERP and Its Impacts

Osam Sato, Tokyo Keizai University, Japan

Yoshiki Matsui, Yokohama National University, Japan

Hideaki Kitanaka, Takushoku University, Japan

There are many manufacturing functions in a plant. Based on the diffusion of ERP software, some or all of these functions are integrated within ERP. ERP software is also customized to adapt to particular needs of a plant before the implementation. But the level of integration of functions and customization differs among plants. This integration and customization is conducted on the basis of expectation of performance improvement. But this has not been fully studied before. Customization of ERP and integration of functions to ERP must correlate to performance of either a plant or the firm according to the above inference. By using the data that were collected from nine industrialized countries, this research conducted an empirical study about the relationship between functional integration and customization of ERP as independent factors that should contribute to both plant and firm performance as dependent variables.

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Friday, May 1, 10:30-noon **Room:** EC-B
Session: Manufacturing Innovation

Track: PITM, 1

Chair: Glen Schmidt

011-0018: Do Customers Properly Value Modularity?

Glen Schmidt, University of Utah, United States of America

Sezer Ulku, Georgetown University, United States of America

Products that are modular-in-use can be adapted over time by consumers, as their tastes change and as technological improves. Despite these advantages, modular-in-use products are not ubiquitous. Our experimental results show consumers may undervalue modular upgradeability due to behavioral biases, similar to hyperbolic discounting as described in financial economics.

011-0899: An Image Inspection Method to Forecast Leather Quality Grade Based on Fast Fourier Transforms and Decision Tree

Mario Neto, Paulista University - UNIP, Brazil

Oduvaldo Vendrametto, Paulista University – UNIP, Brazil

We have investigated the real world-task of leather inspection concepts in this work. The aim is to improve the way to activities within the process of wet blue leather classification in the Brazilian tanning plants. The recognition of defects generators that depreciate the leather has been performed by an approach based on digital image processing using a fast Fourier transform, and the obtained data were fed into a KDD tool for the construction of a decision tree (C4.5 Algorithm) to formulate a classification to solve the Brazilian tanning plants' problems. It first develops related theories to model the classification by capturing images and processing them to count the defects. It then proposes the tree use to generate an algorithm to describe and automate the process. A case study is discussed to illustrate the effectiveness and the discriminatory performance of the proposed decision algorithm.

011-0274: The Relevance of Technology Foresight to Identify New Developments Concerning Industrial Process Technologies within German Industries

Lothar Czaja, Friedrich-Alexander-University of Erlangen-Nuremberg, Germany

Daniel Gerhard, Friedrich-Alexander-University of Erlangen-Nuremberg, Germany

Kai-Ingo Voigt, Friedrich-Alexander-University of Erlangen-Nuremberg, Germany

Friday, 10:30-noon Sessions

In literature, the enduring protection of both the innovative and technological abilities of a company is often mentioned as a central premise to guarantee a company's competitiveness in the long run. In this case, the impacts of the ongoing noticeable technological progress are not only limited to the economic development, but also affect a company's technological position in the competitive environment (cp. Soellner 1999). Because of the fact that Industrial Process Technologies influence the efficiency of production and operations processes to a great extent, companies are forced to permanently scan their technological environment to prevent overlooking relevant developments. In literature, Technology Foresight is discussed as an important tool to support companies' Technology Management divisions (cp. Bright 1970, Tiefel 2007). In our paper, we will determine the relevance of Technology Foresight to identify new developments concerning Industrial Process Technologies within German industries with the help of an empirical analysis.

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Friday, May 1, 10:30-noon **Room:** EC-C
Session: Teaching in the Online Environment

Track: EDUC, 2

Chair: Paul Schikora

011-0943: Using Spreadsheets to Teach Operations Planning Concepts to Distance Students

Paul Schikora, Indiana State University, United States

Moving a traditional OM course to the online world for distance delivery presents many challenges for the novice instructor. One of the most daunting is deciding how to present analytical planning methods that are typically taught via example in the classroom. Due to the multi-layered nature of spreadsheet programs, they can easily be adapted to present detailed, step-by-step examples of typical planning activities. These example files lend themselves well to the asynchronous learning environment found online. We demonstrate this by presenting examples in Aggregate Planning and MRP.

011-0109: Distance Learning: The Importance of the Virtual Contact of the Instructor with Pupils in Operations Management Courses over the Web

Karin Graeml, Pontifical Catholic University of Parana, Brazil

Alexandre Graeml, Positivo University/Federal Technological University of Parana - Brazil, Brazil

Distance learning has become an important teaching/training tool, used by universities and corporations alike. This paper reports the results of a study that consisted of observing the sharing of ideas and thoughts in discussion forums and chat rooms by students who were participating in Operations Management courses over the web. Part of the classes and assignments took place in a virtual environment provided by the university, where students could communicate among themselves and with the instructor, before uploading their assignments. This interaction was monitored for four courses: Project Management, Logistics, Human Resources, and Quality Management. Results show that those courses whose instructors involved themselves to a larger extent in the discussions that were taking place in the virtual environments were also the ones that had greater student participation. Instructors didn't even have to write a lot, they just needed to interject with quick guidance tips to keep the students going.

28

Friday, May 1, 10:30-noon **Room:** Gallery
Session: Business Planning During Disruptions

Track: DSPT, 2

Chair: Fred/ Sanjay Glover / Kumar

011-0110: Logistical Business Continuity Planning: Scale Development and Validation

Divesh Ojha, University of North Texas, United States

In this paper the scale development and validation of Logistical Business Continuity Planning construct has been undertaken. Using data from the transportation industry the psychometric property of the proposed Logistical Business Continuity Planning scale has been evaluated. We also assess the structure of the Logistical Business Continuity Planning construct. Three competing construct structures—Model A: hypothesized multidimensional second order factor model; Model B: first order multidimensional factor model; Model C: first order unidimensional factor model—are proposed and then evaluated using structural equation modeling analyses. The results indicate that the hypothesized second order multidimensional model is the best fit and most parsimonious model.

011-0155: Outsourcing, Yield Uncertainty, and Contingency Responses

Panos Kouvelis, Washington University, United States

Jian Li, Northeastern Illinois University, United States

With increased outsourcing of products and productions, it is important to manage the accompanying issues such as yield uncertainty in order to reduce the cost of outsourcing. In this paper, we intend to examine the informational value of yield uncertainty and contingency responses over a stochastic, discrete-time, finite-horizon planning setting from the perspective of an inventory manager outsourcing its product. Starting from the Benchmark case, three contingency responses are proposed and studied: shipping only good units, emergency order, and order splitting. For each developed model, we characterize theoretically the optimal decisions on the cycle order quantity, the emergency order quantity, and the split of the available units, and derive sensitivity results on how these decisions are affected by one another and the uncertainties. Numerical results are presented to reveal incremental values of the information revelation and contingency responses and how they are impacted by other factors.

011-0368: Competition Under Generalized Attraction Models: Applications to Quality Competition Under Yield Uncertainty

Awi Federgruen, Columbia University, United States

Nan Yang, Cornell University, United States

Friday, 10:30-noon Sessions

We characterize the equilibrium behavior in a broad class of competition models, in which the competing firms' market shares are given by an attraction model, and the aggregate sales in the industry depend on the aggregate attraction value according to a general function. Each firm's revenues and costs are proportional with its expected sales volume, with a cost rate which depends on the firm's chosen attraction value according to an arbitrary increasing function. We apply our general results to a new set of quality competition models. Here an industry with N suppliers of a given product, compete for the business of one or more buyers. Each of the suppliers encounters an uncertain yield factor, with a general yield distribution. The buyers face uncertain demands over the course of a given sales season. The suppliers compete by selecting key characteristics of their yield distributions, either their means, their standard deviations or both.

011-0505: A Holistic Concept for Supply Chain Risk Management of Small and Medium-sized Enterprises

Wolfgang Kersten, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

Mareike Boeger, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

Philipp Hohrath, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

Carolin Singer, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

Recently, awareness of the importance of supply chain risk management in literature and business practice has increased. Several studies show, however, that there is a lack of implementation of risk management in companies, particularly in small and medium-sized enterprises (SMEs). One reason for this is a deficit in methodological support from academia.

In this paper, a holistic concept for supply chain risk management is developed, especially for SMEs. It is based on the risk management process which is widely agreed upon. The difference from existing concepts is that it not only structures the process, but also uses "intelligent" components. Given the attributes of the company and the supply chain, likely risks and appropriate mitigation strategies are suggested automatically. The concept was developed in a research project of the Kühne School at Hamburg University of Technology (Germany) in close cooperation with companies from different industries.

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Friday, May 1, 10:30-noon **Room:** EC-A
Session: Behavior

Track: EMRG, 2

Chair: Yan Cimon

011-0846: Current Debates in Social Network Analysis: Review and Implications for Operations Strategy

Yan Cimon, CIRRELT, Université Laval, Canada

Social networks have enjoyed a growing popularity in the literature yet their implications for operations strategy are still understudied. Social network morphology has an important impact on the performance of firms. The purpose of this paper is to highlight the implications of emerging debates in social network analysis in the context of operations strategy. The paper first presents an extensive review of the literature. Second, it examines fundamental concepts behind the existence and emergence social networks. Building on this, the paper thirdly examines two critical debates. On one hand, the centrality-periphery debate tries to determine which position is the most beneficial for a given actor. On the other hand, the cohesion-structural holes debate seeks to settle which network architecture promotes increased performance. Fourth, implications for operations strategy are outlined. Some empirical considerations and key challenges are presented.

011-0961: Mining Sales Person Behavior for Estimation and Pricing Optimization

Itir Karaesmen, University of Maryland, United States

Wolfgang Jank, University of Maryland, United States

Wedad Elmaghraby, University of Maryland, United States

We seek to improve pricing decision support tools (DSTs) in a B2B setting where sales people are the ones that quote prices to customers. Embedded in pricing DST are forecasts of a customer's maximum willingness-to-pay (WTP). On the one hand, there are observable facts (e.g., customer's purchase history including past transaction prices and purchase quantities), which can be captured and modeled in a DST. On the other hand, there are less tangible pieces of information that speak to how a customer perceives/internalizes a price quote and reacts to it (e.g., fairness) that are only observed by the sales person and as such very hard to incorporate into a pricing DST. We develop a mental model for sales people in making pricing decisions, and investigate sales persons attitude towards pricing recommendations and identify biases towards recommendations.

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Friday, May 1, 10:30-noon **Room:** EC-E
Session: Case Studies in Logistics

Track: LGST, 2

Chair: Doug Hales

011-0410: Hub Arc Selection for Freight Consolidation

Woosung Jang, University of Missouri - Columbia, United States

Sean Carr, University of Missouri - Columbia, United States

Freight consolidation has become a key factor that affects the cost and service quality of a logistics operation. The right combination of various consolidation strategies can considerably reduce the cost of operating a logistics network. This research develops models and solution methodologies for the logistics network design problem using freight consolidation strategies. Due to the complexity and extent of a large scale logistics network there are several potential modifications that can be explored in order to reduce overall logistics costs, while both improving shipping visibility and customer service. Specifically, our work shows the analysis of a sparse logistics network, mathematical models and algorithms, and an implementation strategy for shipment consolidation. This research is motivated and supported by a Fortune 500 diversified manufacturer of engineered components and products that has approximately 220 U.S. branches.

Friday, 10:30-noon Sessions

011-0896: Strategic Logistic Management in the Cosmetic Industry: The “Natura” Case

Vanina Silva, Universidade Federal de Santa Catarina, Brazil
Camila Zago, Universidade Federal de Santa Catarina, Brazil
Antônio Coelho, Universidade Federal de Santa Catarina, Brazil
Mirian Goncalves, Universidade Federal de Santa Catarina, Brazil

Once organizations are inserted in an environment of constant changes, they choose an efficient management style through a set of activities including supply, manufacturing, distribution, and lastly, sales which are essential to gain a sustainable competitive advantage over the competition. These activities integrate the logistic systems that, at this time, have passed from cost centers to strategic centers within a company. Once the logistic costs are incurred, the quality of the services offered to the customers and, in particular, the times of cycle of the logistic chain, depend directly on the chosen strategy. After developing bibliographical, documented and explorative researches, the present study focuses on presenting the strategic logistic management adopted by the Brazilian cosmetic company, Natura. This study verified, by evidence, that the operations and logistic strategies of the successful cosmetic industry have a satisfactory and efficient performance, reaffirmed by the wide acceptance and credibility of their customers.

011-0819: Arcs of Competition: A Case of International Ports

Douglas Hales, The University of Rhode Island, United States
Nik Dholakia, The University of Rhode Island, United States

Container ports are the primary gateways for global trade in durable goods. Of these, Asian ports dominate transshipments and exports, while western ports dominate imports. This has created an imbalance in global trade - creating bottlenecks at many key hinterland and seaside facilities. Due to the bottlenecks, shippers are constantly seeking alternatives that speed transit time and reduce wait times at port facilities. Climate change and the widening of the Panama Canal have created new opportunities for shippers, thereby changing the way ports compete. The purpose of this study is to examine new factors of port competition that consider the effects of climate change and the wider Panama Canal.

011-0497: Idiosyncratic-Risk Characteristics of Port-Focal Logistics

Jianfeng Mao, The Hong Kong Polytechnic University, Dept. of Logistics and Maritime Studies, Hong Kong
Jiguang Yuan, The Hong Kong Polytechnic University, Dept. of Logistics and Maritime Studies, Hong Kong
John Liu, The Hong Kong Polytechnic University, Dept. of Logistics and Maritime Studies, Hong Kong

The studies of logistics and supply chain management (SCM) have been based on a firm-focal framework; while in reality, the worldwide operations of logistics and SCM are carried out around ports and airports. We conduct a pioneer study on port-focal logistics engaged in a 1-provider (port) n-client (carriers) capacitated production system, which can be characterized as a capacity reserve system with one capacity provider (port) and n idiosyncratic patrons (carriers) who reserve and utilize port capacities to meet idiosyncratic streams of logistics demands from an established shipping market. The key contribution is to obtain value characteristics of a port-focal logistics system in terms of quasi-variational inequalities (QVI) of impulse control theory, and show that value of risk-pooling exists in port-focal logistics, and can be measured by endogenous disturbance structure in response to exogenous variability of idiosyncratic demands. Algorithms are developed to compute the value of mutuality by solving the QVIs.

31	Friday, May 1, 10:30-noon Room: EC-F Session: NPD & Tech Transfer	Track: BNCH, 2	Chair: Kalinga Jagoda
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011-0828: Emerging Roles of Technology Intermediaries in Facilitating International Technology Transfer

Kalinga Jagoda, Mount Royal College, Canada
Krishnamurthy Ramanathan, Asian and Pacific Centre for Transfer of Technology, India

In today's dynamic business setting, managers of international technology transfer (ITT) projects are expected to effectively and quickly complete the projects. Delays in technology sourcing and implementation could make it difficult for a transferee firm to fully exploit the "window of opportunity" that opens up due to the implementation of the ITT project. With barriers to global business being gradually dismantled it is possible to perceive the emergence of new and interesting ITT arrangements. This paper discusses the critical role that technology intermediaries can play in facilitating ITT. A case of ITT from the metal-working industry in Australia is presented to illustrate how a local intermediary contributed to the effective completion of the project by partnering with the transferee firm in the packaging of technology, implementation, and commissioning. Based on the findings of the case study some preliminary suggestions for the effective use of intermediaries in facilitating ITT are made.

32	Friday, May 1, 10:30-noon Room: EC-G Session: Competition and Impact	Track: MKTG, 2	Chair: Yusen Xia
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011-0381: Improving Forecasting Accuracy of Sales Promotions through Reference Demand Model and Multiple Linear Regression Analysis

Usha Ramanathan, Nottingham University Business School, United Kingdom
Luc Muyldermans, Nottingham University Business School, United Kingdom
Bart MacCarthy, Nottingham University Business School, United Kingdom

Friday, 10:30-noon Sessions

Demand for products from a leading soft drink manufacturer differs for a range of promotions in various retail outlets. This complicates demand forecasts and hence gaining information from all possible supply chain partners by involving them in collaborative forecasting becomes essential. We propose a conceptual "Reference Demand Model" (RDM) to capture the value of information by identifying factors that may impact on demand. This model is validated through multiple linear regression analysis with actual sales figures. Sales forecasting through regression also identifies the significant demand factors specific to each product and for different retailers. However, some of the demand factors specified as highly important in the RDM are not significant in the regression models. Understanding the importance of product specific demand factors will help managers in improving the current forecasting approaches and in evaluating the promotional events.

011-0339: The Impact of Low End Competition on a Strategic Supplier

Liwen Chen, The University of Texas at Austin, United States

Stephen Gilbert, The University of Texas at Austin, United States

Yusen Xia, Georgia State University, United States

We consider how the entry of a lower quality rival affects an incumbent original equipment manufacturer (OEM) when there are strategic suppliers. We find that if the rival's quality is neither too high nor too low, his entry can benefit the incumbent OEM. In addition, we identify and analyze the trade-off among strategic priorities that exists when the incumbent invests in capacity prior to the entry of a rival. While an aggressive investment in capacity may discourage the entry of a rival, it may also induce strategic suppliers to seek higher margins.

011-0398: Co-Evolution of Demand and Supply under Product Competition: The Role of Responsiveness and Attractiveness in Diffusion Dynamics

Ton de Kok, Eindhoven University of Technology / OPAC, Netherlands

B Vermeulen, Eindhoven University of Technology / OPAC, Netherlands

Only recently, Kumar and Swaminathan (2003) developed a production and operations management model in which demand develops according to the Bass (1969) diffusion model. They derive optimal strategies for inventory build-up prior to product launch. However, from an evolutionary economic point-of-view, competitors would frustrate the quasi-monopolistic roll-out strategies they derive. We present a novel production management model in which replicator equations describe substitutive diffusion occurring in a competitive market. The market dynamics are then the outcome of co-evolution of socially reinforced demand and heuristically adjusted supply. We use our model to investigate the effect of responsiveness and product attractiveness on market dynamics. We formally establish that technologically superior products will eventually dominate the market if only technological performance matters to customers. We also find that, in this case and complementary cases, responsive capacity scaling combined with a pricing strategy always allows realizing temporary dominance or even consolidation of a market segment.

011-0279: Grönroos' Strategic Competition Perspective: The Case of Pizza Delivery

Kleber Nobrega, Universidade Potiguar, Brazil

Rodrigo Leone, Universidade Potiguar, Brazil

Carolina Montenegro, Universidade Potiguar, Brazil

Frederico Barbosa, Universidade Potiguar, Brazil

Tereza Souza, Universidade Potiguar, Brazil

This paper discusses the strategy implemented by a group of companies, aiming to verify the adoption of a service strategy, in comparison with other 3 types of company strategy mentioned by Grönroos (2004): product, price or image. Beginning with a theoretical study about service strategy, comparing different propositions of authors related with service marketing and service management, Grönroos' model was selected as a basis to analyze strategies adopted by pizza delivery companies in the city of Natal. All pizza delivery companies in Natal had their data collected and analysed, totaling 25 organizations. To analyze data the techniques used were cluster analysis and discriminant analysis. Results show how the different companies balance strategy, or not, prioritizing offered product quality, price, image or an approach for customer service.



Friday, May 1, 10:30-noon **Room:** EC-H

Session: Performance

Track: QUAL, 2

Chair: Jamison Kovach

011-0028: Software Development when Testing is Imperfect or Incomplete

Tapan Bagchi, Indian Institute of Technology Kharagpur, India

This study analytically assesses the risk of releasing defective software that cannot be exhaustively tested, and of needlessly testing defect-free software. It quantifies the probabilities of Type I (alpha) and Type II error (beta) in software development when one may release software that is appraised using test methods and cases that themselves may not be perfect. The study uses Truncated Poisson- and geometric-distributed path lengths and Bernoulli-type inspection errors to link alpha and beta to software design features, the development philosophies employed, and certain aspects that include code quality, cyclomatic complexity and the average length of basis paths. All sensitivities are studied and the results are graphically presented.

011-0074: Modeling the Relationship of Quality Management and Knowledge on Performance

Jamison Kovach, University of Houston, United States

Lawrence Fredendall, Clemson University, United States

Friday, 10:30-noon Sessions

Many have suggested that quality management is a source of competitive advantage. However, previous research examining the influence of quality management on performance has shown mixed results. Subsequently, it has been proposed that knowledge creation is a vital activity of quality management. This proposition is based on the knowledge-based view of the firm in which knowledge is viewed as an essential organizational resource that builds competitive advantage. Hence, proving that quality practices lead to knowledge creation will subsequently support the argument that quality management is a source of competitive advantage; yet, the link between knowledge and quality management is still not well understood. This research develops the theoretical relationships between quality practices and knowledge-creation processes and considers how these factors affect organizational performance. It is hoped that this will be useful for future empirical study to determine the organizational value of quality management practices and knowledge-creation processes relative to performance.

011-0072: Adaptation and Application of the SERVQUAL Scale in Higher Education

Otávio Oliveira, UNESP - São Paulo State University, Brazil

Euriane Ferreira, UNESP - São Paulo State University, Brazil

Higher education in developing countries has serious quality problems. In order to change this scenario it is necessary to invest in quality systems and tools for improvement. The SERVQUAL scale is one of these alternatives. It is used to measure the gap between quality expectations and perceptions in services making it possible to establish action plans. The objective of this paper is to propose an adaptation of the SERVQUAL scale's generic questionnaire for the higher education service sector and present the main results of its application in students of the production engineering program at Universidade Estadual Paulista (UNESP) in Brazil. Thirty-eight questionnaires were applied to measure perception in entering students and 28 to measure expectations in graduating students.

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Friday, May 1, 10:30-noon **Room:** EC-I
Session: Sourcing Decision Making 2

Track: SRCG, 2

Chair: Carlos Hector Mena Madrazo

011-0643: The True Costs of Overseas Sourcing

Ken Platts, University of Cambridge, United Kingdom

Ninghua Song, University of Cambridge, United Kingdom

There has been a dramatic increase in overseas sourcing over the last 20 years. Cost savings are frequently stated to be a major reason for this sourcing, however the actual cost savings may not be as great as expected. This paper reports a study which investigates the true total cost of sourcing from China. This research is based on six detailed case studies in UK manufacturing companies with experience of global sourcing from China. The findings provide a comprehensive framework for the analysis of the total costs of outsourcing from China. Empirical data suggests that it is necessary to add (on average) 50% to the quoted price to arrive at a reasonable estimate of the total cost. The variation in this figure is large which provides an indication of the risks involved. Input from this research should inform the strategic sourcing decision.

011-0224: Definition of In-Sourcing Strategies in Complex Global Supply Chain: A Case Study

Marco Busi, Carisma RCT / Vietnam National Economics University, United Kingdom

Steve Chisholm, Carisma RCT, United Kingdom

The research behind this article aims to define a model for in-sourcing of production that would enable a supply chain to assign fulfilment of a client's order from the lower cost production plant in their global production network. This article discusses the theoretical underpinning of global sourcing and presents the decision making frameworks and the models developed during a contract research project with a Multi National Corporation (MNC) with a complex global network of production and sales and distribution facilities. The discussion of the case study will highlight the outcome of and the lessons learned during the scoping phase of the project, aimed at mapping current and future states of the MNC supply chain relevant processes and the definition of the in-sourcing model.

011-0299: Global Sourcing Decisions: Costs, Risks and Environmental Implications

Carlos Mena Madrazo, Cranfield University, United Kingdom

Andrew Palmer, Cranfield University, United Kingdom

Martin Christopher, Cranfield University, United Kingdom

Organizations often look at global sourcing as a strategy to reduce costs and improve competitiveness. However, global sourcing involves costs that might not be immediately apparent and can lead to risks such as: increased response time, loss of sales, loss of trust among supply chain partners, loss of intellectual property and increased vulnerability. Furthermore, the trend to source globally can have other unintended consequences such as increasing pollution and emissions of greenhouse gases, which carry a social cost.

The main objective of the research reported here is to provide practitioners with a more holistic analysis of the costs and risks of global sourcing. Specifically, this paper reports on the development of the Comparative Global Sourcing Model (CGSM), a computer model that supports better sourcing decisions based on a structured analysis of the implications of the sourcing decision in terms of cost, time, risk and emissions.

011-0217: Product Complexity and Mode Choice in Global Product Development

Pedzi Makumbe, Massachusetts Institute of Technology, United States

Warren Seering, Massachusetts Institute of Technology, United States

Eric Rebentisch, Massachusetts of Technology, United States

Friday, 10:30-noon Sessions

Despite the growth in the practice of global product development, little work has been done to understand factors that influence mode choice in global product development. Our research fills this gap in the literature by empirically investigating variables that drive firms to either globally outsource, globally partner or captive offshore. We assume a product-centric view, and combine the transaction cost theory and the resource based view of the firm to explain mode choices based on the analysis of electromechanical products developed across Asia, Europe, the Middle East, and South America for (or by) American firms. Using multinomial logistic models, we find significant relationships between the mode of global product development, and product complexity, product content uniqueness, product strategic importance and designer's technological capability. However, the significance of each variable in predicting the mode of global product development varies by region when we compare emerging regions versus mature regions.

	Friday, May 1, 10:30-noon Room: EC-D Session: The Use of Educational Tools	Track: EDUC, 9	Chair: Michael Shulver
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011-0708: Assessment via the Dragons Den

David Bamford, Manchester Business School, United Kingdom

Paul Cousins, Manchester Business School, United Kingdom

The assessment allowed students to demonstrate what they learnt as the course progressed, rather than the more traditional system of an examination at the end of the course. Business idea posters were assessed in class in weeks 4 and 6 by an academic team, then a "Dragons Den" event was held at which the Managing Director and senior team of a major company assessed the 20 students' posters. They picked the best 4 (in their opinion based upon the business proposition). The best 4 then immediately gave a 10 minute presentation of their proposal to the panel and class. The "winning" group won a cash prize and much publicity. The formal assessment was completed when the students submitted a group report per team, and individual peer assessment, rating each others' contribution. Marks were then attributed within the team accordingly. Very highly rated by all.

011-0729: Proposal for Initial Analysis of Conditions of Use of Business Games

Patricia Zuccari, Universidade Estadual Paulista, Brazil

Débora Pistori, Universidade Estadual Paulista, Brazil

José Rodrigues, Universidade Estadual Paulista, Brazil

This research aims to propose a method the analysis of the initial conditions of use of business games, because it is assumed that users do not always understand the details of the games and guidance provided by their manuals, in addition to show lack of domain of content considered elementary for the use of it. Thus, it is expected to contribute to research on the use of business games as a strategy to support the teaching-learning process. The method of research is exploratory, to be directed to preliminary analysis of the initial conditions of the use of business games.

	Friday, May 1, 10:30-noon Room: Senate Session: Energy	Track: GENL, 1	Chair: Frank Kafka
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011-0429: Discovery of Oil in Western Uganda: Challenges and Opportunities

Frank Kafka, St. Edward's University, United States

Significant oil reserves have been discovered in western Uganda. These discoveries have led to hopes of oil independence for Uganda and opportunities to improve infrastructure, provide improved health care with emphasis on HIV/AIDS prevention and treatment, and offer increased educational opportunities for Ugandan citizens. The challenges facing Uganda's government in their development of these oil resources include the impact of exploration and drilling upon the local rural population - their village life, cultural and social traditions and their reliance on a barter based economy, resolving border boundary disputes with the Democratic Republic of the Congo, addressing instability in the area due to rebel activity, putting in place the necessary infrastructure, and addressing transparency concerns about government - contractor relationships. This paper examines these challenges and the efforts being made to meet them.

Friday, 1:30-3:00 Sessions

37	Friday, May 1, 1:30-3:00 Room: Cloister North Session: Service Design and Development	Track: SRVC, 2	Chair: Roger Solano
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011-0789: Operational Integration of New Services

Marie-Pierre Spooner, Universite du Quebec a Montreal, Canada

Many new services are developed with an eye to marketing but a limited understanding of the impact they will have on an organization's operational system. New services can create variations in the system that can, in a worst-case scenario, prevent the service from being fully implemented. The goal of the case studies is to examine how two financial institutions planned the operational integration of a new service, how these services were deployed, and how managers coped with the resulting variations as they arose.

011-0281: Unsolicited Customer Input (UCI) and New Service Development (NSD)

Amitkumar Kakkad, London Business School, University of London, United Kingdom

This paper examines the role of Unsolicited Customer Input (UCI) in New Service Development (NSD) and Service Innovation (SI). Relevant literature has mostly explored Solicited Customer Input (SCI) in the context of NSD, whereas UCI has largely been studied only in the context of service recovery. This paper attempts to bridge this gap by studying the role that UCI can play in NSD and SI by synthesizing three broad research questions that address the gap and also lead to many promising ideas for future research. Case study as well as survey research methods are used to derive and empirically test the hypotheses based on these research questions. Multiple case studies help examine the role of UCI in the context of NSD in service firms, and refine the proposed conceptual model. A subsequent large-scale survey of service companies across industries helps empirically test the hypotheses derived from the refined model.

011-0255: A Hierarchical Framework for the Design of Service Supply Chains

Roger Solano, Missouri University of Science and Technology, United States

Sanchoy Das, New Jersey Institute of Technology, United States

A Service Supply Chain (SSC) may be described as a network of service provider facilities, each of which is able to process one or more service tasks on an as-needed basis. SSCs are increasingly being developed by companies that experience a high variability of demand for their services. In SSC the business service is decomposable into several sequential tasks that can be processed by different providers, and the primary capacity resource is skilled labor. Typically, the service should be provided within a certain time, and as a result, the service provider needs to maintain sufficient capacity. The primary advantage of a SSC is that the processing capacity (labor) can be economically adjusted (lower hiring and firing costs) to match changes in the current demand level.

A hierarchical framework for modeling the decision structure in SSCs is developed. As a result, three decision problems are presented for further research.

38	Friday, May 1, 1:30-3:00 Room: Cloister South Session: Commodity Markets and Operations Management	Track: SCM, 3	Chair: Nicola Secomandi
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011-0134: The Effect of Store Managers on Performance in Centralized and Decentralized Retail Chains

Zeynep Ton, Harvard Business School, United States

Dennis Campbell, Harvard Business School, United States

How much do store managers affect their stores' operational and financial performance? Does the effect on performance differ for centralized versus decentralized organizations? We explore these questions by examining store manager movements within two different chain organizations.

011-0469: Making Explicit the

Roberto Perez-Franco, Massachusetts Institute of Technology, United States

Mahender Singh, Massachusetts Institute of Technology, United States

Yossi Sheffi, Massachusetts Institute of Technology, USA

Frameworks for supply-chain strategy formulation, from Fischer (1997) to Schnetzler et al (2007), typically ask firms to explicitly define their current supply chain strategy. However, the literature offers no guidance on how an existing supply chain strategy can be articulated. The task is not trivial: high-level discussions about supply chain strategy are often void of facts (Hicks, 1999), and most firms lack a well-defined supply chain strategy (Harrison and New, 2002). In this paper we propose a framework to map a firm's "as is" supply chain strategy. It was developed by applying qualitative content analysis and a variation of Porter's (1996) strategic activity maps to a rich case study, and later refined through a collaborative inquiry in-depth case study. Literature review was used to validate and enrich the evolving framework. The result can be valuable to practitioners both in terms of insight development and as part of a reformulation effort.

011-0930: Forward and Spot Prices under Cournot Competition and Stochastic Demand

Dana Popescu, New York University, United States

Sridhar Seshadri, University of Texas at Austin, United States

We establish the existence of a forward market under Cournot competition and stochastic demand. We compute equilibrium forward and spot quantities and prices. We show that the size of the forward market and the consumer and seller surpluses significantly depend on the uncertainty in demand. Our results explain the occasional disappearance of spot market for highly volatile goods.

011-0726: Optimal Timing of Inventory Decisions with Price Uncertainty

Vishal Gaur, Cornell University, United States

Sridhar Seshadri, University of Texas Austin, United States

Friday, 1:30-3:00 Sessions

Marti Subrahmanyam, *New York University, United States*

We consider the problem of determining the optimal timing of inventory investment for a firm when its forecasts of demand and price improve with time but are correlated with the prices of traded assets in the financial markets. Our model provides results regarding the value of the option to postpone inventory procurement when both price and demand are stochastic. We illustrate the empirical validity of our model by testing it on firms in the gold mining industry. Thus, we present new evidence on the correlation between days of inventory and price volatility.

011-0420: An Approximate Dynamic Programming Approach to Benchmark Practice-based Heuristics for Natural Gas Storage Valuation

Nicola Secomandi, *Carnegie Mellon University, United States*

Guoming Lai, *Carnegie Mellon University, United States*

Francois Margot, *Carnegie Mellon University, United States*

The valuation of the real option to store natural gas is a practically important problem that entails dynamic optimization of inventory trading decisions with capacity constraints in the face of uncertain natural gas price dynamics. Stochastic dynamic programming is a natural approach to this valuation problem, but is not widely used in practice because it is at odds with the high-dimensional natural-gas price evolution models that are widespread among traders. According to the practice-based literature, practitioners typically value natural gas storage heuristically. The effectiveness of the heuristics discussed in this literature is currently unknown, because good upper bounds on the value of storage are not available. We develop a novel and tractable approximate dynamic programming method that coupled with Monte Carlo simulation computes lower and upper bounds on the value of storage, which we use to benchmark these heuristics on a set of realistic instances.

5	Friday, May 1, 1:30-3:00 Room: Captain Session: SC Strategy	Track: SCM, 17	Chair: Vijayendra Viswanathan
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011-0055: Optimal Supply Chain Strategy: A Process Manufacturing Industry Perspective

Tim Coltman, *University of Wollongong, Australia*

Trevor Spedding, *University of Wollongong, Australia*

Albert Munoz, *University of Wollongong, Australia*

In recent years the popular press has given considerable weight to the importance of generic supply chain strategies that can take a lean, agile or continuous replenishment orientation. However, little theoretical and empirical work has been directed towards the relevance of these strategies in complex settings that are frequently found in the process manufacturing industry. In this paper, we theoretically show that the most effective supply chain management approach requires a balance among all three strategic orientations. We then show using three operational measures from a process manufacturing case study that performance is highly dependent upon the interaction among all three generic supply chain strategies. The three operation measures are: inventory levels, customer satisfaction, and volume throughput. This interaction is critical to our understanding of supply chain management as it implies that generic supply chain strategies on their own are far less common than normally assumed.

011-0061: A Planning-Anticipation Approach for Supply Chain Operations Planning

Michiel Jansen, *Eindhoven University of Technology, Netherlands*

Ton Kok, *Eindhoven University of Technology, Netherlands*

Jan Fransoo, *Eindhoven University of Technology, Netherlands*

Linear programming (LP) models for Supply Chain Operations Planning (SCOP) are not well suited for modeling the nonlinear relationship between the release of work to a production unit and its output over time. We present an approach in which the LP planning model is updated with feedback from an anticipation model. The anticipation model describes the stochastic behavior of the production unit. Given a schedule of release decisions over time from an initial planning run, we find the moments of the aggregate work distribution after each release. Using a linear approximation heuristic, the aggregate work is then rescheduled such that planned lead time constraints are met with a certain probability. Next, the planning model is modified based on the adjusted aggregate production plan and a new production plan is generated. In a simulation experiment, we study the effectiveness of the planning-anticipation approach in comparison to a purely deterministic planning model.

011-0127: A Dynamic Game of Supply Chain Coordination and Horizontal Competition

Fouad El Ouardighi, *ESSEC Business School, France*

Pietro De Giovanni, *ESSEC Business School, France*

In this paper we consider two supply chains, each consisting of one manufacturer and one retailer. The supply chains compete for market demand both on price and advertising goodwill. The paper analyzes the players' optimal policies on inventory management, retail price, and advertising effort over time. In order to take into account the potential coordinating power of the compensation scheme adopted in this type of decentralized setting, we compare the possible outcomes under a wholesale price contract and a revenue-sharing contract.

011-0153: The Effect of Operations Strategy on Supplier-Customer Relationships and the Suppliers' Financial Performance

Yoon Hee Kim, *University of Wisconsin-Madison, United States*

Urban Wemmerlov, *University of Wisconsin-Madison, United States*

In the last decade, there has been an enormous interest in the value of effective supply chain management practices to a firm's success. The literature suggests that a move towards a close customer-supplier relationship is mutually beneficial for both parties. Yet, the benefits of close supplier-manufacturer relationships accruing to supplier firms have not been well documented. In this study, we empirically assess the impact of close relationships between suppliers and customers on the financial performance of the supplier. Specifically, we are interested in whether and how a supplier's strategic choices in the operations area affect its relationship with a customer and can help balance risks and rewards in the relationship. Cross-sectional data are collected by survey from suppliers in the manufacturing industry. The direct and mediated relationships among the operations strategies, the supplier-manufacturer relationships, and the financial performance of suppliers are tested using structural equation modeling.

011-0788: Strategic Inventories in a Two Period Cournot Duopoly

Vijayendra Viswanathan, University of Wisconsin-Milwaukee, United States

Jaejin Jang, University of Wisconsin - Milwaukee, United States

Recently, there has been increased interest in the role of strategic inventories in vertical control of supply chains. In this paper we consider a one manufacturer, two-retailer, two period ordering model, where the retailers are in Cournot Competition. Retailers are allowed to carry inventory from the first period to the second. The demand function is assumed to be a linear function of price. We derive closed form expressions for the equilibrium wholesale price of the manufacturer in the two periods, equilibrium order quantities of the retailers as well as inventory carried by the retailers between periods. We find that the manufacturer's first period wholesale price is higher in equilibrium than the second and strategic inventory is optimal for the retailers under certain conditions.

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Friday, May 1, 1:30-3:00 **Room:** Yeoman
Session: Environmental Impact of Operations 1

Track: SUST, 3

Chair: Pauline Found

011-0732: A Comparison of Data Requirements and Control Measures for the Logistics, Security, and Environmental Performance of Container Transport

Rob Zuidwijk, Rotterdam School of Management, Netherlands

Jan van Dalen, Rotterdam School of Management, Netherlands

Albert Veenstra, Rotterdam School of Management, Netherlands

There is a growing belief that progressive security requirements in container transport may be met without compromising logistics and environmental performance. An important enabler is the use of information, based on tracking and tracing data, in decision making. Security constitutes, next to safety and the use of public infrastructures, an important social impact of container transport. The use of information for enhanced performance can be modeled by means of a monitor and control loop. Based on our findings in a demonstrator project on the development of a visibility system for container transport, we address the questions to what extent data requirements of monitor and control loops that are aimed at the enhancement of logistics, security, and environmental performance are aligned, and how control measures can be devised through modeling that balance logistics, security, and environmental performance.

011-0678: Sustainable Design Practices: The Importance of Transnational Networks

Tonya Boone, College of William and Mary, United States

Regina Root, College of William and Mary, United States

In the wake of erratic climate change and a rapid decline in biodiversity and cultural diversity throughout the globe, eco-fashion has emerged as both a media "happening" and powerful shift in lifestyle. The fashion industry is a global enterprise that employs some 26.5 million people worldwide, relies on dangerous chemicals to produce textiles for clothing, further exhausts limited fossil fuels to sustain its supply chains, and promotes excessive consumption. Simultaneously, this same industry regularly produces stellar examples of best practices in sustainable design and corporate social responsibility. There has been little coverage of sustainable design practices in the fashion industry - most of it has focused on US and European designers. Meanwhile, the growing network of Latin American designers has been overlooked. This paper will discuss the main issues guiding the standards of ethical design, including the importance of transnational networks of designers focused on cultural diversity and sustainability.

011-0509: The Environmental Sustainability of Quick Response Concepts

Heidrun Rosic, Vienna University of Economics and Business Administration, Austria

Werner Jammerneegg, Vienna University of Economics and Business Administration, Austria

At the moment environmental sustainability is a highly discussed topic in supply chain management (SCM). This is due to several internal or external drivers, like customer pressure or legislative requirements. In the past, several trends have emerged in SCM, such as centralization, outsourcing, and offshoring. A trend that represents a hybrid form is quick response with reactive capacity, i.e. an enterprise uses on the one hand inflexible but cheap offshore capacity and on the other hand flexible but more expensive nearshore capacity. The decision-making in supply chains is traditionally based on economic criteria which are expressed by financial and non-financial measures like total cost and customer service. From the perspective of sustainable development in the evaluation of these processes also the environmental dimension has to be considered. Therefore, we present a stylized quick response model and show how the environmental dimension could be integrated into decision-making.

011-0126: Lean and Low Environmental Impact Manufacturing

Pauline Found, Cardiff University Lean Enterprise Research Centre, United Kingdom

There is an assumption that Lean means Green because Lean means doing more with less and this is also taken to mean less energy used, fewer raw materials consumed, and less toxic waste produced. Yet the evidence to support this is mostly anecdotal and the causal link is unproven. As a result it poses the question: are the operational practices of Lean manufacturing more environmentally sustainable than traditional mass, or batch, manufacturing? Resolution of this question is of interest to academics in the operations management and sustainability arena, as well as to business managers designing sustainable operations and to policy advisors advising industry on "Best Practice" in the light of environmental concerns. The paper examines the concept that Lean manufacturing secures both economic and environmental sustainability for the long-term growth and prosperity of the organisation by improving productivity whilst minimising the environmental impact of its activities.

Friday, 1:30-3:00 Sessions

41	Friday, May 1, 1:30-3:00 Room: Scribe Session: Servicing/Marketing Issues	Track: SUST, 7	Chair: Vishal Agrawal
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011-0851: Models for Retail Pricing and Customer Return Incentive for Remanufacturing a Product

Xiangrong Liu, Drexel University, United States

Banerjee Avijit, Drexel University, United States

Used products can often be collected via customer returns by retailers in supply chains and remanufactured by producers to bring them back into "as-new" condition for resale. In this paper, we develop mathematical models for determining optimal decisions involving retail pricing and reimbursement to customers for returns. These decisions are made in an integrated manner for a single manufacturer and a single retailer dealing with a single recoverable item. Multiple contracts are discussed.

011-0704: Revenue and Cost Management for Remanufactured Products

Anton Ovchinnikov, University of Virginia, Darden School of Business, United States

This paper presents a model and a study of consumer behavior with respect to the choice between new and remanufactured products. Our model does not rely on knowing consumers' willingness-to-pay, but rather it relies on knowing the fraction of consumers who switch from the new to the remanufactured product. In the behavioral study we find that the switching fraction has an inverted U-shape, and thus the underlying consumer behavior cannot be modeled using the willingness-to-pay approach. Combining theoretical and behavioral results, we find that the firm in most cases follows one of three strategies – remanufacture nothing, remanufacture everything, or resell falsely returned products. We characterize the optimality conditions for each strategy, relate them to the underlying product and market parameters (consumer behavior, price, demand elasticity, and others) and discuss managerial intuition. In particular we comment on the differences between our results and WTP-based solutions.

011-0572: To Sell or To Provide? A Comparison of Selling and Membership

Ioannis Bellos, College of Management, Georgia Institute of Technology, United States

Mark Ferguson, College of Management, Georgia Institute of Technology, United States

Beril Toktay, College of Management, Georgia Institute of Technology, United States

In recent years we have observed new business models flourishing in the transportation business. Such models include membership and fractional ownership schemes, which focus more on the provision of mobility services and less on the pure selling of products. In this paper we study the sell versus provide decision faced by a monopolist who wants to enter the transportation business. We assume the existence of a representative customer with certain characteristics, such as frequency of product use, expected duration of use and perceived value per use; while we borrow from queuing theory to model the membership business. Through a strategic level approach we shed light on the conditions under which each strategy dominates the other and identify the parameters that affect profitability most.

011-0456: Is Leasing Green? The Environmental Impact of Product Recovery, Remarketing and Disposal under Leasing and Selling

Vishal Agrawal, Georgia Institute of Technology, United States

Mark Ferguson, Georgia Institute of Technology, United States

Beril Toktay, Georgia Institute of Technology, United States

Landfilling fees and bans increase the cost of disposing of used products that firms maintain ownership of, such as products coming off operating leases or products recovered via trade-in programs. It is important for firms to have a better understanding of the total environmental impact of their decisions. In this paper, we characterize the optimal integrated pricing, recovery, remarketing and disposal strategy of a manufacturer under leasing and selling. We provide insights about how production cost, disposal cost and durability should shape their decisions. While the question of whether a firm should lease or sell its product has been studied, little is known about which strategy dominates when disposal is costly and when a firm can recover previously sold products through trade-ins. We find that leasing performs at least as well as selling with respect to profitability. To investigate claims in the industrial ecology literature that leasing is environmentally preferable to selling, we characterize under what conditions each strategy dominates from an environmental impact perspective.

011-0292: Discount Pricing and Consumer Segmentation for Reusable Goods

Tolga Aydinliyim, University of Oregon, United States

Michael Pangburn, University of Oregon, United States

We consider the problem of setting optimal price-discounts for a firm that sells a product with complementary reusable resources, e.g. Starbucks coffee with a reusable cup and a sleeve. Our model captures the effects of such a policy on the profitability of the firm and its environmental impact. Using an appropriate demand model, we analyze the sensitivity of the pricing and the discount decisions depending on the price- and environmentally-sensitive customer segments that the policy creates.

42	Friday, May 1, 1:30-3:00 Room: Knave Session: Improvement and Learning in Healthcare	Track: HLTH, 3	Chair: David Bamford
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011-0293: Healthcare Capacity Measurement

David Bamford, Manchester Business Sch, United Kingdom

Elizabeth Chatziaslan, Manchester Business School, United Kingdom

Friday, 1:30-3:00 Sessions

This paper presents findings from an action research intervention in the outpatient department of a National Health Service (NHS) Hospital. It investigates the perceived and actual problems of performance measurement, specifically measuring capacity. In addition to considering capacity measurement and performance issues, the authors examined the effects this may have on the long-term potential of the organisation. The research identified gaps in the capacity and activity measures used and in the dissemination of performance information. To address these problems and meet the changing needs of the department a new performance measurement and reporting tool was implemented. Specific recommendations for the implementation of a new performance tool for healthcare organisations are made.

011-0295: Knowledge Transfer in Healthcare

Steven Bradt, Lean Sigma Associates, United Kingdom

The presentation focuses on ways to improve the effectiveness (ability to retain) and efficiency (short focused workshops) of "Learning" within resource slender organizations. To address these tactical obstacles and enable retained learning the use of practical, hands-on, activities can be achieved through the use of process simulations. Data collected from within the healthcare sector suggests this type of activity based learning provides better knowledge transfer than more traditional methods such as formal presentations and projects. The emphasis of the "simulation" activities is to generate a common basis for collective learning, to establish a familiar vocabulary and a basic understanding of "process" problem solving. Furthermore, the flexibility and dynamic characteristics of a simulation allows the facilitator secondary and tertiary learning opportunities. Drawing upon primary experience of facilitating these development workshops, the presentation will share key observations and learning.

011-0296: Learning Together in Long Term Care to Improve Patient, Staff and Family Outcomes

Mimi Falbo, Mimi Falbo, LLC, United States

Debra Thompson, University of Pittsburgh, United States

One's lifetime risk for long-term care placement after the age of 65 is > 43%. Long-term care is one of the most highly scrutinized industries in the U.S with national expenditures totaling US\$124.9 billion in 2006. There is constant vigilance about cost, quality, and safety. Effective methods to improve outcomes are essential. This paper reports on the first stage of a systematic approach to organizational change grounded in the principles of the Toyota Production System and learning organizations. We demonstrate how the use of leadership coaching at the executive and frontline levels and point-of-care problem solving teams positively impacted outcomes. Improvement in resident outcomes, nurse aide turnover, and resident, family, and staff satisfaction will be reported. How this program has impacted compliance with regulatory agencies will be reviewed along with next steps. This work was funded by The Jewish Healthcare Foundation of Pittsburgh.

011-0297: An Empirical Study for Medication Delivery Improvement Based on Healthcare Professionals' Perceptions of Medication Delivery System

Lukasz Mazur, North Carolina State University, United States

Medication errors are major safety concerns in all hospital settings. The insufficient knowledge about managerial and process improvement strategies required to reduce medication errors can be considered as one of the most important factors holding back hospitals from achieving the desired goals for patient safety. However, strategies for medication error reduction cannot be successfully implemented without a clear understanding of factors affecting medication delivery errors. This paper presents a study in which healthcare professionals' perceptions on three factors, namely 1) technical complexity of tasks/connections; 2) resources problems; and 3) qualification of human resources, are analyzed within the medication delivery system at one community hospital. The outcomes of this research are a theoretical model for reducing medication delivery errors and a set of workflow design rules for healthcare professionals to continuously reduce medication delivery errors.

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Friday, May 1, 1:30-3:00 Room: EC-D1
Session: Organizational Initiatives

Track: EMPR, 3

Chair: Ayman Bahjat
Abdallah

011-0867: The Impact of Lean Practices on Mass Customization and Competitive Performance of Mass-Customizing Plants

Ayman Abdallah, Yokohama National University, Japan

Yoshiki Matsui, Yokohama National University, Japan

This paper starts with proposing multi-item scales to measure mass customization and lean practices in term of JIT production, TQM, TPM, human resource management, manufacturing strategy, supplier relationship management, and customer relationship management. It examines the effect of lean practices on mass customization for machinery, electrical & electronics and automobile companies in six countries (Japan, Korea, USA, Germany, Austria, and Finland), and also the impact of mass customization and lean practices on competitive performance of the plant. The statistical analysis reveals that four lean practices, namely, JIT production, manufacturing strategy, supplier relationship management, and customer relationship management, positively affect the level of mass customization implementation. The result from an ANOVA shows that the plants with high level of both mass customization and lean practices attain higher competitive performance than the plants with high level of mass customization and low level of lean practices.

011-0769: Causal Relationship Between Lean And Green From Manufacturing Perspective: Empirical Evidence From European Countries

Mark Yang, University of Toledo, United States

Paul Hong, University of Toledo, United States

James Roh, Penn State Brandywine, United States

Friday, 1:30-3:00 Sessions

Recently, the linkage between "lean" and "green" has generated much attention from researchers. Current studies on this issue, however, fail to answer a few important questions surrounding the linkage: why are lean and green practices related? How do lean elements affect green performance? What is the underlying rationale behind such relationships? In addition, the causal relationship between lean and green practices has not been empirically explored. This study attempts to find appropriate linkages between the two practices from a manufacturing perspective and explores the impact of implementation of both practices on firms' performance. We empirically test the causal relationship with International Manufacturing Strategy Survey (IMSS IV), using samples mainly from European companies. Our results show that lean practices lead to green practices and implementing both practices positively affects firms' performance outcomes. Managerial and theoretical implications as well as limitations and future research are provided.

011-0598: Links in Supply Chain Leadership and Financial Performance

Gerard Burke, Georgia Southern University, United States

Rongrong Zhang, Georgia Southern University, United States

Karl Manrodt, Georgia Southern University, United States

We segment North American Industry Classification System (NAICS) codes to populate firms within supply chain categories from raw material providers to retailers. Using publicly reported financial information, our analysis seeks to characterize relationships between supply chain metrics and financial metrics for firms within and across supply chain categories. We identify firms that exhibit sustained supply chain excellence and report the relative performance parity for supply chain leaders within each of our defined supply chain categories. We further investigate the degree to which large performance gaps between supply chain leaders and industry groups may be indicative of competitive advantage from supply chain excellence.

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Friday, May 1, 1:30-3:00 **Room:** EC-B
Session: Services and Supply Networks

Track: PITM, 2

Chair: Pedro Oliveira

011-0523: User-Generated Service Innovations: Evidence from the Telecom and Banking Sectors

Rosa Padre-Eterno, School of Economics and Management - Catholic University of Portugal, Portugal

Pedro Oliveira, School of Economics and Management - Catholic University of Portugal, Portugal

Ana Pvoa, Instituto Superior Tecnico, Portugal

Despite the importance of services, scarce attention has been paid to the study of service innovation. To fill this gap, we investigate the process of New Service Development when it involves the "users" as sources of innovative ideas. Users can be firms or individual consumers that expect to benefit from using (not from selling) a new product or service (Von Hippel 2005). We analyze data on new ideas for new services developed by two Portuguese companies: a telecom and a major bank. We study the extent to which users can be sources of ideas for new services and the antecedents that influence lead-user innovations. We suggest that a company's system of incentives and the level of customer connectedness drive the degree to which the company's innovations are lead-users based, which ultimately has an impact on the commercial attractiveness of a company's new services.

011-0713: Product-Related Services and the Product Development Process – A Preliminary Analysis

Paulo Cauchick-Miguel, Universidade de São Paulo - USP, Brazil

Leandro Almeida, Universidade de São Paulo - USP, Brazil

The importance of services to the overall success of manufacturing companies is growing significantly due to increasing competition and the resulting decrease in profit and demand. Besides that, services play an important role in the success rate of products, given that it helps customers to obtain the expected product performance. Even though in the last decades the movement toward the incorporation of services into the offers of manufacturing companies has gained both academic and professional attention, very little has been done in order to understand how services related to products are developed. This paper is a preliminary investigation on how services related to products are affected by and relate to the product development process, and is conducted through a literature review. As a result, it maps out the different services and characteristics related to products and the outcomes and activities of the product development process that might impact such services.

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Friday, May 1, 1:30-3:00 **Room:** EC-C
Session: Approaches to Teaching Quality Management (Invited)

Track: EDUC, 3

Chair: Jamison Kovach

011-0479: Zen and the Art of Teaching Quality Management

Kevin Linderman, University of Minnesota, United States

How do we teach abstract concepts like "Systems Thinking" in quality management? This talk presents teaching approaches used in quality management to engage students in the assessment and practice of quality management. Different teaching methods are discussed in the context of Quality Management. Specific examples in quality management are provided to address different student learning styles. Examples are also provided in how to teach abstract concepts like "Systems Thinking" and "Statistical Thinking."

011-0190: A Learning and Knowledge-Based Framework for Teaching Quality Management

Jamison Kovach, University of Houston, United States

Friday, 1:30-3:00 Sessions

The idea that knowledge creation is a vital activity of quality management is a belief held by many leaders in this field. In fact, quality improvement projects involve both learning and the creation of new knowledge. In parallel with current research, this work establishes a framework for teaching quality improvement methods based on well-known dimensions of quality management and the theory of knowledge creation. This instructional approach utilizes problem-based learning and reflection exercises to challenge students to consider quality improvement methods from a knowledge creation perspective. Students' observations regarding how quality improvement methods can be used to create knowledge provided the basis for constructing this didactic framework. When positioned as a review and extension of the previous lesson, the insights contributed by students also supported closing the loop on the learning process. This work demonstrates a unique way of thinking about the tools typically taught in quality management.

011-0243: Teaching Quality Management Using a Contingency Approach

S. Foster, Jr., Brigham Young University, United States

In this session I will discuss teaching quality management using contingency theory. I will also provide tips and approaches that I have found effective in teaching quality management.

011-0334: Quality Management Principles from Film Clips

Gopesh Anand, University of Illinois at Urbana-Champaign, United States

Several new and improved quality management initiatives such as Lean and Six Sigma have emerged over the years. Despite this steady evolution and the inclusion of novel ways of conducting process improvement within each new initiative, some basic principles continue to serve as tenets for quality improvement. Using clips from popular movies in class exercises can be effective in helping students understand these basic principles. This presentation will demonstrate and describe such an exercise.

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Friday, May 1, 1:30-3:00 Room: Gallery

Track: DSPT, 3

Chair: Kathy Stecke

Session: Long Term Planning and Recovery for Supply Chain Disruptions

011-0677: Disaster-Disruption Recovery with Information Asymmetry

Amiya Chakravarty, Northeastern University, United States

The need for service (medicine, clothing, food, and shelter), assessed by field workers at the remote location, is uncertain at best. The disaster zone needs to acquire a disaster-recovery capacity from a service provider (government or charitable organization) at a certain unit cost. However, because of communication disruption, the need cannot be communicated to the service provider "noiselessly." The extent of information-asymmetry in the transmitted data depends upon the effectiveness of the communication system that may be set up in real time. The disaster location must decide the amount of capacity it should acquire and the effectiveness of communication system it should attain. The service provider decides the price it should charge for the capacity. The conditions, under which an ex ante investment in disaster-proof communication technology can be justified, will be of considerable interest to all.

011-0969: Mitigating Operational Disruptions and Risks in Global Supply Chains

Germaine Saad, Widener University, United States

This paper discusses different descriptive and prescriptive approaches for managing risks and operational disruptions in global supply chains. Both conceptual and practical insights as to how to transform challenges into opportunities in global operations will be emphasized. Illustrative examples will be presented as well.

011-0609: The Relationship Between Supply Chain Design and Resilience: A Framework of Supply Chain Design

Laird Burns, Michigan State University, United States

Steven Melnyk, Michigan State University, United States

Supply chain design is a research conundrum. On one hand, there is evidence of its importance to firms as they continue to seek competitive advantage. Yet, limited research has been devoted to it. This presentation seeks to address this conundrum by providing a theoretical framework for viewing supply chain design. Specifically, we investigate the role of supply chain design on firm performance during conditions of disruption. We use the supply chain design framework to identify several critical factors that can influence firm performance. We validate the framework with an empirical study. Initial results indicate that supply chain design decisions can generate zones of resilience – areas where the supply chain is able to delay the onset of disruptions and where it can recover quickly once the disruptions have taken place.

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Friday, May 1, 1:30-3:00 Room: EC-A

Track: EMRG, 3

Chair: Mridula Sahay

Session: Organizations

011-0544: Consciousness Approach to Operations Management

Mridula Sahay, Institute of Public Enterprise, India

J. Venkataratnam, Institute of Public Enterprise, India

Friday, 1:30-3:00 Sessions

The paper aims at humanizing the business organization and interiorizing (self) management for achieving better Operations Management practices. Management by consciousness is the concept of oneness and of harmonization. In any organization, the employee, management systems, and resources require attention. Response will be better with increased concern without demand. Active concern to employee's well being by management creates interest in workers to improve productivity, quality outputs: manufacturing and services. Management systems are like "DHARMA" meaning "Right way of doing" and "Dealing problems with fair consciousnesses." They maintain equilibrium which is capable of sustaining and improving performance. Blend of analytical techniques and human values with superordinate goals leads to Loka Samasta Sukhinobhavantuh (universal happiness), an established hypothesis in Indian ethos. The paper finally provides an analogy with management practices in America and Japan which are highly specialized in following this concept in one way or other.

011-0559: Managing Cultural Diversity: Integration Values and Management Skills

Erika Bernardi, University of Udine, Italy

Alberto De Toni, University of Udine, Italy

We are present at the globalization of enterprises and markets, at a growth of multiethnic workforce, and at the increasing presence of women at the workplace. These trends induce more and more enterprises to manage diversity. Many studies about this topic focus on the advantages coming from diversity teams, while few analyze the necessary assumptions to implement tools of diversity management in enterprises. The aim of this research is to analyze which could be the necessary requirements and which could be the effective routes to manage workforce diversity. In order to analyze these aspects a model has been proposed and implemented in an enterprise of building industry. By this model, we study both the integration values of the organizational culture and the management skills required to manage diversity, combining the Organizational Culture Assessment Instrument and the Management Skills Assessment Instrument.

011-0415: The Contribution of Organizational Life Cycle Theories for Management Accounting Research

Abraão Júnior, University of São São Paulo, Brazil

Karine Carvalho, University of São São Paulo, Brazil

Reinaldo Costa, University of São Paulo, Brazil

This work aims to characterize, in a theoretical perspective, the contributions of organizational life cycle theories in managerial accounting research, besides surveying the main authors from the countries and the institutions where organizational life cycle research is carried out. For this, a bibliometric analysis from the ProQuest® database was used. From a total of 22 papers, 6 are listed as theoretically-based using organizational life cycle and present contributions to the research in managerial accounting. It is concluded that the management accounting system undergoes changes as internal and external configurations factors of the company are modified among the different organizational life stages. The existence of concentration of the main life cycle theories in universities in Canada is also evident, mainly due to the high number of citations of the work developed by Danny Miller and Peter Friesen.

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Friday, May 1, 1:30-3:00 Room: EC-E
Session: OR Methods

Track: LGST, 3

Chair: John Liu

011-0056: A New Procedure for Synthesizing Qualitative and Quantitative Processes to Solve Complex Logistics Decisions

Minfang Huang, School of Management, Dalian University of Technology, China

Xiangpei Hu, School of Management, Dalian University of Technology, China

Lihua Zhang, Archives of Dalian University of Technology, China

In this paper, we present a new solution procedure for several complex decision-making problems in the area of logistics management; for example, Vehicle Routing Problem (VRP), and disruption management in distribution planning. The solution procedure begins with the analysis of the characteristics of the problems and the critical impact factors of the solution process. Then the concepts and techniques in knowledge representation, state-space search theory, heuristics, and optimization are employed concurrently in the last few stages of the solution procedure. In addition to the capability of dealing with both empirical information and a powerful computing efficiency, this solution procedure aims to solve practical problems in an intelligent and real-time fashion.

011-0370: Research on Optimization of Hub-and-Spoke Logistics Network Design with Impedance Effect

Li Sun, Southeast University, China

Lindu Zhao, Southeast University, China

Hub-and-spoke pattern is one of the most important forms of modern logistics networks. In order to treat with the capacitated single allocation p-hub problem, this paper presents a new non-linear programming model to design the network. Due to the fact that the current research has some limitations, the capacity of materials disposal at hubs and the capacity limit of courses between hubs are treated as constraints in the model based on the analysis of characteristics of hub-and-spoke logistics network. In the process of optimization, an impedance function is introduced to balance some local logistics volumes properly in order to avoid congestion. Additionally, we provide a genetic algorithm that finds high-quality solutions within reasonable time. Then, an example and simulation is given to verify the validity of the model. The results of the model provide new and realistic insights into the hub-and-spoke network design problem.

011-0893: A Deterministic Heuristic for the Two-Stage Supply Chain Distribution Problem with Variable and Fixed Charge Transportation Costs

Jose Humberto Ablanedo Rosas, The University of Texas at El Paso, United States

Alex Ruiz-Torres, The University of Texas at El Paso, United States

Friday, 1:30-3:00 Sessions

The Fixed Charge Transportation Problem (FCTP) is central in a wide variety of supply chain distribution problems; one of the strategic decisions is the allocation of transaction quantities from production facilities to customers in order to meet demand at minimum cost. A two-stage supply chain is a more real scenario where the transportation network includes transactions from production facilities to distribution centers and from distribution centers to customers. The cost of distribution considers a fixed charge associated with the distribution channel, and a variable cost proportional to the amount transported between a source and a destination. This paper introduces a deterministic heuristic aimed to provide good feasible solutions to this nonlinear programming problem. The proposed heuristic is evaluated with benchmark problems proving that it produces high quality solutions.

011-0922: Logistics Costs: An Essay on the Modal Shift Operation in Containerized Cargo

Washington Soares, UNISANTOS - Universidade Católica de Santos, Brazil

Rafael Barreto, Universidade Católica de Santos, Brazil

Getulio Akabane, Universidade Católica de Santos, Brazil

Camila Lopes, Universidade Católica de Santos, Brazil

Luiz Silveira, Universidade Metropolitana de Santos, Brazil

This article analyzes the competitive advantages in the logistics costs through the utilization of modal shift and the decision taking by transport companies in this modality. In the exploratory instead of explanatory, the rail modal was emphasized as a sustainable option in the modal shift since it reduces the emission of CO₂, which represents gains for the company and for the society. It has been proved that modal shift is a complex alternative, which requires attention to the several factors involved in the containerized cargo transportation, from the distance between ports and hinterland, adding competitive advantages through operational logistics costs and inventory-theoretic in the supply chain and the kind of modal adequate to the identified conditions in the geographical and political space being studied.

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Friday, May 1, 1:30-3:00 **Room:** EC-F
Session: Performance Measurement

Track: BNCH, 3

Chair: Andy Neely

011-0569: Literature Review on Balanced Scorecard – Types of Research, Difficulties and Benefits

Vanderli Prieto, University of São Paulo, Brazil

Marly Carvalho, University of São Paulo, Brazil

The importance of alignment between business strategy and its operational performance has been increasingly studied. Several frameworks that might be appropriate to implement and manage the strategy can be found in the literature. Among these, the Balanced Scorecard (BSC), has become the most widely used and researched method. Despite the growing interest in the BSC, an emerging body of research points out that little attention has been given to the problems or difficulties associated with its implementation and some authors suggest that over 70 percent of initiatives fail. In this context, the objective of this paper is to present a review, analysis, classification and codification of the literature on Balanced Scorecard (BSC). The publications were identified through a number of databases, consulting works published between 2000 and 2007. The problems with the BSC implementation are codified, presented and analysed in order to facilitate future research and applications of the method.

011-0618: Exploring the Impact of Business Intelligence: A Meta Analysis

Andy Neely, University of Cambridge, United Kingdom

For years organizations have been seeking to develop robust performance measurement systems. Led by calls from the accounting and operations communities, organisations adopted and adapted frameworks such as the balanced scorecard and the performance prism. In recent years a new phase of performance management system development has evolved – that of Corporate Performance Management, Enterprise Performance Management or Business Intelligence. Led by the large software vendors and global consultancy businesses, BI/CPM/EPM, seeks to integrate various management practices into a coherent performance framework. This paper draws on an extensive review of the literature on BI/CPM/EPM to explore what we know about the impact of these integrated performance management systems.

011-0471: The Measurement of Organizational Performance with a Focus on Stakeholders: A Performance Prism Approach

Vagner Cavenaghi, São Paulo State University, Brazil

Guilherme Frederico, São Paulo State University, Brazil

The objective of this study is to present a conceptual approach to the measurement of organizational performance by means of a review of literature, introducing the Performance Prism as the system for this measurement. Besides introducing the entire conceptual structure, based on the authors who proposed the model, Andy Neely and Chris Adams, this paper introduces a theoretical review regarding the concepts of performance measurement, differentiating the new tendencies of new approaches and showing the relation between performance measurement systems and the management of organizational performance. The Performance Prism model presents itself as a new performance measurement system alternative within the current need that goes beyond the financial approach. However, literature shows that the Performance Prism does not stand out yet as a broadly used model in the world. We conclude that this model can contribute towards organizations that seek changes in how they manage performance.

011-0821: An Investigation of Productivity, Profitability and Performance Improvements in a Canadian Packaging Company

Wouter d'Ailly, CEM International,

Kalinga Jagoda, Mount Royal College, Canada

Robert Lonseth, Mount Royal College, Canada

Adam Lonseth, Mount Royal College, Canada

Friday, 1:30-3:00 Sessions

The long buildup in oil prices since 9/11 combined with recent downturns in financial markets has forced companies to rethink their manufacturing processes. The increase in raw material costs has presented managers with the key challenge of maintaining/increasing productivity. While increasing output to reduce unit fixed costs remains the common management response, reducing and recycling waste coupled with lean production systems have also become popular tactics with managers. A lack of understanding of the linkages between productivity, profitability and performance has led to application of piecemeal solutions for productivity problems. This paper examines productivity improvements of a small Canadian packaging company. An integrated model of planning and implementing productivity is used to analyze the case. This paper also discusses both short and long term management strategies implemented by the company and highlights key success and failure factors. Limitations of the study and directions for future research are also discussed.

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Friday, May 1, 1:30-3:00 **Room:** EC-G
Session: Case Studies on the OM/Marketing Interface

Track: MKTG, 3

Chair: Nagihan Comez

011-0916: The Identification of the Customers along the Supply Chain: An Exploratory Study

Claude Machline, FGV - EAESP, Brazil

Fernando Serson, FGV - EAESP, Brazil

The objective of this paper is to help companies to identify with more precision which are their customers. The increasingly pervasive concept of supply chain compels all companies to review the notion and even the definition of what is a customer, in order to be able to allocate more rationally their selling, marketing and relationship efforts. This revision might lead the firm to reach the conclusion that all the business units situated downstream along the supply chain are its customers. The model suggested in the paper is the allocation of marketing efforts according to each customer's importance, computed with a multi-criteria ranking system. An emblematic example of a situation is the orthopedic surgical goods supply chain, focused in the present study. This specific supply chain here is based on the importer, located in São Paulo, Brazil, who is also the manufacturer's exclusive representative and master distributor in Latin America.

011-0918: Use of APS Systems in the Production Planning Process at a Steel Major in India

Sanjay Kumar, XLRI Jamshedpur, India

Biswajit Roychowdhury, Tata Steel Ltd, India

Vinit Mathur, Tata Steel Ltd, India

Preliminary results of a study focusing on the use of Advanced Planning and Scheduling (APS) systems in the production planning process at a steel major in India are presented. The production planning process from demand forecasting stage to the order dispatch stage, was studied, both as designed and as executed in practice. It was observed that the APS solution was modified through systemic intervention through add-on processes, and was also modified manually by the managers, to cater to other plant requirements.

The objective of the study was to explore the reasons for modification of the system by the managers.

The organizational and people perspectives help in understanding why the managers do not implement the APS solutions in certain situations. Also for the managers managing the process, process variation and technical complexities resulted in conflicting requirements.

011-0920: Effect of Dynamic Process Interaction on the Use of Advanced Planning Systems at the Production Marketing Interface

Sanjay Kumar, XLRI Jamshedpur, India

Biswajit Roychowdhury, Tata Steel Ltd, India

In the current environment of increased customer responsiveness, most companies are using Advanced Planning Systems to support their production planning processes, to achieve a certain flexibility of response.

The need for higher responsiveness at the production marketing interface leads to the dynamic interaction of supporting associated processes such as order management, production planning and execution.

This paper explores how this dynamic process interaction affects the way in which the advanced planning systems are used for process and decision support. This usage is at variance with the designed usage of these advanced planning systems, and it is observed that suggested solutions are often different from the implemented solutions.

011-0989: A Framework for Strategy Development in Start-ups: The Case of a Biomedical Device Start-up in Cambridge

Sirirat Lim, Institute for Manufacturing, University of Cambridge, United Kingdom

Ken Platts, Institute for Manufacturing, University of Cambridge, United Kingdom

Tim Minshall, Institute for Manufacturing, University of Cambridge, United Kingdom

Early in their lifecycles, technology start-ups are often vulnerable and prone to failure. Usually small and with limited resources, they have yet to build up the strength and resources to sustain themselves through both internal and external challenges. Operating in such an environment, developing the most appropriate strategy is arguably more critical in new ventures than in established organisations, yet little research has addressed this area. This paper presents the results of a study into the development of strategy in a biomedical device start-up in Cambridge, UK. After a brief review of the literature, this paper introduces a framework that captures the key decisions this new company makes and the major value creating activities it undertakes. Also discussed are the major challenges the company faced and how these problems were tackled. The paper concludes by discussing the use of the framework and suggesting how it might be operationalised.

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Friday, May 1, 1:30-3:00 **Room:** EC-H
Session: Global Quality Applications

Track: QUAL, 3

Chair: Kirit Patel

011-0244: Benefits from ISO 9001 Implementation in Japanese Companies

Tomoaki Shimada, Kobe University, Japan

Friday, 1:30-3:00 Sessions

Nobuki Okamoto, *Kobe University, Japan*

ISO (International Organization for Standardization) systems are represented by ISO 9001:2000 quality management systems since the establishment of the ISO 9000 series in 1984. The systems specify operational procedures reflecting business policy, organizational characteristics, environmental factors, etc. The conformance to the international standard has been the requirements of ISO certification. In recent years, increasing importance has come to be attached to the effectiveness of ISO management systems. In this study, we analyze the impact of ISO 9001 system implementation on operational effectiveness with MBO (management by objectives), corporate philosophy, and internal characteristics. We also consider top management support and trading partners' pressure for ISO 9001 system. We conducted a mail survey with corporate heads or administrative managers, and obtained 511 effective responses out of 1,250 unlisted Japanese companies. One of the results indicates that participating perspectives of MBO are greatly related to the effectiveness of ISO 9001 system implementation.

011-0121: A Cost of Quality Analysis of the 2008 "Tainted Baby Milk Formula" Incident in China

Bin Xie, *Tsinghua University, China*

Chunyan Lu, *Tsinghua University, China*

2008's "Tainted Baby Milk Formula" incident in China has generated a negative impact on Chinese milk-related products, industries and even the image of China in the world. From the concept of the cost of quality, an analysis of this incident was conducted in terms of prevention costs, appraisal costs, internal failure costs, and external failure costs for related companies and Chinese society. It aims to validate the principles of "quality is free" and "the higher the quality the lower the cost," and provides a good case to convince entrepreneurs that improving quality can reduce internal and external failure costs and eventually lower total costs. Based on the above analysis, the paper also suggests that higher penalties should be established in China's legal system to more effectively curb the occurrence of such food safety incidents.

011-0564: Managing Project Quality in the Indian Construction Industry

Kirit Patel, *MIDDLESEX UNIVERSITY, United Kingdom*

The Indian construction industry is one of the world's largest and fastest growing industries with investments worth \$475(2008) billion lined for upgrading the infrastructure across the country. However, there are issues in this industry of lack of adoption of modern technologies, unavailability of modern machinery, lack of adequate investments, and unavailability at times of raw materials. One of the key issues here is how quality is managed and developed within project management. This paper, by examining construction firms in four Indian cities, will analyse perspectives on the current state of quality management and control, customer focus, process capability, quality metrics, strategic quality planning, process management and development, and quality philosophies within project management. What are the issues if any standards or methodologies are used for managing quality within projects? The paper will also analyse attempts made to improve the quality management process within project management in this sector.

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Friday, May 1, 1:30-3:00 **Room:** EC-I

Track: SRCG, 3

Chair: Claus Jorgensen

Session: Supplier Development and Supplier / Buyer Relationship

011-0749: Cooperation with Customers and Suppliers and Firm Performance

Luciana Horta, *FGV-EAESP, Brazil*

Luiz Brito, *FGV-EAESP, Brazil*

Eliane Brito, *FGV-EAESP, Brazil*

Measuring cooperation is not simple. This research conceptualized cooperation with four dimensions: flexibility, information exchange, shared problem solving, and restraint in the use of power. Cooperation with key suppliers and customers was evaluated separately with a survey with 124 packaging manufacturers, in Brazil. Measurement models were analyzed with Confirmatory Factor Analysis. The relationships between cooperation dimensions and six different operationalizations of performance was evaluated with six multiple regressions. Cooperation with customers has different performance impacts than cooperation with suppliers and not all dimensions of cooperation have similar impacts, implying relevant practical implications. When cooperating with customers: flexibility promotes growth and reduced cost; restraint in use of power promotes growth; and shared problem solving has a negative impact on growth. When cooperating with suppliers: information exchange promotes profitability and joint problem solving has again a negative impact, but now on profitability.

011-0540: Knowledge Integration and Its Dynamic Impact upon Strategic Offshore Sourcing Decisions

Claus Jorgensen, *Aarhus University, Denmark*

Alternative forms of integration of knowledge will be shown to have important effect on the strategic intent of the focal organization, where the gains of offshore sourcing of manufacturing activities will be discussed regarding the development of the present and future capabilities of companies. The paper will illustrate different approaches of how to manage knowledge integration within the offshore supply relations and how different knowledge dimensions influence the development of the company's capabilities. The experienced journey of four SMEs within the textile and wood industries will be presented regarding how they change strategic intent due to challenges concerning knowledge integration within their respective supply relations. The cases will illustrate the development of sharing and integrating knowledge in the complex setting of globalised procurement, manufacturing, design and sales, where time and place become important factors influencing both strategic offshore sourcing decisions and the impact on future capabilities within the organizations.

011-0879: Supplier Integration in the Chinese Automotive Industry: A Multiple Case Study Approach

Martin Lockström, *China Europe International Business School, China*

Joachim Schadel, *European Business School, China*

Norma Harrison, *China European Business School, China*

Roger Moser, *Indian Institute of Management Bangalore, China*

Friday, 1:30-3:00 Sessions

Collaborative approaches such as early supplier involvement in the automotive industry have for a long time been acknowledged as key to assure quality, timely delivery and lower total cost. However, such approaches have proven to be very difficult to accomplish so far in China. This paper aims to identify antecedents that can potentially facilitate supplier integration and ultimately improve supply chain performance in the Chinese automotive industry. A multiple-case approach was applied as a methodology where empirical data were collected from 30 foreign automotive OEMs and suppliers with operations in China. The results show that factors such as collaborative capabilities, continuous supplier development, supplier collaboration readiness and buyer leadership effectiveness have a positive impact on supplier integration. The results add to the existing body of research by acknowledging the existing of inter-firm resources and leadership, and the necessity to build collaborative relationships.

011-0979: Label Licensing Strategy and Network Agility: A Case Study of High-tech Firms

Ai-Hsuan Chiang, National Taiwan University, United States

Wun-Hwa Chen, National Taiwan University, Taiwan, Republic of China

Full outsourcing of product manufacturing allows original equipment manufacturer (OEM) customers to reduce labor costs and free up capital investment. OEM customers can then focus on the most valuable processes such as R&D and marketing. However, contract manufacturers (CMs) may decide to foster their own brand and forge their own relationships with retailers or distribution channels. We demonstrate a service innovation for CMs for overcoming organizational boundaries to jointly manage business processes through implementing both label licensing strategy and information technology systems, leading to network agility. A label licensing strategy enhances the marketing capability of a CM, allowing it to move up the value chain. A case study involving a supply chain network in the optical storage media industry is used to develop a conceptual model explaining the competitive advantage resulting from a label licensing strategy in competition among marketing channel systems and cooperation processes of all involved channel parties.

53	Friday, May 1, 1:30-3:00 Room: EC-D Session: Education and Research	Track: EDUC, 10	Chair: Rafael Barbastefano
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011-0772: Fostering Undergraduate Research Experience in Operations Management

John Kanet, University of Dayton / Department of MIS, OM & Decision Sciences, United States

Martin Stöblein, University of Dayton / Department of MIS, OM & Decision Sciences, United States

This paper explores the merits of undergraduate research experiences (URE) in Operations Management (OM). We report preliminary findings from our research-in-progress on where undergraduate business research is being done well. We hypothesize what might be key factors that make undergraduate research successful. We identified a large gap between the implementation of URE in science versus in business administration and operations management respectively, although the idea seems worthy and a number of remarkable trends in raising the level of undergraduate student involvement in research are evident. Our findings are based on analysis of the academic and professional literature and website-published URE curricula.

011-0445: PhD Students: Supervision and Success

Harm-Jan Steenhuis, Eastern Washington University, United States

Erik de Bruijn, University of Twente, Netherlands

Much of the extensive literature on the scholarship of teaching and learning is aimed at primary and secondary education compared with tertiary education. Within this last literature stream the main focus is more on undergraduate studies than on the masters level. Research on teaching and learning aimed at PhD-level programs is hard to find. The aim of this paper is to explore the factors that influence successful completion of PhD programs. This is based on a European PhD program and covers 15 years of experience including 29 PhD students who have successfully completed the program, 6 who have abandoned the program, and 7 who are currently enrolled in the program. It examines 1) the goals of the PhD program, 2) the degree of success of PhD students, and 3) an exploration about factors that influence success such as the type of supervision, student characteristics, and environmental characteristics.

011-0840: Designing Virtual Environments to Expand Research and Educational Capabilities at Operations Management Academic Institutions

Alessandra Dahmer, Fundacao Instituto de Administracao, Brazil

Andre Fleury, Universidade de Sao Paulo, Brazil

Gilson Schwartz, Universidade de Sao Paulo, Brazil

This paper presents the results of a research study that investigates how virtual environments expand learning and research capabilities at operations management academic institutions when improving communication and collaboration, accessing global networks and generating new technological possibilities. Virtual environments are designed and implemented using the Technology Roadmapping approach and their development comprises four main phases: conceptualization, design, prototyping and operationalization. Research initiatives include the use of collaborative virtual environments to support the development of final course project reports, the establishment of virtual networks to create new technology-intensive social projects, and the use of virtual reality systems to access global research networks, among others. Obtained results reveal that higher levels of communication and collaboration are obtained when participants execute clear tasks to accomplish defined goals using traditional learning management systems. Although working with very innovative technologies provides useful learning for participants, they are not effectively incorporated into their daily routine.

54	Friday, May 1, 1:30-3:00 Room: Senate Session: OM in Public Applications	Track: GENL, 2	Chair: Rosane Batistelle
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011-0017: The Community Reinvestment Act and the Financial Crisis of 2008

Friday, 1:30-3:00 Sessions

Samique March, *Florida International University, USA*

Krishnan Dandapani, *Florida International University, USA*

Joel Barber, *Florida International University, USA*

In this paper we document the deregulation of the finance industry with specific reference to the Community Reinvestment Act (CRA) and examine its impact in the ensuing financial crisis of 2008. We develop a theoretical model and explore the relationship between the growths of subprime mortgages, structured financing vehicles and the ensuing defaults which lead to the crisis. Empirical validation of the theoretical model is presented and the consequences of the deregulation for future policy are outlined.

011-0811: Companies Inclusive in Mexico

Aida Lucia Montiel, *UNIVERSIDAD DE GUADALAJARA, Mexico*

Luis Antonio Gutierrez, *UNIVERSIDAD DE GUADALAJARA, Mexico*

Maria Elena Silva, *UNIVERSIDAD DE GUADALAJARA, Mexico*

With the Reconocimiento Empresa Incluyente, Mexico recognizes the corporate social responsibility towards vulnerable groups, such as people with disabilities, older adults and people living with HIV / AIDS. In Mexico it is estimated that about 9% of Mexicans belong to any of these three groups, and for this reason the Mexican State works through the National Development Plan 2007-2012 (PND). With the equal opportunities, the state is working to eliminate all forms of discrimination and ensure equal opportunities for all people, especially for people who make up the most vulnerable sectors of the population, such as the elderly and people with disabilities. In order to generate strategies to sensitize the business sector on social responsibility and provide employment opportunities for people in vulnerable situations, Reconocimiento Empresa Incluyente was founded in 2005. Since then it has recognized 389 companies around the country, which have given employment to a total of 3902 people.

011-0058: Comparative Analysis of the Selective Collection Programs in Three Municipalities in the Interior of the State of Sao Paulo, Brazil

Raquel De Marco, *UNESP - Universidade Estadual Paulista, Brazil*

Rosane Batistelle, *UNESP - Universidade Estadual Paulista, Brazil*

Rosani De Castro, *UNESP - Universidade Estadual Paulista, Brazil*

Of the 5564 Brazilian municipalities, 65% have some sort of selective collection initiative for household waste. In the southeast of the country, this number is 82.4%. However, this is more a social-economic reality of our cities than it is the interest of communities in carrying out environmental preservation actions. This paper aims at making a quantitative and qualitative comparison of several aspects (economical and social-environmental) of the selective collection programs in three different sized municipalities in the interior of the state of São Paulo, Brazil, identifying the main difficulties, alternatives found and role exercised by the trash collectors. For example, in Lençóis Paulista only 40 of the 150 tons of waste that reach the plant can be sold. This study was conducted by applying questionnaires and visiting generation, screening and final disposal sites.

011-0949: The Strategy to Use Nets of Companies in the Process of Technology Transfer for Agribusiness - the Embrapa Case

Ana Lucia Atrasas, *Brazilian Company for agricultural research- Embrapa/ Universidade Paulista, Brazil*

José Sacomano, *Universidade Paulista - UNIP, Brazil*

The importance of world-wide agribusiness in the generation of income in the economy has grown because of the increase of the world-wide demand for foods, especially in emergent countries. Motivated by demographic growth and the increasing ability to consume in the emergent countries, there is an increase in importance of the alimentary security. The technological domain of tropical agriculture through the generation of knowledge and happened technologies of the Brazilian Company of Agricultural Research (Embrapa) allowed Brazil to make use of comparative advantages in the segment, making it possible for Brazilian agribusiness to play an important role in the international markets. The authors defend the hypothesis that the organizational configuration of nets of companies used by the Embrapa allowed agility in the adoption of the technologies generated through productivity profits and aggregation of value in the products. These preliminary results will be presented in this text.

011-0046: A Multiple Criteria Evaluation of Tourism Locations: Adapting the Huff Model using Data Envelopment Analysis

Ramakrishnan Ramanathan, *Nottingham University Business School, United Kingdom*

Competitive facility location problems involve identifying the best location of a facility that can capture maximum market share in the presence of competition. The Huff model is popular for competitive facility location but it considers only two factors for deciding a good location. This model is not considered very realistic and efforts have been made to improve the model by including additional factors. These improved models have used more factors but they have to be calibrated using data elicited from surveys. In this paper, an extension of the Huff model to consider multiple factors using Data Envelopment Analysis (DEA) is proposed. Since DEA computes the weights (measuring the influence) of factors implicitly using linear programming, there is no need for specifying their values exogenously. The model is applied to a problem in the tourism sector for estimating the market share of selected tourist destinations in the Sultanate of Oman.

Friday, 3:30-5:00 Sessions

50	Friday, May 1, 3:30-5:00 Room: Cloister North Session: Call Center Management	Track: SRVC, 3	Chair: Rouba Ibrahim
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011-0637: Call Center Scheduling with Arrival Rate Uncertainty

Thomas Robbins, East Carolina University, United States

In this talk we look at issues related to scheduling call centers when arrival rates are uncertain and service level requirements are strict. We review the literature and analyze empirical data to make the case that arrival rates are doubly stochastic; that is, that arrivals follow a Poisson process with a rate that is itself uncertain. We then review several approaches for scheduling in the face of this uncertainty, including mean value scheduling, stochastic programming, robust programming and simulation.

011-0362: Service Innovation in Call Centers – The Role of Employee and Technological Competencies

Marisa Smith, University of Strathclyde, United Kingdom

Nuran Acur, University of Strathclyde, United Kingdom

Call centers have emerged as one of main points of contact for customers accessing organisations so they are a key factor in the overall perception customers have of organisations. In the call centre, new service development is a process of linking technology and employees. Innovation is related to the high degree of exploration and exploitation of a firm's competences. Using eight case studies, the objective of the research presented in this article was to identify and analyse the extent to which 1) call centres develop employee and technology competencies 2) these two competencies are reflected in service innovation and innovation type. The emergent findings from the case studies imply that complex professional services are focused on customer led service innovation whereas service shops and mass services are more focused on process innovation primarily for cost reduction.

50	Friday, May 1, 3:30-5:00 Room: Cloister South Session: Interface of Operations and Finance	Track: SCM, 4	Chair: Saravanan Kesavan
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011-0159: Stock Market Pressure on Inventory Investment and Sales Reporting for Publicly Traded Firms

Guoming Lai, Tepper School of Business, Carnegie Mellon University, United States

Laurens Debo, The University of Chicago, United States

Lin Nan, Carnegie Mellon University, United States

We study a two-period inventory management problem with correlated demand. The inventory manager's compensation is partially based on the firm's stock price which is influenced by the reported sales revenues. With better information about the "real" demand, the manager may manipulate the stock price by shipping more than the real demand to downstream customers, called "channel stuffing," and reporting higher than real sales revenues. Investors are rational and may infer the sales padding from the report and assign a fair stock price. Based on a game between the manager and the investors, we identify two operational factors that influence the manager's incentive to use channel stuffing: the boundary effect and the carryover effect. Concerning the initial inventory investment, we find that, compared to the optimal initial inventory level of an otherwise identical private firm, the manager may under- or over-invest inventory, both possible.

011-0249: Order Quantity and Inventory Decisions with Endogenous Cost of Capital

Alejandro Serrano, MIT Zaragoza International Logistics Program, Spain

Santiago Kraiselburd, MIT Zaragoza Program and INCAE Business School, Spain

Rogelio Oliva, Mays Business School and MIT Zaragoza Program, United States

A widely held idea that dates back to Fisher (1930) states that investment decisions should be separate from financing decisions. In other words, it is commonly believed that decisions about the sources of funds should be separate from decisions about the uses of funds. Following this, operations researchers and practitioners have traditionally concentrated on minimizing cost (or maximizing profits), taking the firm's cost of capital as an exogenous constant which should be left to corporate finance academics and practitioners. We present a stylized model of a firm that shows that, in fact, the cost of capital for shareholders is endogenous to operations decisions such as ordering quantities. We provide an explicit expression for linking the cost of capital and ordering quantities, study the mechanisms through which this interaction takes place, and relate these to the firm's operating and financial risks. We contribute to narrowing the gap between operations and finance.

011-0271: The Effect of Supply Chain Disruptions on Suppliers, Customers, and Rivals

Kevin Hendricks, Wilfried Laurier University, Canada

Daniel Seifert, Ecole Polytechnique Fédérale de Lausanne, Switzerland

Ralf Seifert, IMD - International Institute for Management Development, Switzerland

Vinod Singhal, Georgia Institute of Technology, United States

We examine the effect of supply chain disruptions on suppliers, customers, and rivals of firms that have experienced disruptions. Based on press information and a new database on trade relations, we construct a sample of first tier primary suppliers and customers, and main rivals. We hypothesize that disruptions will cause negative stock market reactions at suppliers, and customers, and mixed reactions at rivals. We use event study methodology to analyze stock market effects. Preliminary findings seem to confirm our hypotheses. These results underline the importance of effective supply chain management and the dependency among supply chain partners.

011-0614: The Correlation of Supply Chain Risk and Financial Market Returns

Friday, 3:30-5:00 Sessions

Nikolay Osadchiy, New York University, United States

Vishal Gaur, Cornell University, United States

Sridhar Seshadri, University of Texas at Austin, United States

The volume of retail sales is acknowledged to be correlated with the contemporaneous returns on aggregate financial indices. This effect would propagate upstream in supply chains, resulting in deviations of manufacturers' and wholesalers' sales from forecasted values. We estimate the volatility and correlation with aggregate market returns for the sales forecast errors for US manufacturers and wholesalers. Both volatility and the correlation coefficient increase, compared to their estimates for retailers in the respective segments. We discuss lead time, excess manufacturing capacity, and demand switching as potential causal factors.

011-0461: Does abnormal inventory growth predict earnings of retailers?

saravanan kesavan, University of North Carolina at Chapel Hill, United States

Vidya Mani, University of North Carolina at Chapel Hill, United States

Ananth Raman, ,

Forecasting earnings is a key activity in financial markets. Earnings of a firm depend on, among other factors, its sales and operating expenses. In this paper we investigate if abnormal inventory growth contains useful information to predict earnings of retailers. We find that abnormal fluctuations in inventory are indicative of underlying operational performance of a retailer and contain useful information that can be used to improve forecasts from time series methods as well as Wall Street analysts.

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Friday, May 1, 3:30-5:00 **Room:** Captain

Track: SCM, 18

Chair: Sunil Hwang

Session: Channel Collaboration

011-0149: An Investigation of the Moderating Effects on the Demand Integration–Supply Network Performance Relationship

Pamela Danese, University of Padova - DTG, Italy

Pietro Romano, University of Udine - DIEGM, Italy

Downstream integration (DI) is a key managerial area to improve performance in supply networks. Though most studies agree that DI positively influences performance, literature also reports cases of failures in achieving significant improvements. This evidence suggests that some factors may act as moderators on the DI-performance relationship. This paper analyzes the impact of DI on supply network performance and the moderating effect on this relationship of upstream integration (UI), supply network performance measurement systems (SNPMS) and supply network structure (SNS). Data from a sample of 248 manufacturing firms settled in several countries around the world demonstrates that all the three investigated moderating effects exist. Therefore managers should launch an appropriate mix of interventions on DI, UI, SNPMS and SNS, rather than investing and focusing on DI only. The paper provides some hints on how to structure the SCM initiatives' mix to strengthen the impact of DI on supply network performance

011-0464: Supply Chain Agility, Collaboration, and Performance: How Do They Relate?

Teresa Betts, Southern Illinois University - Carbondale, United States

Suresh Tadisina, Southern Illinois University Carbondale,

Business managers are concerned with what factors influence the degree of supply chain collaboration and what moderates supply chain collaboration's effect on supply chain performance. This study will empirically examine how supply chain agility acts as a moderator between supply chain collaboration and supply chain performance. Furthermore, the presence of environmental uncertainties will be examined to determine their influence on the degree of collaboration, and the degree of collaboration will be examined to determine its influence on supply chain performance.

011-0669: Firm Performance and the Use of CPFR: An Empirical Investigation

Craig Hill, Georgia State University, United States

Yusen Xia, Georgia State University, United States

Peter Zhang, Georgia State University, United States

The Collaborative Planning, Forecasting and Replenishment (CPFR) initiative helps the supply chain to better coordinate activities to serve customers with improved demand forecasting and production scheduling. CPFR provides a framework that covers a broad range of issues including demand forecasting, inventory management, production and replenishment planning, and order fulfillment. This research provides empirical evidence of the effect of CPFR adoption on a firm's financial and operational performance as compared to similar firms who have not indicated that they were implementing CPFR. Using an event study method and a COMPUSTAT database, we found significant improvements in several performance measures for firms that have adopted CPFR.

011-0757: Lead Time and Its Interdependency with Information Sharing in Supply Chains: A Review and Framework

Martin Poiger, Vienna University of Economics and Business Administration, Austria

Time is an important operational performance dimension for many companies. They need processes with short lead times to meet customers' expectations. The goal for such enterprises is to be fast and responsive at a reasonable level of cost. An important enabler for short lead times in supply chains is information and information sharing. This paper seeks to clarify the relationship between lead time and information sharing. This is done by first providing a review of the existing literature dealing with time as an important performance measure in supply chain management. Second, an overview of the different concepts, models and best practices of information sharing is presented with special focus on their interdependency with lead time in a supply chain. Finally a framework is built, relating these concepts, models and best practices of information sharing to lead time.

Friday, 3:30-5:00 Sessions

∞ L	Friday, May 1, 3:30-5:00 Room: Yeoman Session: Environmental Impact of Operations 2	Track: SUST, 4	Chair: Dana Johnson
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011-0794: Beliefs on Climate Change and the Impact on Firms' Operations

Dana Johnson, Michigan Technological University, United States

Kathleen Halvorsen, Michigan Technological University, United States

Barry Solomon, Michigan Technological University, United States

Environmental sustainability is affecting every aspect of consumers and the products they purchase. This is a key driver to how companies operate more sustainably to provide products and services to their customers. Further, climate change as a key variable in decisions regarding sustainability will affect future choices. A study was undertaken to learn more about individual consumers' attitudes about energy and global warming or climate change, energy and America's future, and the environment. It also gathered information about consumers' willingness to pay for cellulosic ethanol in the form of E85 as an alternative to gasoline. Initial statistical analysis has been conducted, including linear regression. Additional theoretical frameworks and models will be presented in this paper to help understand which variables are related to respondents' view on cellulosic ethanol. The funding for this research provided by NSF and the USDA.

011-0607: Flexible and Robust Business Strategies for an Uncertain Energy Future

Stephen Lawrence, University of Colorado, United States

Timothy Smunt, Wake Forest University, United States

In an era of energy instability, businesses and other organizations are faced with the daunting task of planning for an uncertain energy future. For example: Should an energy intensive business invest in access to alternative energy sources such as wind; invest heavily in energy efficiency; or stay the course with traditional energy? What are optimal switching strategies as our energy future unfolds? In this paper we employ a Markov Decision Process to develop both flexible and robust strategies for business responses to several future energy scenarios. Simulation experiments and numerical examples demonstrate the efficacy and utility of our model. Results should prove useful for managers and administrators as they develop a successful energy strategy.

∞ L	Friday, May 1, 3:30-5:00 Room: Scribe Session: Reverse Logistics	Track: SUST, 8	Chair: Ephrem Eyob
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011-0057: From IT Resources to Performance in Competitive Aggressiveness Landscapes: The Mediating Role of Green Supply Chain Management Capability

Jose Benitez-Amado, University of Granada, Spain

Maria Nieves Perez-Arostegui, University of Granada, Spain

Vanesa Barrales Molina, University of Granada, Spain

Francisco Javier Llorens-Montes, University of Granada, Spain

Drawing on a resource-based view, the literatures on operations management (OM) and management information systems (MIS) have recently demonstrated that information technology (IT) business value, namely IT impact on organizational performance (OP), is generated indirectly, not directly, by means of other higher-order business capabilities. This study investigates the mediating role of green supply chain management capabilities (e.g., Zhu and Sarkis, 2004) in the relationship between IT resources (technological IT assets and human IT capabilities) and OP. Additionally, building upon contingency theory, we argue that these relationships are moderated by the level of competitive aggressiveness in the landscape (Ferrier, 2001). A proposed research model and hypotheses are tested by using cross-sectional survey data collected from a sample of 203 Spanish firms. This is complemented by the use of objective data to measure OP. The implications of the findings for researchers and practitioners are discussed and further research directions suggested.

011-0865: Sustainable Network Design at a Logistics Service Provider

Ian Langella, Shippensburg University, United States

Simone Zanoni, University of Brescia, Italy

The following contribution aims at illustrating a practical network design decision faced by an industrial partner who seeks to incorporate both economic as well as environmental considerations. Trade-offs between cost and environmental impact lead to a Pareto efficient frontier which decision makers can use to deliberate solutions. Due to the size of the problem and characteristics of the model, a heuristic approach is developed and suggested. Additionally, product recovery will also be examined in this context, both with respect to that which is being done at present as well as deliberating several options for increased product recovery opportunities.

011-0099: Product Characteristics and Choice of Closed-Loop Supply Chain Structures

Sam Chen, National Tsing Hua University, Taiwan, Republic of China

Yih-Long Chang, Georgia Institute of Technology, USA

Jack C. P. Su, National Tsing Hua University, Taiwan, Republic of China

Due to rising awareness of environmental protection and stringent regulations, firms are held responsible for collecting and recycling the goods they manufactured. Hence, the closed-loop supply chain, which not only deals with goods delivery from manufacturers to consumers but also recycling from consumers to manufacturers, arouses much research interest. Considering the combination of centralized/decentralized evaluation point design and focused/general facility, we construct four closed-loop supply chain structures. In this research we study how product characteristics and market factors lead to the choice of supply chain structure.

Friday, 3:30-5:00 Sessions

00	Friday, May 1, 3:30-5:00 Room: Knave Session: Healthcare IT: CPOE and RFID	Track: HLTH, 4	Chair: Asoke Kumar Dey
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011-0810: An Integrated Model of Computerized Physician Order Entry (CPOE) Implementation at Acute Care Hospitals

Asoke Dey, University of Akron, United States

Kingshuk Sinha, University of Minnesota, United States

Sriram Thirumalai, University of Utah, United States

This study develops an understanding of the key determinants of information technology implementation and its impact on performance. Specifically, the study investigates the implementation of Computerized Physician Order Entry (CPOE) systems by 188 health care providers in the U.S. The findings of the study indicate that organizational readiness (top-management support, facilitating conditions) and user readiness (user attitude towards technology and user's prior experience) are key to the successful implementation of CPOE. Further, the study findings also suggest that CPOE is significantly associated with health care provider's operational efficiency. Implications of the study findings, limitations, and directions for future research are identified.

01	Friday, May 1, 3:30-5:00 Room: EC-D1 Session: Flexibility	Track: EMPR, 4	Chair: Daniel Arias-Aranda
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011-0528: Does Supply Chain Flexibility Influence Product Customization?

Manoj Malhotra, University of South Carolina, United States

Alan Mackelprang, University of South Carolina, United States

Offering product customization through modification of existing products has become a competitive priority for many firms. However, the operational challenges associated with meeting this objective may be heavily dependent upon a firm's modification flexibility as well as the flexibility of its external supply chain partners. Consequently, this study evaluates the extent to which both inbound supplier and outbound logistics flexibilities are able to influence plant level modification flexibility and delivery performance. Based on a sample of 158 U.S. manufacturing firms, we find that elevated internal modification capabilities are not required, given that a firm has flexible supply chain partners. Additionally, simultaneous investments in both inbound as well as outbound supply chain resources and processes are not needed. This result is unique in suggesting that arcs of supply chain integration need not always extend in both directions if the intent is to achieve customization through reliably delivering modified products.

011-0355: Operations Flexibility and Outsourcing Benefits

Oscar Bustinza, University of Granada, Spain

Daniel Arias-Aranda, University of Granada, Spain

Vanessa Barrales-Molina, University of Granada, Spain

Outsourcing of operations management activities is a widely extended practise for many manufacturing and service industries competing at the global level. This way, firms are able to clearly define their core field of activity while relocating other non-core activities to organisations which are able to perform them with higher degrees of efficiency. However, outsourcing is not exempted from some risks, specially those derived from process coordination, information sharing or possible opportunistic behaviour on the outsourced firm. Operations flexibility can play a fundamental role in moderating these risks while increasing the benefits from outsourcing by decreasing the level of dependability on the outsourced activities. In this paper, a structural analysis is performed to analyse the relationship between operations flexibility and outsourcing benefits in service firms. Results show that higher levels of flexibility in the Informations Systems, markets, expansion and personnel dimensions are directly related to higher outsourcing benefits.

011-0336: The Role of Manufacturing Flexibility in Meeting the Organizational Objectives in the Jordanian Manufacturing Companies

Basem Mobaitheen, Al-Hussein Bin Talal University, Jordan

Abdulkareem Awwad, Al-Hussein Bin Talal University, Jordan

This study aimed at investigating the influence tactical flexibilities (mix flexibility, volume flexibility, and modification flexibility) on the achievement of operational objectives. To address this objective, a cross-sectional survey employing a questionnaire method of data collection was adopted. Director, Vice-President, Operations or Production Manager, and Marketing Manager in the Jordanian Manufacturing Companies classified in Amman Stock Exchange Market were targeted by this study. A total of 162 usable responses were received representing a response rate of 67.5%. For the purpose of data analysis, the research utilized descriptive and advanced statistics using multiple regression analysis. The results of data analysis indicated significant impact of tactical flexibilities (mix flexibility, volume flexibility, and modification flexibility) on the achievement of operational objectives.

011-0335: An Empirical Investigation of the Role of Strategic Flexibility on the Achievement of Strategic Objectives

Abdulkareem Awwad, Al-Hussein Bin Talal University, Jordan

This study aimed at investigating the influence of strategic flexibility dimensions (market flexibility, new product flexibility, and expansion flexibility) on the achievement of strategic objectives. For the purpose of data analysis, the research utilized descriptive and advanced statistics using multiple regression analysis. The results of data analysis indicated significant impact of strategic flexibility dimensions on the achievement of strategic objectives. The study raises some implications for managers and consultants such as encouraging them to use the several dimensions of strategic flexibility in planning, setting, and achieving strategic objectives. The study also proposes several directions for future research such as conducting more empirical studies about the role of the intervening variables -such as company size, organizational level, and industry type- on the relationship between strategic flexibility and strategic objectives.

Friday, 3:30-5:00 Sessions

02	Friday, May 1, 3:30-5:00 Room: EC-B Session: Introductions, Life Cycles, and Dynamics of Innovations	Track: PITM, 3	Chair: John Angelis
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011-0622: A Dynamic Analysis of Technological Innovation Using System Dynamics

Soo Wook Kim, Seoul National University, Korea, Republic of (South Korea)

Kanghwa Choi, Hansung University, Korea, Republic of (South Korea)

This paper describes a comprehensive approach to examine how technological innovation contributes to the renewal of a firm's competences through its dynamic and reciprocal relationship with R&D and product commercialization. Three theories of technology and innovation (the R&D and technological knowledge concept, product-process concept, technological interdependence concept) are used to relate technology and innovation to strategic management. Based on these theories, this paper attempts to identify the dynamic relationship between product innovation and process innovation using system dynamics by investigating that aspect of the dynamic changes in the closed feedback circulation structure in which R&D investments drive the accumulation of technological knowledge.

011-0836: New Product Positioning for a Segmented Market

John Angelis, Rochester Institute of Technology, United States

We focus on how competing profit-maximizing firms should set price and quality for a new technologically-advanced product. Customers are segmented into adopter categories on the basis of their innovativeness. Each category makes its purchase based on its product preferences for quality and net value. We analyze a closed-loop Stackelberg game with perfect information. If a late entrant is at a severe enough cost disadvantage, it should set its price and quality to target the less innovative segment. If either firm has a large enough cost advantage relative to its rival, it may be able to attract customers from all segments. However, such a firm will not necessarily earn higher profits by moving first.

011-0444: Online or Offline – An Analysis of Video Game Release Strategies

Jack Leu, California State University at San Marcos, United States

Fang Fang, California State University at San Marcos, United States

Yi Sun, California State University at San Marcos, United States

Many game providers now release both online and offline versions of a video game. While the offline version is considered a simpler version of the game where players can get a jumpstart by coping with artificial intelligence, the online version allows players to interact and compete with real people across the network and thus provides them with a stronger sense of community and accomplishment. In this study, we extend the legendary Hotelling model to analyze strategies for releasing video games based on two factors deemed to affect a player's game selection: skill level and enjoyment utility. More specifically, we focus on the following research questions from the perspective of a game provider: (1) how to set the optimal prices for both versions when they co-exist and (2) how the co-existence of both versions affects the demand for each version and, ultimately, the overall profitability of a video game.

011-0388: Is Decline Really the Last Phase of the Industry Life Cycle? Predicting Patterns of Product Attributes, Dominant Design and Firm Positioning

Bo van der Rhee, Nyenrode Business University, Netherlands

Lyda Bigelow, University of Utah, United States

Combining macro-theoretical papers on industry evolution and the emergence of the dominant design with micro-analytical research on product positioning, we construct specific predictions regarding the interaction of the stage of industry evolution, the competitive position of the firm, and product features. We are particularly interested in disruptive innovations made after the dominant design has become established, as these could lead to a new phase in the industry life cycle and affect competitive positioning choices. The data we use consists of detailed information on each member of the entire population of U.S. auto producers from 1917-1933. The insights of this model provide a unique lens for unpacking details of the predictions of shifts from product to process innovations, and possibly back again, identified by industry lifecycle models. To the best of our knowledge, no papers have dealt with the potential move from process back to product innovations and its implications.

03	Friday, May 1, 3:30-5:00 Room: EC-C Session: Use of Educational Software	Track: EDUC, 4	Chair: Carlos Castro
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011-0385: ARQUIMEDES: A Tool For Teaching PPC in an Operations Management Course

Carlos Castro, Universidad Eafit, Colombia

Guillermo Carmona, Universidad Eafit, Colombia

Maria Bravo, Universidad Eafit, Colombia

Production Planning and Control (PPC) is one of the most complex and important processes that students must learn in an undergraduate Operations Management (OM) course. Unfortunately, many traditional academic programs continue to teach the activities that comprehend the PPC process as a sequence of isolated stages, ignoring that PPC is an iterative process rather than sequential. In this paper we present ARQUIMEDES, a computer-based manufacturing planning and control systems developed to help undergraduate students understand the different stages involved in the PPC process (i.e. forecasting, aggregate production planning, master production scheduling and material requirements planning) and how they are related to each other in an integrated approach. We describe the most important modules of the application and include a guide on how this tool can be used to support the process of learning PPC.

011-0212: On the Use of Mathematica in Deploying Interactive Demonstrations for POM and the Decision Sciences

Shailesh Kulkarni, University of North Texas, United States

Friday, 3:30-5:00 Sessions

In this paper I show how one of the world's foremost technical computing systems (Mathematica) can be effectively utilized to demonstrate and explain simple as well as seemingly complex ideas in Production and Operations Management (POM). I relate my experience in developing and testing interactive visual demonstrations and user-driven applications for topics ranging from Inventory Management to statistical techniques frequently used in POM-related data and case studies. Student feedback from testing a subset of these demonstrations in a large section of a core undergraduate course is also discussed.

011-0926: Using SERVQUAL as a Engaged-Learning Project for a Course in Operations Management

T. J. Gabriel, N. Georgia Colelge and State University, United States

This article describes an engaged-learning project used as part of a second course in operations management. Two student teams conducted a service quality analysis of local service businesses. The project was incorporated into the course to provoke the students to consider how the five dimension of service quality proposed by Passraman, Berry, and Zeithaml can be evaluated in service businesses. Other objectives of the project were for students to see how to solicit customer evaluations of service quality, to integrate statistical skills, to develop professional interaction skills, and to improve presentation skills. Smaller student groups were formed in each team to complete five major activities required as part of the project. Both clients were pleased with the students' findings and the students advocated the continued use of this type of project in this course. Suggestions for improvement from both students and instructor are also included.

64	Friday, May 1, 3:30-5:00 Room: Gallery Session: Managing Risks in Supply Chains	Track: DSPT, 4	Chair: Tom/Sanjay Schmitt/Kumar
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011-0371: Managing Global Food Supply Chain Risks: A Scenario Planning Perspective

Aman Deep, Loughborough University Business School, United Kingdom

Samir Dani, Loughborough University Business School, United Kingdom

Global challenges in manufacturing and specifically in food supply chains are pushing towards exploring new avenues of performance and cost improvement ranging from sourcing raw materials and finished products globally, to increasing dependency on technology for multi-tiered supply chains. The complex nature of these global food supply chains have introduced them to numerous uncertainties and risks, and the challenges with regards to managing these are immense. This paper studies the risks and uncertainties surrounding global food supply chains and finds that "scenario planning" which is a popular tool used in other sectors for risk identification, is less widely used to identify risks within global food supply chains. Presented in this paper is also a review of available literature and a discussion with regards to the feasibility of using scenario planning to address food supply chain risks. Retrospective analysis of cases in which scenario planning has been used is provided.

011-0468: Managing Supply Chain Disruption and Competition

Biyng Shou, City University of Hong Kong, Hong Kong

Zhaolin Li, The University of Sydney, Australia

Jianwei Huang, The Chinese University of Hong Kong, Hong Kong

We consider a one-shot game between two competing supply chains with supply disruptions. Each supply chain consists of a supplier and a retailer. The suppliers have different probabilities of disruptions. The retailers engage in Cournot competition by determining order quantities from their suppliers. We analyze the market equilibrium with different supply chain contracts and show that a supply chain benefits from supply chain coordination.

011-0543: A Conceptual Framework for Risk Mitigation in Case of Supply Disruptions

Fabio Cerquinho, IESE Business School, University of Navarra, Spain

Marc Sachon, IESE Business School, University of Navarra, Spain

We present a framework for risk of the purchasing function in industrial supply chains. Our conceptual model is based on an empirical analysis of four manufacturers (in four different industries) that experienced supply disruption of key direct goods. To be able to compare the type of disruption and its downstream effects in the four different industries, we focused on disruptions due to supplier bankruptcy. Some major findings were: cost pressures play a key role in understanding diversity in mitigation practices implemented; first-order problem-solving behaviour predominates, i.e., palliative actions able to ensure the continuity of the operation instead of attacking the disruptive causes. Based on the findings of our empirical analysis, we propose a model of learning and mitigation practices that addresses the question: why do firms react differently to similar disruptive events and learning occurs in different degrees?

65	Friday, May 1, 3:30-5:00 Room: EC-A Session: FSM	Track: EMRG, 4	Chair: Diwakar Gupta
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011-0197: On the Value of Flexible Suppliers and Disruption Information in Supply Chains

Soroush Saghafian, University of Michigan, United States

Mark Van Oyen, University of Michigan, United States

We analyze remedies to increase supply chain resilience: (1) a capacity reservation contract with a secondary flexible supplier, and (2) dynamic monitoring of primary suppliers to estimate their risk of disruption. We model the dynamics of disruptions as discrete time Markov chains. We clarify conditions under which (1) investment in a secondary flexible supplier, (2) having a recourse option, and (3) obtaining information about disruption risk levels of unreliable suppliers may or may not be effective strategies to mitigate disruption risks. We show that implementing supply flexibility without information can be even harmful. Yet, supply flexibility is usually more valuable for firms without than those with information about the risk levels of their suppliers. Our results suggest that implementing supply flexibility is a potent substitute for the lack of risk information.

Friday, 3:30-5:00 Sessions

011-0300: Flexible Contracts in the Service Industry

Hao-Wei Chen, University of Minnesota, United States

Diwakar Gupta, University of Minnesota, United States

Haresh Gurnani, University of Miami, United States

Retailers (or resellers) utilize flexibility specified in procurement contracts with their suppliers (providers) to reduce supply-demand mismatch under uncertain demand. For example, a fashion-goods retailer may try to obtain a larger total supply commitment from its supplier than the size of its firm order to satisfy any excess demand. In response, a supplier may propose contracts that limit either the total supply, or the size of the second order. The latter could be specified either in terms of total excess supply or as a fraction of the retailer's firm order. We study different types of flexible supply contracts, and characterize the retailer's and the supplier's optimal decisions and the impact of parameter changes on these decisions for each contract type. We also study the relative benefit of different levels of contract flexibility on the supply chain's overall performance.

011-0476: Product Differentiation & Operations Strategy in a Capacitated Environment

Saibal Ray, McGill University, Canada

Sachin Jayaswal, University of Waterloo, Canada

Elizabeth Jewkes, University of Waterloo, Canada

We study a firm selling two products/services, which are differentiated solely in their prices and delivery times. When both products are available to all customer segments, they act as substitutes, affecting each other's demand. Customized products for each segment, on the other hand, result in independent demand for each product. On the supply side, the firm may either share its capacities, or may dedicate capacity for each segment. We show that in a highly capacitated system, if the firm decides to move from a dedicated to a shared capacity setting, it will need to offer more differentiated products. In contrast, when independent products become substitutable, a more homogeneous pricing scheme results. The optimal response to an increase in capacity cost also depends on the firm's choice of dedicated versus shared capacities.

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Friday, May 1, 3:30-5:00 **Room:** EC-E
Session: Intermodal Logistics

Track: LGST, 4

Chair: Hugo Yoshizaki

011-0138: Alliances and Logistics Performance: A Case Study of the UK Upstream Oil and Gas Logistics Operations

Mohammed Dauda, The University of Hull, United Kingdom

Yahaya Yusuf, University of Central Lancashire, United Kingdom

This paper reports a case study of alliances among oil and gas companies that maximise logistics management and performance within the Aberdeen region of UK North Sea upstream oil and gas industry. The study involves the organisation and arrangement of the main players in the oil and gas extraction activity. The alliances, involving some of the global oil majors operating in the UK upstream oil and gas industry, were aimed at exploiting scale economy within the supply chain as well as being in tandem with Cost Reduction in the New Era (CRINE) initiative of the UK government directed at optimising the operations of the industry so as to enhance the revenue accruals to the government. Findings from the case study reveal the conceptual interplay between transaction cost, geographic proximity, and scale. Success factors in the alliance were found to be contingent on three key attributes of Commitment, Co-operation, and Communication.

011-0908: Management View of Intelligent and Environmentally Friendly Intermodal Transport

Jukka Hemilä, VTT Technical Research Centre of Finland, Finland

Outi Kettunen, VTT Technical Research Centre of Finland, Finland

Intermodal transport is an important topic due to continuously increasing attention to environmental concerns. Many challenges have to be resolved before intermodal transport can significantly increase its share in freight transport. In a large European project "EURIDICE" is addressed one of the most important challenges, the information flow between different stakeholders and the transportation itself as well as the management system. There are exceptionally many players involved in the intermodal transport and for this reason fluent information flow including the management support is crucial. In the EURIDICE project will be developed solutions for information flow to support efficient management including technical solutions as well as the design of a management and operations system. There will be available measurements of the status of the cargo and rail wagons for planning and operations management purposes and for KPIs for top management. This paper concentrates on issues of the management and operation system.

011-0935: Designing Logistic Networks with Optimization and Multi-Criteria Decision Analysis

Hugo Yoshizaki, Universidade de São Paulo, Brazil

Gilberto Montibeller, London School of Economics, United Kingdom

The optimal design of logistic networks, with its plants and warehouses, is a strategic decision for manufacturers, particularly those which are operating in large developing countries which have to deal with specific issues, such as lack of infrastructure or logistic service availability. Such decisions have been traditionally supported by optimizing models; commonly discrete facility location models; that search for the configuration with the minimum total cost. In practice, other intangible factors that add or reduce value to a potential configuration are important in the location choice, but these are usually exogenously included into the model-supported decision process. We propose an alternative framework which combines multi-criteria decision analysis and network optimization, where factors that add value to both particular nodes of the network and to the network's topology may be measured and included in the decision model. An illustrative case with a decision support system is presented.

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Friday, May 1, 3:30-5:00 **Room:** EC-F
Session: Production/Manufacturing

Track: BNCH, 4

Chair: Shicai Yang

011-0133: The Effect of the Number of Suppliers and Allocation of Revenue-Sharing on Decentralized Assembly systems

Zhaoqiong Qin, North Carolina Agriculture and Technical State University, United States

In this paper, we study a decentralized supply chain with assembled products or jointly sold products. With the revenue-sharing contract, the assembler orders the parts from the independent suppliers based on the announced revenue-sharing rates and then assembles the final product. The involved parties pursue their own profits. Two-stage Stackelberg game is used to help formulate the model. We show how the number of the suppliers affects the total supply chain profit and how the revenue-sharing rates should be allocated to coordinate the whole supply chain.

011-0642: Benefit Assessment of Cooperation Efficiency in Production Networks

Dirk Oedekoven, Forschungsinstitut für Rationalisierung e.V., Germany

Volker Stich, Forschungsinstitut für Rationalisierung e.V., Germany

In times of globalization succeeding in production networks becomes more and more important for small and medium size enterprises (SMEs). The success of cooperation as an activated part of a production network is highly dependent on doing the right things. The question is: which activities are justified? For this differentiation SMEs need to understand the dependencies in cooperation constraints. Cost reduction and sales increase are the most named reasons for taking the risk of cooperating. In fact, in these fields the target achievement rate of SMEs is less than 50%. This shows the complexity of this task and proves the fact that there is no useful management concept for assessing SME cooperation efficiency. To finally provide SMEs with a viable management system the author will show a holistic approach. Starting with the specification of effort and benefit indicators the approach leads to a fundamental understanding of relevant mechanisms.

011-0375: Analysis and Simulation Study on Multiple AGV Utilization Efficiency in AS/RS

Shicai Yang, Southeast University, China

Lindu Zhao, Southeast University, China

With the rapid development of advanced manufacturing technology, Automatic Storage and Retrieval System (AS/RS) and Automated Guided Vehicles (AGV) are being used more and more widely in China. However, the utilization efficiency of Multiple AGV in AS/RS is not entirely satisfactory. In order to improve the AGV scheduling management in AS/RS, queuing theory and soft computing methods are used to study the multiple AGV scheduling problems; in the meanwhile, the scheduling strategy differences between single AGV and multiple AGV are explored. Then the utilization efficiency is analyzed and the simulation results of utilization efficiency are given.



Friday, May 1, 3:30-5:00 **Room:** EC-G
Session: OM/Marketing Integration

Track: MKTG, 4

Chair: Kathryn Stecke

011-0567: Review, Analysis and Classification of the Literature on Strategic Fit

Vanderli Prieto, University of São Paulo/Mackenzie University, Brazil

Marly Carvalho, University of São Paulo, Brazil

In the area of strategy studies, fit is a central theme portrayed in the normative models of strategy formulation. The executives also consider the alignment as a central condition for the successful strategy implementation. However, there are several difficulties in making the concept operative, among them: which elements need to be aligned, how to carry out the alignment process and how to determine whether a company is aligned or not. In addition, alignment has been used as a superior concept without due conceptualization. In this context, this paper employs a citation/co-citation analysis of work using the ISI Web of Science database to explore developments in the strategic fit area. The publications are classified into two main groups: conceptual research and empirical research. The most frequently cited works are identified and their influence analyzed. The main issues in the field research are identified and discussed.

011-0199: Metrics for Measuring the Effectiveness of Operations-Marketing Integration

Joel Goldhar, Illinois Institute of Technology/Stuart School of Business Administration, United States

Paul Prabhakar, Northern Illinois University/College of Business, United States

Thirty years ago Ben Shapiro asked "Can Marketing and Manufacturing co-exist?". The answer then was yes, but with difficulty. Today, as Operations evolves into services and the internet and other applications of digital electronics allow low cost computation and communication, we no longer have a choice. Co-existence becomes integration. Effective organizational mechanisms for aligning supply and demand will, of necessity, be highly idiosyncratic. Managers need a set of "metrics" that can measure the degree to which operations and marketing are cooperating with each other and their integrated functional "fit" to business strategy. We offer new ideas including the "Vitality Index" and the "Product Half Life Cycle" as examples of strategic metrics for controlling the alignment of supply and demand/the integration of operations and marketing that can be used to evaluate and reward independent functional organizations for cooperation.

011-0259: POM and Marketing Symbiosis

Martin Starr, Crummer GSB/Rollins College, United States

Marketing variety (e.g., brand names and claims) and production diversity (e.g., modular product design) are inextricably bound together. The illusion of independence decreases the probability of breakthrough successfulness and increases the likelihood of failure. Price elasticity is a critical factor which depends significantly on process design (e.g., flexible manufacturing systems) and sustainable demand volume. Modular design permits aggregation of volume to allow mass production and/or mass customization.

011-0096: Launching New Products through Exclusive Sales Channels

Christopher Tang, University of California, Los Angeles - The Anderson School, United States

Dimitrios Andritsos, University of California, Los Angeles - The Anderson School, United States

Friday, 3:30-5:00 Sessions

We examine a situation in which a manufacturer launches a new product exclusively through a single retailer. An exclusive new product launch offers to the manufacturer the opportunity to obtain information regarding the potential market size. Also, the exclusive retailer can capture a higher market share by establishing market presence earlier. To capture market competition over time, we present a two-period game-theoretic model of a supply chain comprising one manufacturer and two retailers. The retailers bid for the exclusive rights to sell the product in the first period, while both retailers sell the product in the second period. We examine the retailer's optimal bidding behavior and develop mechanisms to induce retailers to reveal their private information truthfully. We develop expressions for the optimal price contracts.

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Friday, May 1, 3:30-5:00 **Room:** EC-H
Session: Quality Awards and Standards

Track: QUAL, 4

Chair: Paulo
Cauchick-Miguel

011-0466: Validating the Theoretical Criteria Underlying the Baldrige Model: Empirical Evidence from China

Zhen He, School of Management, China

James Hill, Fisher College of Business, The Ohio State University, United States

Ping Wang, The School of Economics and Management, Southwest Jiaotong University, China

Gang Yue, School of Management, Tianjin University, China

The purposes of this research are to validate theories underlying the Baldrige model in China and to add knowledge to the growing body of research in quality management. A questionnaire was designed based on the criteria of the 2006 Baldrige model. 18 hypotheses were developed to validate the underlying theories of the model. Data were collected in 2007 by the Chinese Association for Quality. The sample represents 2675 companies (manufacturers: 74%; service: 24%) from 14 regions and provinces in China including Hong Kong and Macau. The measurements of each of the seven constructs of the Baldrige model were tested and found to be valid and reliable. Results of confirmatory structural equation modeling show that 15 out of the 18 hypothesized causal relationships in the Baldrige model are statistically significant, which leads to a path diagram consistent with previous studies of validating the Baldrige model. Major findings and future research directions are discussed.

011-0705: An Analysis of Practices of Environmental and Social Responsibility in the Companies That Adopt the Brazilian National Quality Award

Paulo Cauchick-Miguel, Uninove, Brazil

Leandro Santos, Uninove, Brazil

Vanio Paz, Uninove, Brazil

The purpose of this paper is to present a preliminary analysis of organizational practices of environmental and social responsibility in companies that adopt the Brazilian National Quality Award three times. The award is the highest form of recognition of excellence in business management in the country. The work is based on an analysis of secondary data published by the National Quality Foundation. It consists of 82 practices in 20 companies from 25 different industrial sectors. The paper categorizes the practices in terms of environmental or social responsibility. The results show that most of them cannot not be considered exemplary as expected for companies in the journey towards performance excellence.

011-0983: ISO9000 Standard Certification and Organizational Performance

C Kartha, University of Michigan-Flint, United States

The ISO9000 quality system standard is used for ensuring a supplier's conformance to specified customer requirements. The standard requires documenting conformance of quality systems to the company's quality manual and established quality system requirements. The process of obtaining ISO certification can be long and requires a significant investment of both human as well as financial resources of the organization. Questions have been raised as to the worthiness of making such investments by organizations for obtaining the certification. A few studies in the past have shown mixed results on the benefit of certification. A survey was conducted to assess the impact of certification on a number of quality related factors such as customer satisfaction, productivity, profitability and market share. Preliminary results are presented in this paper.

011-0486: Contribution of TQM and TPM Practices to Quality Performance of Manufacturing Plants

Phan Anh, Yokohama National University, Japan

Yoshiki Matsui, Yokohama National University, Japan

This paper presents the results of an empirical analysis on the contribution of quality management (QM) and total productive maintenance (TPM) practices to the quality performance of manufacturing plants using survey data from 238 manufacturing plants in eight countries. Analysis of variance (ANOVA) technique and hierarchical regression were used to analyze the relationship between support practices, QM practices, and TPM practices. Results of the analysis demonstrate that excellent quality highly associates with high degrees of both QM and TPM practices. Additional implementation of TPM significantly improves the effect of QM practices on quality performance. The results indicate that autonomous and preventive maintenance highly depends on information tracking, cross-functional training, and integration between functions of manufacturing plants. The findings suggest that the plants explore the linkage and synergy of operational practices to achieve high competitive position in the global market.

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Friday, May 1, 3:30-5:00 **Room:** EC-I
Session: Contractual and Managerial Issues

Track: SRCG, 4

Chair: Bin Jiang

011-0827: An Analytical Study of Market Based Gainsharing Contract

Bin Jiang, DePaul University, United States

Baichun Feng, Pennsylvania State University, United States

Tao Yao, Pennsylvania State University, United States

Friday, 3:30-5:00 Sessions

The market based gainsharing contract is emerging in the Chinese outsourcing market. However, how to determine the target price and the share ratio of gains between the client firm and the vendor firm is an under-researched topic in the current literature. Thus far, research on gainsharing contracts is predominantly descriptive and the output is too vague to be applied in practice. This research provides several important properties of gainsharing outsourcing contract through a continuous-time analytical approach. Specifically, we consider the determination of a market based gainsharing contract between two risk-averse firms through a Nash bargaining process. We derive the optimal gainsharing contract analytically and provide extensive analysis on how the cost and price uncertainties and correlations affect the optimal gainsharing contract. We conclude by discussing implications for research and practice.

011-0658: Outsourcing to Risk-Averse Suppliers Who Might Subcontract

Hubert Pun, Indiana University, United States

H. Sebastian Heese, Indiana University, United States

Suppliers often subcontract part of their work-load to lower-tier suppliers. When outsourcing, firms need to take into consideration their suppliers' strategic incentives regarding subcontracting. We consider the case when a project (or product) that consists of two tasks (or components) is outsourced to a risk-averse supplier. The outputs (qualities) of these two tasks are uncertain and potentially correlated. The manufacturer contracts with a generalist, offering a payment which is linear in the quality of the delivered product. The generalist can perform both tasks in-house or subcontract one task with a specialist. We analyze the generalist's subcontracting incentives and derive the manufacturer's optimal payment. We also characterize the impact that considering the supplier's subcontracting incentives has on project (product) quality and firm profitability.

011-0373: IP Protection in Service Offshoring: A Self-Assessment Model

Guido Nassimbeni, UNIVERSITY OF UDINE, Italy

Marco Sartor, UNIVERSITY OF UDINE, Italy

Daiana Dus, UNIVERSITY OF UDINE, Italy

Service offshoring (SO) nowadays represents an increasing phenomenon. There are several motivations that justify the location of (IT or business) processes in developing countries, such as cost reduction, access to new technologies and skills, focus on core business, and strategic flexibility (Ghodeswar, Vaidyanathan, 2008). The IP protection constitutes one of the most relevant issues in SO processes and may strongly affect their success (Weidenbaum, 2004). The literature so far developed is mostly focused on single aspects (such as the contractual terms or the technical tools for data protection), while only a few studies consider the whole process in order to capture – besides the legal or technical aspects – the managerial ones. In this study based on a literature review and the analysis of some cases, we develop a self-assessment model useful to understand the main disruption risks and managerial tools for IP protection along all the steps of the offshoring process.

011-0996: Fishing for Information in Procurement Auctions

Ali Pilehvar, University of Maryland, United States

Wedad Elmaghraby, University of Maryland, United States

Manu Goyal, University of Maryland, United States

In many practical instances of procurement auctions, one sees that some buyers behave "insincerely". That is, they give the right of first refusal to their existing and favored suppliers, rather than selecting the winner in an unbiased manner based on the lowest bid. Such insincerity is driven by the buyer's needs to "fish for information" to benchmark their existing suppliers with the market. However, we prove that this insincerity can act as a double-edged sword: we establish conditions where this can both benefit and hurt the buyers.

011-0391: Strategic Sourcing and Supplier Selection in the Aerospace Industry

Brian Simons, Honeywell International, United States

Linda Hendry, Lancaster University Management School, United Kingdom

The aerospace sector is increasingly characterised by global supply chains. Although research has explored various aspects of global strategic sourcing in this sector (such as Supply Chain Risk, Total Cost of Ownership, Make v. Buy etc.), key research gaps include empirical studies to: 1. Document current processes, through case study research; 2. Implement solutions (and potentially advancements) currently in the literature to explore practical results, through action research. This paper will present the findings of case study research aiming to fill the first of these two research gaps, to understand how suppliers are selected, including how risk is assessed and what "costs" are considered in making strategic sourcing decisions. It is a multi-case study project involving divisions of Honeywell Aerospace. The research also aims to pave the way to fulfill the second research gap by identifying areas in which current processes could be improved through a follow-on action research project.

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Friday, May 1, 3:30-5:00 **Room:** EC-D
Session: Operations Strategy

Track: EMPR, 5

Chair: Cesar Ortega

011-0206: Framing the Theory of Constraints' Theoretical Tenets

Michael Naor, George Mason University, United States

Alex coman, The Academic College of Tel Aviv Jaffa, Israel

Several scholars postulate that there is lack of theory building in the area of operations management. Although the Theory of Constraints (TOC) has been articulated for over twenty years, it is widely recognized as a scheduling method and a managerial philosophy. The extensive amount of practitioner oriented books and novels about TOC implementation methods certainly had a major role in creating TOC's image as a consultant's technique. The goal of the current study is to frame the tenets of TOC using Wacker's (1998) framework for theory-building as a prism. This study contributes to build TOC's body of knowledge by integrating under one theoretical umbrella all of its tools and practices.

011-0795: Manufacturing Strategy and Technology Interaction: Fit Line & Impact

Friday, 3:30-5:00 Sessions

Cesar Ortega, *Universidad Nacional Autonoma de Honduras/University of Sevilla, Honduras*

Jose Machuca, *University of Sevilla, Spain*

Jose Perez, *University of Seville, Spain*

Pedro Garrido, *University of Sevilla, Spain*

Many studies examine the influence of several manufacturing practices on performance, but fewer of them explore the relationships between practices that improve performance of their combined implementations, and those that do, do not consider the possibility of both a supplementary and complementary view of interaction. Thus, two areas are identified in this paper as being of particular interest: (i) supplementary (whether manufacturing strategy (MS) and technology follow a fit line that increases performance); and (ii) complementary (whether the positive impact of MS on performance increases when level of technology is raised and/or whether technology's positive impact on performance increases when level of manufacturing strategy is improved). Although there are theoretical differences between these two forms, this paper does not try to contrast them; on the contrary, results from the High Performance Manufacturing project seem to suggest that both complement each other when evaluating the interrelation of manufacturing strategy-technology on performance.

011-0492: The Cumulative Model of Competitive Priorities: An Empirical Analysis in the Thai Automotive Industry

Sakun Boon-itt, *Thammasat Business School, Thailand*

Based on the competitive priorities theory, the relationship among competitive priorities has been recognized as an important element of operations strategy. This paper analyzes the five competitive priorities with the data from 151 firms from the Thai automotive industry. Factor analysis, correlation analysis, and multiple regression analysis are conducted. This paper concludes that (1) There are mainly positive correlations among elements of five competitive priorities; and (2) The descending importance order of them is product quality, delivery, production cost, product innovation, and production flexibility. This order is somewhat consistent with the cumulative model. This study adds new knowledge to operations management by investigating the relationships in the Thai automotive industry and filling the gap in the literature on competitive priorities. As a result, it takes the next step of trying not only to examine but also strengthen the relationships in the previous cumulative model.

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Friday, May 1, 3:30-5:00 **Room:** Senate
Session: Academic Opportunities with APICS

Track: GENL, 3

Chair: Rhonda Lummus

011-0230: Academic Opportunities with APICS

Rhonda Lummus, *Indiana University, United States*

Vincent Mabert, *Indiana University, United States*

Robert Vokurka, *Texas A&M University - Corpus Christi, United States*

APICS, The Association for Operations Management, provides education and certification to practitioners working in the field of operations management. During the past 52 years it has worked closely with the academic community to meet the needs of the practicing professional and college students. This 90 minute workshop will cover a number of APICS initiatives which can be beneficial to academics. The discussion will include:

- A discussion by the editor of Production & Inventory Management Journal on the Journal's mission, submission requirements and review process
- Information on the opportunity to interact and see important presentations from practicing managers at the 3-day International APICS Conference
- Insight into research funding and scholarship opportunities from the APICS Educational & Research Foundation.

While the presentation will focus on the topics listed above, the speakers will reserve time for a discussion on how APICS can better provide value to academics.

Saturday, 9:30-11:00 Sessions

73	Saturday, May 2, 9:30-11:00 Room: Cloister North Session: Service Management Theory	Track: SRVC, 4	Chair: Emma MacDonald
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011-0883: Making Room for Operations in Service-Dominant Logic

Larry Menor, University of Western Ontario, Canada

Scott Sampson, Brigham Young University, United States

One of the biggest trends in the study of services today is Vargo and Lusch's "Service-Dominant Logic." Their 2004 article has been cited 561 times, and is a major topic of discussion at Services Management conferences. Some have claimed it is the future of Services Management, even though it is hostile towards operations management. For example, Vargo and Lusch espouse that "Investment in manufacturing technologies constrains market responsiveness" and "firms will increasingly become more competitive by outsourcing the manufacturing function" and "Ultimately, the most successful organizations might be those whose core competence is marketing." As such, SDL minimizes the relevance of operations issues in service and non-service businesses. In this research we reformulate SDL into a more balanced perspective that accommodates both operations and marketing perspectives.

011-0860: Customization versus Standardization: Spectrum or Spectra

Annibal José Scavarda, Marriott School of Management, Brigham Young University, United States

Scott Sampson, Marriott School of Management, Brigham Young University, United States

The literature generally analyses Customization and Standardization as extreme concepts of the same managerial spectrum. Nevertheless, they seem to belong to distinct spectra. This subtle distinction is relevant for students to understand business fundamentals, academics to teach and research managerial aspects of theories, and practitioners to implement these aspects. This research study will analyze this question based on the following points: Operations and Marketing bringing different views of these concepts; Operations, Marketing, and Information Technology using respectively process, product, and system as unit of analysis; Customization stimulating variations, while Standardization avoiding it; the level of variation and its causes (main customer, customer's belongings, and customer information) differentiating services and non-services; variations happening in three stages: input, transformation, and output, with some variations controllable; and the interface between the output of a member and the input of the following member influencing the value chain and the supply chain.

011-0613: The Role of General Services in Market Process Evolution

Ari Vepsäläinen, Helsinki School of Economics, Finland

Jukka Kallio, Helsinki School of Economics, Finland

Katariina Kemppainen, Helsinki School of Economics, Finland

Mika Raulas, Helsinki School of Economics, Finland

Markku Tinnilä, Helsinki School of Economics, Finland

We argue that efficient service operations are based on the same principles as efficient manufacturing operations – division of labor, specialization of facilities and relationships, and economies of scale. In services, however, market pricing does not enforce institutional learning of specialization as smoothly as in the case of production of goods. This is due to greater variability of customer needs and habits, and the complexity of service facilities and operations. Furthermore, we show that the integration of a wider variety of services into one service channel – a condition called general service – may be advantageous to both the customers and service providers during some stages of market process evolution. This is due to progress in technology allowing for greater scale by serving several customer segments. We introduce the concept of general service and the problems and benefits posed on various service industries and market processes.

011-0412: A Framework for Assessing the Value-in-Use of Product-Service Systems

Emma Macdonald, Cranfield School of Management, United Kingdom

Veronica Martinez, Cranfield School of Management, United Kingdom

Hugh Wilson, Cranfield School of Management, United Kingdom

The increasing servitization of manufacturing provides a customer insight challenge. We argue that where a hybrid of physical goods and co-created services forms a product-service system (PSS), understanding customer perceived value-in-use becomes vital. An approach to assessing the value created by a PSS might involve a summation of existing measures including product quality, service quality and relationship quality. We argue, however, that the weakness of such an approach is that these existing measures assess embedded value (what the supplier delivers) as opposed to value-in-use (what goals are achieved by the customer). To address this gap, we propose a framework which includes an assessment of the supplier's processes, the customer's processes, and the co-created customer perceived value-in-use. This framework extends theory by taking into account the processual and interactive perspective of value-in-use creation. This has implications for design, management, pricing and delivery of PSS offerings.

74	Saturday, May 2, 9:30-11:00 Room: Cloister South Session: Quantitative Supply Chain Models	Track: SCM, 5	Chair: Joe Guenes
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011-0474: Economic Lot-Sizing with Perishable Inventories

Edwin Romeijn, The University of Michigan, United States

Mehmet Onal, University of Florida, United States

Saturday, 9:30-11:00 Sessions

We consider extensions of the classical dynamic economic lot sizing problem where items perish in a certain number of periods, where this number can depend on the period in which the item was produced. We distinguish between (i) settings in which the retailer has the power to supply customer demands in each period with any non-perished items, and (ii) settings in which the customer has the power to select from the collection of available items. In the latter case, we assume that customers prefer items with later expiration days. We develop polynomial-time dynamic programming algorithms for several problem variants.

011-0462: Optimal Configuration of a Service Delivery Network: An Application to a Financial Services Provider

Hari Natarajan, University of Miami, United States

Anuj Mehrotra, University of Miami, United States

Geoffrey Meester, Fidelity Investments, United States

Michael Seifert, Wyeth Pharmaceuticals, United States

Driven by market pressures for greater variety of services at lower costs, companies are increasingly partnering with independent partners to create service networks that deliver high quality services at low costs. Configuring such a service network entails determining which partners to select and how to assign customer requests among the selected vendors, while incorporating vendors' capabilities, costs, and revenue-generating abilities. Motivated by a call-center outsourcing initiative at a Fortune 500 company with global operations, we develop and apply a novel mixed integer programming model for the service network configuration problem. Our model effectively accounts for the impact of uncertainty in arrivals and service times and permits imposing various call routing preferences and alternative service costs. Results from the model suggest that our approach can generate considerable economic savings and substantial additional revenues, while ensuring a high quality of service throughout the network.

011-0329: Assortment Selection under Heterogeneous Consumer Choice

Sreelata Jonnalagedda, University of Texas, Austin, United States

Dorothee Honhon, University of Texas, Austin, United States

We consider the problem of a firm choosing an assortment of products in a make-to-order setting when the customer population is heterogeneous. Each customer type has a ranking of the potential products by order of preference. A customer purchases the highest ranked product (if any) offered in the assortment. Products also differ in their levels of profitability for the firm. Under the general choice model we show that the most profitable product should be included in the assortment. We consider special cases of the general choice model (such as the Multinomial Logit model, the locational choice model or the Markovian second choice model) and obtain an efficient method to get the optimal assortment. In some cases the problem of finding the optimal assortment can be likened to a shortest path problem. Finally, we suggest a number of heuristics and test their performance numerically.

011-0724: Manufacturer's Promotional Support in Dynamic Retail Market Duopoly

Xiuli He, UNC Charlotte, United States

Ashutosh Prasad, University of Texas at Dallas, United States

Suresh Sethi, University of Texas at Dallas, United States

We study a supply chain that consists of a manufacturer and two competing retailers. The manufacturer supports the retailers' promotional activities by sharing a portion of the retailers' promotional expenditures. The manufacturer first announces the participation rate for the each retailer and the retailers set the optimal promotional effort levels in response. The market share of each retailer depends on its own and its rival's promotional effort level. We model this supply chain problem as a differential game whose dynamics follows Sethi's sales-advertising model. Specifically, in the horizontal level, we derive feedback Nash equilibria for symmetric and asymmetric retailers. On the vertical level, we derive the feedback Stackelberg equilibria. We obtain the conditions when participating in the promotional activities is optimal for the manufacturer.

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Saturday, May 2, 9:30-11:00 Room: Captain

Track: SCM, 19

Chair: Kelly Weeks

Session: Social Responsibility

011-0616: Sustainable Supply Management: Links between Relationalism and Environmentalism

Antony Paulraj, University of North Florida, United States

The increased recognition of environmental deterioration requires supply chain managers to reduce the risks passed on by their suppliers. So, many firms aspire to green their supply management activities and build common approaches to waste reduction, product stewardship, and operational greenness. Accordingly, sustainable supply management has been recognized as a key ingredient of organizational sustainability. This manuscript seeks to extend current research within sustainable supply management by considering key relational, environmental and performance factors. Using survey data and structural equation modeling, a number of interrelationships are hypothesized and tested. The results from this study are expected to provide strong support for the overlapping nature of relationalism and environmentalism in achieving sustainability. Implications for future research and practice within sustainable supply management are offered.

011-0692: The Impact of Green Supply Chain Practices on the Selection of Environmental Technologies

Jeremy Meacham, Jackson State University, United States

Jack Crumbly, Jackson State, United States

Saturday, 9:30-11:00 Sessions

The economic and environmental performance equilibrium has become increasingly important to organizations facing competitive, regulatory and community pressures. With increased pressures for environmental sustainability, it is expected that enterprises will need to implement strategies to reduce the environmental impact of their products or services. Environmental management in the supply chain must be viewed as managing the environment-related activities of two or more transacting organizations. This paper assesses the impact of Green Supply Chain Practices (GSCP) on the selection of different environmental technologies. For instance, does environmental collaboration between organizations lead to the selection of more process- or product-based changes with regard to the environment rather than end-of-pipe solutions? Previous research has shown that environmental management orientation and investment in environmental technologies are intrinsically related. A model is developed and hypotheses and results presented.

011-0799: Moving toward a Green Supply Chain

Kelly Weeks, Texas A&M University at Galveston, United States

Logistics plays a huge part in everyone's lives. It allows people a means to travel from place to place, receive goods or services, conduct business, and acquire energy. All these aspects are highly important to citizens and the community; however, these things come with a cost. Most logistical methods are not environmentally friendly and thereby cause problems which are detailed and analyzed in this study to find green solutions. Although interest is growing in the so-called greening of logistics, relatively few empirical studies have dealt with environmental issues in logistics. This research will analyze the areas of energy transportation and the different modes of transportation of goods. It will then discuss all the problems of each and research means of resolving the harmful effects of each, which are both many and serious according to Moore (2008).

011-0200: Social Entrepreneurship: Lessons in Supply Chain Management

Kathleen McKone-Sweet, Babson College, United States

While the field of social entrepreneurship isn't a new concept, it has gained in popularity as the division between the haves and the have-nots has grown in the world. Social entrepreneurs act as the change agents for society, seizing opportunities others miss in order to improve systems. The operations management literature has examined how companies and organizations improve their supply chain's socially and environmentally responsible practices; however, the literature has not examined social entrepreneurs, their organizations' supply chains. In this paper, we draw upon multiple case studies of social entrepreneurs to identify the innovative ways in which their organizations have strategically leveraged supply chains to create and capture the most social value. The goals of this paper are to identify supply chain innovations that are applicable to traditional for-profit organizations and to highlight research opportunities in the overlapping fields of supply chain management and social entrepreneurship.

011-0041: Network Marketing Strategy and Supply Chain Management

Raj Selladurai, Indiana University, United States

This paper focuses on the use of network marketing strategy by an organization as a distribution tool in its supply chain management activities. The paper looks at the traditional corporate business paradigm and the "new" network marketing paradigm, and analyzes some implications of both strategies in operations management. The network marketing paradigm has been greatly enhanced by the growth and popularity of the internet, which provides a powerful impetus to the whole concept of effective supply chain management. The study also discusses a few specific manufacturing and service companies that are implementing the network marketing strategy model in some form; and it analyzes the supply chain management activities used by these organizations to achieve unprecedented success in their respective industries. Then, this study attempts to develop an effective supply chain management model that uses network marketing as a key strategy in its operations management.

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Saturday, May 2, 9:30-11:00 Room: Yeoman
Session: Management Issues

Track: SVCN, 1

Chair: Patricia Deflorin

011-0054: Management of Virtual Enterprises - Optimisation of Value Optimising Activities

Yumin Zhang, Aston University, United Kingdom

Ashok Kochhar, Aston University, United Kingdom

The significant increase in inter-organisational collaboration during the last two decades has led to the development of the so-called Virtual Enterprises, defined as a structure which can optimally utilise operational internalisation and externalisation to improve its performance. Such Virtual Enterprises are often global and different from traditional organisations in that they can achieve tasks beyond their internal capacity, and focus more resources on core competencies thus becoming agile. To transform a traditional organisation into a virtual enterprise, it is necessary to create an alliance management function for managing the alliance operations. This paper describes the development of an externalisation and internalisation (EI) management function as the core of a virtual enterprise, organised around an organisation's value stream function. This value stream oriented structure further ensures that the optimisation is value adding.

011-0280: Create the Network You Need - A Value Net Framework

Maik Jaehne, Chemnitz University of Technology, Germany

Ralph Riedel, Chemnitz University of Technology, Germany

Complex global supply chains are a topic for small and medium enterprises as well as for multinational enterprises. Both of them have to fight with a lack of transparency and stuttering information flow which has negative effects on integration and communication. Our Value Net framework is a basis for analyzing global networks. It is used to figure out where potential is hidden to create value in global production. A key factor is the overcoming of barriers made by humans, like cultural, goal differences or lack of trust. Depending on the supply chain structure, the products, the production strategy and company structure the right level of integration has to be chosen. The question is how to identify the right and important (soft) success factors. How should the network be organized and where are possible pitfalls? We will present our concept to answer these questions.

011-0517: The Effect of Geographically Distributed R&D and Production Networks on Exploration and Exploitation

Saturday, 9:30-11:00 Sessions

Patricia Deflorin, University of Zurich / Institute of Strategy and Business Economics, Switzerland

Maïke Scherrer-Rathje, University of St.Gallen / Institute of Technology Management, Switzerland

Helmut Dietl, University of Zurich / Institute of Strategy and Business Economics, Switzerland

In this paper we develop a theoretical framework to identify under which circumstances the lead factory concept is more successful than the more traditional structure of spatial separation in combining exploration and exploitation. Two main structures of the geographically distributed R&D and production network are dominant: spatial separation and parallel structures as encountered in lead factories. Our conceptual research and theoretical analysis result in four major propositions: (1) The lead factory concept increases the acceptance of innovations due to the principle of parallel structures. (2) As the balance of exploration and exploitation increases within the lead factory, the competitive advantage enlarges. (3) The lower the exploration activity within the factories, the larger is the competitive advantage. (4) The competitive advantage of the lead factory concept increases as the knowledge loss avoided by the lead factory decreases.

011-0876: Strategy, IT and Dynamic Change in Value and Supply Networks

Ben Clegg, Aston Business School, United Kingdom

Dapo Ajayi, Aston Business School, United Kingdom

This paper explores the importance of collaboration between different types of organisations within an enterprise. To achieve successful collaboration requires both endogenous and exogenous factors of each organisation to be considered and a shared meta-strategy supported by shared cross-organisational processes and technology. A rolling business plan would periodically review, assess and reposition each organisation within this meta-strategy according to how well they have contributed. We show via case studies produced via an action research based approach that recent technological advances have made organisational structures more agile, organisational infra-structure more connected and the sharing of real-time information an operational reality; we also discuss the challenges, success factors and risks in doing this.

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Saturday, May 2, 9:30-11:00 **Room:** Scribe
Session: Empirical Research 1

Track: SUST, 9

Chair: Manpreet Hora

011-0773: Sustainable Supply Chain Management – An Exploration of Current Practice

Simon Croom, university of san diego, United States

Saman Barani, UNIVERSITY OF SAN DIEGO, United States

Dan Belanger, BUSINESS SCHOOL, UNIVERSITY OF SAN DIEGO, United States

Tim Lyons, UNIVERSITY OF SAN DIEGO, United States

Jaime Murakami, UNIVERSITY OF SAN DIEGO, United States

In this paper we set out to examine how concern for environmental impact is being incorporated into the strategic and operational management of supply chains. Our research is an explanatory study intended to provide an overview of practice and inform further research. In an Aberdeen Group report best-in-class companies cited a "desire to be a thought leader for green/sustainability" as the number one pressure driving the green supply chain. A close second and third were the "rising cost of energy/fuel" and to command a "competitive advantage/differentiator," respectively. The significance of sustainability for supply chain practitioners and academics alike led us to conduct a case study research program in Southern California to investigate the characteristics and sophistication of organizations' current approaches to adoption of sustainability aims. We developed a business sustainability evolution model and in this presentation report on the case findings, methodology and analysis of our study.

011-0707: Agility in Reverse Supply Chains: Evidence from Product Recalls in the Toy Industry

Hari Bapuji, University of Manitoba, Canada

Manpreet Hora, Georgia Institute of Technology, United States

The recent years have witnessed an increase in the recalls of consumer products. Prior research on product recalls shows that customers, markets and regulators react strongly and negatively to product recalls. Thus, to counter such negative reactions, firms need to have effective recovery programs to minimize the impact of product recalls. However, very little research exists on how firms differ in the way they manage product recalls in the reverse supply chain. In this study, we test the firm and recall characteristics that influence the agility in product recalls. Examining over 500 product recalls over a twenty year period (1988-2007) in the U.S. toy industry, we find that the agility in product recalls is associated with supply chain entity announcing the recall (manufacturer, distributor, and customer) at the firm level, the scope of the recall (large vs. small), and the remedy to the recall (repair, replace or refund).

011-0539: Environmental Violations and Firm Reputation: New Evidence

Marie Dutordoir, Rotterdam School of Management, Netherlands

Joao Quariguasi, Bradford School of Management, United Kingdom

Min Uh Cha, Rotterdam School of Management, Netherlands

We examine the reputational costs imposed on firms that violate environmental regulations. Previous research indicates large reputational damages for false advertising, product recalls, and financial misrepresentation. Karpoff et al. (2005), however, find that reputational penalties are small for firms committing environmental violations over the period 1980-2000. Our paper provides two contributions. First, using a sample of 41 environmental violations announced between 2000 and 2007, we demonstrate that the loss in stock market values upon the announcements (-0.61% on average) is about six times larger than the loss caused by the actual legal penalties (-0.11% on average). The difference with the results of Karpoff et al. (2005) might be driven by an increase in environmental awareness over recent years, causing a larger reputational loss for firms harming the environment. Second, we show that the reputational losses are larger for companies whose value largely depends on intangible assets such as brand value.

011-0047: Influence of Risk on the Relationship between Handling Product Returns and Customer Loyalty: An Empirical Analysis

Ramakrishnan Ramanathan, Nottingham University Business School, United Kingdom

Saturday, 9:30-11:00 Sessions

Ability of an organization to attract and retain customers is vital to its success. A number of factors contribute to the positive experience of customers—convenience, availability, delivery, returns policy, etc. Some of these factors are based on efficient performance of companies in managing product returns, and in fact these factors are more important in the e-commerce context since e-commerce typically experiences higher levels of product return compared to traditional retailing. Using data from online customer ratings, we explore how the relationships between performance of companies in handling product returns and customer loyalty are affected by risk characteristics of products. Our results show that handling product returns plays an important role in shaping customer loyalty for low-risk products and also for high-risk products but not for products that exhibits medium levels of risk. These results have implications for website managers and development of reverse-logistics channels in the internet supply chains.

011-0825: Transformation for Global Compression -- Quality Over Quantity

Robert Hall, Indiana University (emeritus), United States

Operations in the near future must consider four related global problems at once: excessive resource consumption, shortages of energy and materials, environmental sustainability, and rejection of the system by those who feel cheated or displaced by it. Much has been written about each of these problems. Our biggest challenge is transforming ourselves to meet them. Arbitrarily quantifying this challenge suggests its magnitude: Improve industrial society quality of life; extend it to everyone globally while using less than half the energy and less than half the virgin raw materials of today, while reducing toxic releases nearly to zero. Lean operations, eliminating waste as a customer might see it, conserves resources, but that is only a start. To dig deeper, do a mass-energy balance around a large system boundary, and over a complete product or service life cycle; then look for the big material and energy losses and the big opportunities. Doing this begins to generate ideas for a different business model, usually one with reverse logistics. On top of this, look qualitatively at the effects of processes on the external environment; what is now often called green chemistry. But to do all this, many more people have to become proficient seeing and solving problems daily. So our biggest challenge is not operational techniques, but our instincts and our systems of business. For 500 years they have developed to promote expansion, so that in Compression, even our assumptions of economic efficiency need revision to minimize use of resources - not merely making substitutions among them.

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Saturday, May 2, 9:30-11:00 **Room:** Knave
Session: Healthcare Supply Chains I

Track: HLTH, 5

Chair: David D Dobrzykowski

011-0251: Healthcare Supply Chain and IS Strategies for Improved Outcomes

Mark Vonderembse, University of Toledo, United States

David Dobrzykowski, University of Toledo, United States

Rising costs and concerns over quality have increased attention on the potential gains that can be realized by developing and implementing healthcare supply chain and Information Systems (IS) strategies. However, the development and implementation of such strategies in healthcare has lagged behind other sectors. This study explores some of the unique characteristics of the healthcare industry, specifically the complexity of service delivery, and proposes a theoretically grounded research model positing supply chain and IS strategies that can be implemented to create high quality, cost efficient care delivery to patients. In doing so, two theories (complexity theory and value co-creation theory) provide support for a four stage causal model proposing relationships between; (1) operational complexity, (2) supply chain and IS strategies, (3) supply chain practices, and finally (4) quality and cost outcomes.

011-0703: Understanding Hospital Supply Chain Performance Drivers

Vicki Smith-Daniels, Arizona State University, United States

Supply expenditures are consuming an increasing larger percentage of a hospital's operating expenses. In 2007, patient care supply expenses averaged 21.3% of a hospital's adjusted operating expenses. This presentation describes a hospital supply chain industry-university research partnership that identifies the operational, organizational, and supply chain performance drivers of hospital and departmental supply expenses. Given the lack of industry standards, this research developed new supply chain measures using empirical measurement methodologies and qualitative research methods. This presentation concludes with a discussion of the initial data collection process and the challenges and opportunities of advancing a large-scale supply chain research program in the health care industry

011-0820: Collaborative Relationships in a Healthcare Network

Adriane de Queiroz, UNIMED Campo Grande, Brazil

Luis Henrique Pereira, FGV-EAESP, Brazil

From seminal studies on the competitiveness based on core competence (Bowen, 1994; Stalk, Evans and Schulman, 1992; Prahalad and Hamel, 1990) it is possible to exploit the issue of structuring networks with focus on cooperation. The theme of structuring supply networks, in the light of cooperation between enterprises, has the assumption that a network of companies will have more chances to take a competitive positioning within a new business environment, given the complex and fast changes. This paper presents a study of collaborative relationships in a healthcare network. The case of Unimed Brazil - the largest cooperative experience in healthcare across the world and also the largest network of healthcare in Brazil- is explored.

011-0625: Supply Chains for Living Products: The RegenMed Business Models

Petri Lehenkari, University of Oulu Medical School, Finland

Katrina Nordstrom, Helsinki University of Technology, Finland

Marko Närhi, Helsinki University of Technology, Finland

Timo Ruuska, University of Oulu, Finland

Ari Vepsäläinen, Helsinki School of Economics, Finland

Saturday, 9:30-11:00 Sessions

Tissue engineering (TE) creates living products which require viable supply chains with novel effects on production, marketing, distribution, quality management, regulation and profitability. Cells produced under aseptic conditions must maintain viability through various stages of differentiation, regeneration of tissue and restoring of cellular or organ functions. We analyze some business models of the first generation of regenerative medicine (RegenMed 1.0), such as Carticel® and Dermagraft®. A more recent business model creates value by commercializing mesenchymal stem cells (Prochymal®), typifying the emerging RegenMed 2.0 era. We specify a framework for classifying and evaluating the capabilities and hurdles of the viable supply chains for living products, and illustrate plausible RegenMed business models such as commercial production of bone marrow transplant, umbilical chord blood and products based on mesenchymal stem cells. Finding the success factors of simple TE product offerings indicates the direction of truly formative years for RegenMed services.

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Saturday, May 2, 9:30-11:00 Room: EC-D1
Session: Sourcing

Track: EMPR, 6

Chair: Shaohan Cai

011-0052: Inventory Velocity in Canadian Breakfast Cereal Supply Chains

Meagan Boileau, Queens University, Canada

Michael Armstrong, Brock University, Canada

We describe a field study of the operational performance of breakfast cereal supply chains in Canada. The primary performance measure is product age: i.e., the total amount of time the product takes to reach consumers through retail stores after leaving the manufacturers' production lines. Lower ages indicate that a supply chain has a higher inventory turnover or inventory velocity. The study analyzed the ages of 1666 boxes of breakfast cereal produced by 3 manufacturers that were sampled from 6 major retail chains operating in Canada. The results showed some significant differences in inventory velocities amongst the firms, particularly for the manufacturers. The study did not find much evidence of retailers and manufacturers coordinating their joint replenishment processes.

011-0154: The Sourcing Hub and Upstream Sourcing Networks

Anupam Agrawal, University of Illinois at Urbana Champaign, United States

We explore how firms can manage their sourcing better by developing relationships not only with their suppliers but also with their suppliers' suppliers. Building on our four-year empirical investigation in the auto industry, we propose the concept of the Sourcing Hub, a collaborative center involving the firm, its suppliers and raw material suppliers, as the principal alignment mechanism for managing value in upstream sourcing. We model non-cooperative and cooperative sourcing hub scenarios, anchoring to our empirical work, and examine the resulting profits along the supply chain. Overall, our results show that active management of upstream sourcing can add value to supply chains.

011-0499: Response to Supply Chain Uncertainties: An Empirical Investigation for Developing a New Framework

Mahesh M V, IIM Bangalore, India

Literature and themes related to Risk issues in operations management are underdeveloped areas. Supply chain processes encounter several kinds of uncertainties. These can be broadly classified as supply related, demand related and context related. The specific response decision adopted by firms may depend on several factors including the perception of the uncertainty, the risk attitude of the firm, the existing supply chain structure of the firm, the relationship of the firm with its vendors and customers, etc. A new framework is developed based on the prospect theory understanding of how decision makers set risk attitude, the generic ways of responding to uncertainty, the behavioral issues in supply chain management, the value of flexibility and the internal and external orientation of organizational action as response to uncertainty. Relevant literature is discussed and a set of propositions developed. The paper further tests the propositions by a mix of methods.

011-0982: Trust, Information Integration, and Coordination Costs: An Integrative Model

Shaohan Cai, Carleton University, Canada

Based on the results derived from an empirical study of 398 Chinese companies, we examine the relationships among trust, information integration, and supply chain outcomes. Specifically, we study the effects of two types of trust, namely goodwill trust and competence trust, on two components of information integration, such as information sharing and joint action. Goodwill trust is found significantly and positively related to information sharing, but not to joint action. Competence trust is found to have positive effects on both information sharing and joint action. We further examine the relationship between two elements of information integration on coordination costs and supplier performance. Our analysis reveals that information sharing has negative impact on coordination costs, while joint action has positive effects on the cost. Both information sharing and joint planning are found to have a significant, positive impact on supplier performance.

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Saturday, May 2, 9:30-11:00 Room: EC-B
Session: Practices for Success

Track: PITM, 4

Chair: Paulo Gomes

011-0266: Total Quality Management as Competitive Advantage: An Empirical Analysis of Quality and Innovation Outcomes

Paulo Gomes, Universidade Nova Lisboa, Portugal

Graça Silva, Universidade Nova de Lisboa, Portugal

Saturday, 9:30-11:00 Sessions

We examine the effect of TQM and innovation capabilities on a firm's competitive advantage and performance. Competitive advantage is assessed in terms of product differentiation through quality or innovation. We distinguish three types of TQM capabilities: organizational, related to leadership and HR, process capabilities related to continuous improvement, and product capabilities related to product design. Data were collected from 224 senior executives. PLS was applied to evaluate the relationships under examination. Results show significant relationships between product design tools and product innovation, TQM supportive and product quality. Innovation capability mediates the effect of innovation orientation on product innovation. Differentiation through product quality is associated with positive strategic performance, while differentiation through innovation is positively associated with both strategic and economic performance. By considering multiple dimensions of TQM capabilities we gain a better understanding of the impact of TQM on quality and innovation.

011-0320: Antecedents and Consequences of Popular New Product Development Practices and Software Tools: An Exploratory Study

Gregory Heim, Texas A&M University, United States

Debasish Mallick, University of St. Thomas, United States

David Peng, Texas A&M University, United States

This paper empirically examines antecedents and consequences of development practices and software tools used by new product development (NPD) teams. Many development practices and software tools enable activities of new product development teams, yet little empirical evidence sheds light on the development tasks and operational contexts surrounding their adoption and use. Nor does research identify how practices or tools relate to project performance. We examine nine popular development practices and software tools using data collected from a cross-sectional international study sample of new product development projects. We first examine how practice and tool adoption and extent of use are associated with project characteristics and organizational IT infrastructure. We then examine whether their extent of use is associated with project performance. The paper contributes by providing guidance to researchers and managers regarding the conditions under which these popular development practices and software tools support new product development performance.

011-0606: Innovation Management Practices in Small and Medium Enterprises (SMEs)

Adegoke Oke, Arizona State University, United States

Andrew Myers, AJM Associates, United Kingdom

Fred Walumbwa, Arizona State University, United States

Christopher Penney, Arizona State University, United States

With the global economy in serious turmoil, how to stimulate economies and create jobs is the top priority of global leaders. In the recent 2008 US general election, the economy was a top priority and was regarded as issue number one. SMEs have been long recognized as the engine that drives economies. Also, differentiating through innovation is seen as a key strategic weapon for survival by such firms. While there is an abundance of studies on how large firms undertake innovation, there is a need for such studies on small firms. Thus, the objective of this study was to investigate the innovative practices of small firms. Our survey research reveals that implementing new product or innovation strategy and human resource policies that foster innovative culture are significantly related to innovation performance. Innovation performance also mediates the relationship between innovation management practices and business turnover growth in small firms.

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Saturday, May 2, 9:30-11:00 Room: EC-C
Session: Improving Decision Making

Track: EDUC, 5

Chair: Anna Carvalho

011-0185: Abilities and Competences in Leadership: Concepts and Discussions

Rita de Cássia Fucci-Amato, Federal University of ABC (UFABC), Brazil

João Neto, University of São Paulo (USP), Brazil

The aim of this paper is to analyse and discuss some essential abilities related to the practice of leadership in organizations and formal or informal work groups. Firstly, it presents some definitions concerning the theoretical concepts of abilities and competences; then, some essential abilities are presented and applied to the leadership role, in reference to the human resources and operations management. The paper is based on a multidisciplinary literature review, involving the areas of knowledge of business management, industrial engineering, and pedagogy.

011-0204: Integrating Behavioral and Social Psychology Concepts into the Operations Management Course

Janelle Heineke, Boston University/School of Management, United States

Cheryl Druehl, George Mason University/College of Business, United States

Joel Goldhar, Illinois Institute of Technology/Stuart School of Business Administration, United States

Mathematical models have become an increasing part of OM courses to the point where we no longer teach the fundamental concepts of Behavioral Science that Operations Managers need to know to be effective. Adding an integrated emphasis on human behavior to OM course content will create a better, and necessary, balance between models describing what should happen and the understanding of human behavior required to achieve results. Many of our quantitative models take behavior into account in overly simplistic ways, resulting in a disappointing mismatch between analytical expectations and actual results. Our labor intensive service economy also requires Operations Managers to manage and control the behavior of customers as they engage in "co-production." Our presentation will offer an overview of useful behavioral concepts and one example of a course that integrates behavioral factors with quantitative analysis.

011-0782: Activity-based Learning Experiences in Quantitative Research Methodology for Young Scholars - Course Design and Effectiveness

Martin Stöblein, University of Dayton / Department of MIS, OM & Decision Sciences, United States

Saturday, 9:30-11:00 Sessions

The paper investigates the reaction of PhD students and junior faculty to a six-month course in Survey Research Methodology (in supply chain management and entrepreneurship) that used active learning experiences. Noteworthy is that the course was tailored to an audience with variable previous knowledge, interests, available time, cultural backgrounds, research and writing skills. Thus a major challenge was presenting an intimidating quantitative course while bridging variation in learner backgrounds. We present the course design and its effectiveness. Empirical evidence indicates that an active learning approach is more successful than a traditional technique-based course and exam format. We analyzed learning preferences, knowledge and skills acquired, and degree of satisfaction - before, during, and after the course. Although the efforts of tailoring the course to a heterogeneous group are substantial, the benefits outweighed this. Each participant was not only engaged in complicated statistical methods, but also developed life-long empirical research skills.

011-0568: Improving Operations Management and Quantitative Analysis Techniques with Microsoft Excel® Skills Assessment Instrument

James Gilbert, Rollins College, United States

Microsoft Excel® is used in many core operations management courses to develop student skills in forecasting, capacity planning, inventory management, waiting-line models, and other topics. Today, the possession of fundamental keystroke-level Excel skills is a pre-requisite for achieving classroom success in operational planning and analysis. The purpose here is to understand the level of fundamental Excel skills possessed by matriculating students using survey inquiry resulting in a picture of the proficiency level of the moment. Fundamental Excel skills are defined as the minimum task-level spreadsheet keystrokes for productive and efficient classroom performance in a graduate business program. The objective is to move from anecdotal to quantitative evidence on the Excel skill sets of entering students. Armed with in-depth knowledge of student Excel the faculty may develop skills training sessions and support tutorials leading to Excel mastery and better performance in both core and advanced courses.

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Saturday, May 2, 9:30-11:00 Room: Gallery

Track: DSPT, 5

Chair: Sanjay Kumar

Session: Risk Identification and Operational Planning for Supply Chain Disruptions

011-0542: Strategies to Mitigate Supply Chain Disruptions

Virginia Machado, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal

Susana Azevedo, University of Beira Interior, Portugal

Ana Barroso, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal

Alexandra Tenera, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal

Virgílio Machado, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal

As supply chains increase in complexity due to outsourcing, globalization and volatility in environment, the risk of disruptions may increase and variability is beyond a company's control. Being so, companies need to adopt disruption-management practices at strategic, tactical and operational levels. The main objective of this paper is to propose a conceptual model on strategies to mitigate supply chains disruptions under the supply-demand perspective. A literature review on disruption-management practices is presented. Also, a qualitative approach is used to identify some strategies used by actual supply chains to mitigate the disruptions that have occurred. This qualitative approach makes it possible to validate the proposed conceptual model.

011-0506: Risk Identification and Assessment in the Supply Chain

Wolfgang Kersten, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

Mareike Boeger, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

Carolin Singer, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

Philipp Hohrath, Kühne School of Logistics and Management/Hamburg University of Technology, Germany

In recent years, the importance of a common risk management policy between supply chain partners has increased. As the nature of supply chain risks is different from other risks, further developed risk management instruments are required to avoid disruptions affecting the whole supply chain. In addition, risk management instruments should be chosen carefully according to the specific company and supply chain situation. This paper addresses these aspects of risk management both from the perspective of theory and business practice. First, the results of ten expert interviews are presented, which explore the current practices of supply chain risk management in German companies. Based on these results, the general requirements for risk management instruments in the supply chain context are evaluated. Criteria are defined which influence the selection of a suitable instrument. The paper concentrates on the first steps of the risk management process, i.e. risk identification and assessment.

011-0530: The Development of a Simulation Tool for Supply Chain Risk Assessment

Danny Boeykens, Möbius, Belgium

Els Pandelaere, Vlerick Leuven Gent Management School, Belgium

Jonas Hatem, Möbius, Belgium

Erika Vreys, Möbius, Belgium

Ann Vereecke, Vlerick Leuven Gent Management School / University of Ghent, Belgium

Managing risk in the supply chain has never been more challenging. Outsourcing and off-shoring of production to overseas locations has extended supply chains and increased their complexity, thus increasing their risk. The 2008 Marsh report on SC risks highlights that the typical risk manager assesses only 25% of the company's end-to-end SC annually for risk likelihood and impact. This indicates the difficulties companies face in assessing SC risk management. The objective of our research is to identify the major SC risks, to quantify their impact on the P&L account, to formulate possible mitigation strategies and to quantify their bottom-line impact. We have built a simulation tool for mapping the SC and identifying risks. This assessment tool provides insight into the major SC risks and optimal mitigation strategies. The theoretical foundation for the tool, the simulation model, and its application in a chemical company will be presented.

011-0771: Models for Analyzing Resilience of Manufacturing Enterprises to Major Disruptions

Saturday, 9:30-11:00 Sessions

Yao Hu, University of Kentucky, United States

Jingshan Li, University of Kentucky, United States

Lawrence Holloway, University of Kentucky, United States

We consider modeling of manufacturing enterprises as networks which process, store, and transport materials between enterprise nodes in order to feed customer demand. Each node within the network is represented as a dynamic model with associated costs of production and inventory. Examples of disruptions for such an enterprise could be weather events, material shortages, equipment disasters, or labor events. Using the dynamic model, we consider major disruptions within this network. We present analysis methods to evaluate the impact of these disruptions, and develop control strategies that reduce the impact of the disruptions.

3 ∞	Saturday, May 2, 9:30-11:00 Room: EC-A	Track: OAG, 1	Chair: Rafael Menda
Session: Forging mutually-beneficial relationships with industry			

011-0275: A Critique of Collaborative Research Practices in Operations Management

Pauline Found, Cardiff Business School, Cardiff University, United Kingdom

Foster Fei, Cardiff Business School, Cardiff University, United Kingdom

The paper highlights a number of key issues emerging from collaborative research practices in the field of operations management. It is suggested that the choice of research methodology with its impact on researchers and those being researched fundamentally contributes to these key issues. We argue that in order to make research in operations management relevant and meaningful for those in practice, researchers shall consider: (1) letting their research focus emerge through their engagement with research participants; (2) conceptualising their research problem as the problem facing research participants; and (3) viewing their research as a representation of business practices across time, people, and place.

011-0604: Be Careful What You Wish For: The Benefits & Pitfalls Learned Through Ten Years of Academic-Industry Collaboration

Steven Melnyk, Michigan State University, United States

Laird Burns, Michigan State University, United States

Education, training and research opportunities with industrial partners are becoming increasingly important to academic institutions. While the benefits of collaborative academic-industry relationships are well known, the pitfalls and hidden efforts necessary to develop and maintain such relationships should not be overlooked. This presentation draws on more than ten years of the presenters' experiences in academic-industry collaborations with three major corporations. The collaborations have resulted in several research projects and numerous management training & education programs. The presentation identifies the keys to developing such relationships as well as the hidden dangers.

011-0971: Essentials of Being an Effective Consultant

Martin Starr, Rollins College, United States

Rafael Menda, Johnson & Johnson Group of Consumer Companies, United States

Sushil Gupta, Florida International University, United States

One must be a hybrid, i.e., part academic and part practitioner to see all issues from both perspectives. However, there can only be one set of objectives to focus on, and these must be clarified and defined before undertaking the consultancy. Study the biggest possible system and do this with the utmost detail until the situation is so well understood that the problem can be reduced to the right size and specificity of data required. Use teamwork as much as possible including smart insightful people who understand the nature of the problem and who have the strong inferential abilities of Sherlock Holmes. Finally sell the solution by giving it away to those who have the power to implement the results but retain the rights to publish results.

4 ∞	Saturday, May 2, 9:30-11:00 Room: EC-E	Track: LAPS, 2	Chair: Aleda Roth
Session: Panel on Public Sector Supply Management – Supply and Quality Risk Mitigation			

011-0801: Panel on Public Sector Supply Management – Supply and Quality Risk Mitigation

Aleda Roth, Clemson University, United States

Greg Schlegel, VP Business Development, SherTrack LLC, United States

Lawrence Fredendall, Clemson University, United States

Panelists will cover various topics in mitigating supply and quality risks in multiple industries. The session will cover several projects across multiple industries, profiling how supply chain & six sigma teams leverage digital modeling, discrete event simulation, lean/six sigma methods and design of experiments to test hypotheses associated with extremely complex supply environments, to develop supply chain strategies. Other topics include a discussion of research issues on lean operations in the health care and supply chain complexity issues.

5 ∞	Saturday, May 2, 9:30-11:00 Room: EC-F	Track: BNCH, 7	Chair: Fariborz Partovi
Session: Strategic Sourcing/Environment			

011-0395: Flexible Strategies in Supply Chain Management and Their Relationship with Innovation and Inter-Organizational Learning

Maria Saenz, MIT-Zaragoza International Logistics Program, Spain

Maria Lamban, University of Zaragoza, Spain

Saturday, 9:30-11:00 Sessions

The paper strives to approach one of the main drivers in the efficiency of the supply chain within its strategic context. Initially, the conceptual framework that presents the driving features of flexibility is analyzed, when seen from the inter-organizational stand point, for the encouragement of value creation and greater relational integration. Complementary to these actions, a panel of Key Performance Indicators (KPI) is included. An analysis of how the supply chain actors have to jointly learn from an inter-organizational point of view while implementing innovative flexible strategies will also be outlined. The empirical analysis is provided through the execution of a survey about the implementation of these practices in the food and beverage supply chain, from the standpoint of the integration of actions in the buyer-supplier dyad. Finally, the correspondent conclusions and managerial implications will be faced.

011-0690: Measuring Supply Chain Carbon Efficiency

Anthony Craig, *Massachusetts Institute of Technology, United States*

Yossi Sheffi, *Massachusetts Institute of Technology, United States*

Edgar Blanco, *Massachusetts Institute of Technology, United States*

With growing global concern over the effects of climate change, attention to the role of the supply chain in greenhouse gas emissions has increased. This paper proposes to measure the impact of a supply chain through the product's carbon footprint, a popular measure of the greenhouse gas emissions. Several authors suggested the use of Life-Cycle Assessment (LCA), to measure product carbon footprints. LCA provides a quantitative measure of the environmental burdens associated with the product throughout its life cycle. Though LCA is theoretically well-suited for measuring carbon footprints of products, it suffers from several shortcomings in practice when applied to supply chains. These issues are explored and a framework for measuring the carbon efficiency of a supply chain which can be imbedded in product-level carbon labels is presented.

011-0870: The Influences of Strategic Sourcing to Business Competency

Chung-Yean Chiang, *University at Buffalo, SUNY, United States*

Nallan Suresh, *University at Buffalo, SUNY, United States*

Canan Kocabasoglu-Hillmer, *City University of London, United Kingdom*

Strategic sourcing is widely believed to build benefits in today's environment. The value of the buyer-supplier relationship is examined through the supply chain competency model, which considers firm-level agility, firm-level responsiveness, and firm-level leanness three major competitive factors in the supply chain competition. Strategic sourcing practices, including the use of information sharing and the establishment of close buyer-supplier relationship, have strong impact on firm-level leanness, which further has a positive impact on firm-level finance performance and supply chain performance. However, one unexpected finding revealed is that to build strong buyer-supplier relationships would result in negative impact on firm's responsiveness.

011-0897: Perspective to Improve the Research Efficiency of the Wheat Productive Chain in Agro-Industrial Cooperatives using a Dynamic Scorecard Model

Roberto Protil, *Pontifical Catholic University of Parana, Brazil*

Amarildo Fernandes, *Federal University of Rio de Janeiro, Brazil*

Alfredo Kugeratski Souza, *Pontifical Catholic University of Parana, Brazil*

The scope of this work is to develop an instrument for the evaluation of agricultural research in the productive chain of wheat and its impact on the profitability of agribusiness cooperatives in Brazil. A conceptual model was developed using the Balanced Scorecard (BSC) and System Dynamics methodologies. In the development of the model all processes involved in the agricultural research of the wheat productive chain were initially mapped. Furthermore, a strategic map was developed, explaining the objectives and indicators of the cooperative. Finally, using the method of System Dynamics, Causal and Stock & Flow diagrams were created. The resulting model developed in this work allowed a better understanding of the complex relationships between research and agricultural production, making it easier to analyze the process and the decision of new investments in research on the part of managers and analysts of the agro-industrial cooperative in the study.

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Saturday, May 2, 9:30-11:00 **Room:** EC-G

Track: MKTG, 5

Chair: Hui Zhao

Session: Channel Strategies

011-0321: Selecting Distribution Channel Strategies for Nonprofit Organizations

Xuan Zhao, *Wilfrid Laurier University, Canada*

Run Niu, *Webster University, United States*

Ignacio Castillo, *Wilfrid Laurier University, Canada*

Because of declining government/donor support, among other pressures, many nonprofit organizations have turned (and are turning) to commercial activities to increase revenues. By selling products or services related to its institutional mission using a particular distribution channel strategy, a nonprofit organization might reach more people, including those it might otherwise never reach. In this paper, we consider two channel strategies: an integrated and a decentralized channel. We investigate how a nonprofit organization should select its distribution channel strategy under certain market conditions. We also investigate a nonprofit's channel selection when competing with an integrated fully for-profit channel and with a decentralized fully for-profit channel. Finally, we investigate the pricing strategy and market coverage of the nonprofit organization when using a dual channel strategy.

011-0062: Dual Supply Chain using Direct Online Selling to Compete with a Direct Online Seller

Byong-Duk Rhee, *Whitman School of Management, United States*

Saturday, 9:30-11:00 Sessions

The explosion in e-commerce has not only resulted in a proliferation of new direct online vendors, but has also led numerous manufacturers to add direct online selling to their existing retail networks in facing competition from the new online vendors. This paper examines firms' adoption of dual supply chain, that is, the utilization of both their retail networks and direct online sales. We propose a game-theoretic model describing competition between a firm using dual supply chain and a direct online vendor. We show that the additional direct online selling increases the firm's sales but decreases its profit. This study gives supply chain practitioners a warning against the adoption of the dual distribution strategy in a competitive environment.

011-0077: The Effect of List Price on Channel Performance in a Revenue-Sharing Contract

Xiangpei Hu, Dalian University of Technology, China

Yunzeng Wang, University of California, Riverside, United States

Jun Ru, The University of Texas at Dallas, United States

Amazon.com, the leading online retailer, has designed a unique contract called the Advantage Program for managing its business relationship with suppliers. A key parameter in the contract is a list price that a supplier (he) is allowed to choose for his product. Amazon.com (she) then sets the retail price at or below supplier's list price for selling the product to the market, and charges the supplier an amount equal to a pre-specified percentage of the list price on each unit sold. We show that supplier's list price acting as a constraint on retailer's retail price in the contract plays a major role in determining firms' decisions and performance in equilibrium. In particular, without such a constraint, the contract becomes equivalent to a traditional wholesale-price contract. Switching from a wholesale-price contract to the Advantage program, however, Amazon.com can significantly improve her own profitability without hurting her suppliers.

011-0343: Clinic Overbooking and Patient Responses: A Game Theoretic Approach

Bo Zeng, Purdue University, United States

Hui Zhao, Krannert School of Management, Purdue University, United States

Mark Lawley, Biomedical Engineering, Purdue University, United States

Following successful stories in the airline industry, clinics have frequently adopted overbooking to deal with their prevalent patient no-show problem. However, the unique aspect of patient responses and its implications for the effectiveness of overbooking have been largely ignored. In this paper, we take a game theoretic approach to study overbooking with the consideration of patient responses. We find that, indeed, the long waiting time caused by overbooking negatively affects patients' future show-up decisions, causing higher no-show rate in the future. Correspondingly, overbooking may or may not improve clinics' net profit, depending on the patients' characteristics. Further, the effectiveness (or ineffectiveness) of overbooking may be significantly overstated when ignoring the patient responses. Based on the analysis, we propose a selective dynamic overbooking strategy, which can serve as an incentive mechanism to reduce patient no-show and increase the clinic's profit at the same time.

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Saturday, May 2, 9:30-11:00 Room: EC-H

Track: QUAL, 5

Chair: Gopesh Anand

Session: Quality Systems

011-0082: Review, Trends, and Opportunities in the Literature on Six Sigma

Marly Carvalho, University of São Paulo, Brazil

This paper examines the Six Sigma literature in order to understand more deeply this approach. The first step of the research was devoted to searching and reviewing in the ISI Web of Science database. Every article that contained the words "Six Sigma" and "quality" in its title, keywords or abstract was identified, using time span "all years." The data were downloaded and analyzed using the Sitkis software. We identified 165 papers published in 94 different journals, by 250 different authors since 1992.

011-0116: Integrated Maintenance Planning and Order Scheduling on the Basis of Condition Monitoring Considering Different Condition Attributes

Andreas Junker, University of Siegen, Germany

Peter Letmathe, University of Siegen, Germany

Most preventive maintenance strategies minimize the costs of breakdowns and of maintenance activities without taking interdependencies with traditional scheduling problems into account. This contribution investigates opportunities to simultaneously optimize production and maintenance planning by applying the condition-based maintenance strategy with parallel machines and overlapping capabilities. The condition of each machine is measured through different attributes which determine the machine's operating performance. The presented approach considers a time-discrete, deterministic model with no setups. Parallel machines enable output of the same product types with different tasks. It is assumed that maintenance activities consume machine capacity and lead to variable costs. The model is based on the VERA-PRO-Verbundprojekt funded by the German Federal Ministry of Education and Research and aims to install planning systems to optimize machine availability through condition-based maintenance. It allows the exploitation of machine wear considering optimal order assignments to machines which is illustrated by a numerical example.

011-0135: The Fragility of Quality Advantage

Gopesh Anand, University of Illinois, United States

John Gray, Ohio State University, United States

Enno Siemsen, University of Minnesota, United States

Anecdotal evidence suggests that companies often struggle to maintain superior quality management systems. Using audit data from the Food and Drug Administration, we search for evidence that quality management systems deteriorate over time without regular renewals. We also combine this audit data with merger & acquisitions data to test whether a change in the ownership of a plant severely disrupts quality management systems.

011-0365: Organizational Impact of Quality Certification on Business Services: An Analysis of the SME Hotels

Saturday, 9:30-11:00 Sessions

Maria del Mar Alonso-Almeida, UNIVERSIDAD AUTÓNOMA DE MADRID, Spain

Jos Miguel Rodriguez-Anton, UNIVERSIDAD AUTONOMA DE MADRID, Spain

Lius Rubio-Andrada, UNIVERSIDAD AUTÓNOMA DE MADRID, Spain

Soledad Celemin, UNIVERSIDAD AUTONOMA DE MADRID, Spain

Evidence of the quality contribution to companies for improving them has dramatically increased the demand for the certification of quality systems in all sectors, but particularly in manufacturing. The number of certificated companies in the service sector has been traditionally lower than the number in other sectors. This is mainly because in the service sector, there are higher costs of certification and lack of quality professionals. However, this trend is changing in recent years, caused by the need to improve the internal company efficiency and to maintain a sustainable advantage. Therefore, the purpose of this work is to conduct a rigorous study for a better understanding of the certification process in the service sector and concretely in the tourism business. By doing so, the following issues of hotel SMEs firms are analysed: their certification in national or international standards, and identification of their performance and their decision making process.

011-0424: Implementation of Quality Exploitation versus Quality Exploration: Institutional or Rational?

Dongli Zhang, Fordham University, United States

Kevin Linderman, University of Minnesota, United States

Roger Schroeder, University of Minnesota, United States

This paper investigates the theoretical motivation for the adoption and implementation of two aspects of quality management: quality exploitation (QE) and quality exploration (QER). Two theoretical views are identified and empirically tested: the institutional view and the rational view. Institutional perspectives generally emphasize the role of social factors rather than economic or efficiency factors in driving organizational actions. The rational view suggests that goals and objectives may be a motivational factor that influences the organization's implementation of QEI or QER. Based on the different aims of QEI and QER, their implementation might be driven by different goals of an organization. The results show that institutional factors have more explanation power than rational goals on the implementation of QEI and QER.



Saturday, May 2, 9:30-11:00 Room: EC-I

Track: SRCG, 5

Chair: Daesik Hur

Session: Current and Emerging Trends

011-0493: Does One Size Fit All? An Exploratory Case Study of Differentiated Supplier Development Programs

Daesik Hur, School of Business, Yonsei University, Korea, Republic of (South Korea)

Joonhyuk Bok, School of Business, Yonsei University, Korea, Republic of (South Korea)

Jongchedul Choi, School of Business, Yonsei University, Korea, Republic of (South Korea)

As more and more noncore operations have been outsourced to outside suppliers, it becomes critical for the manufacturing firm to utilize suppliers' resources and capabilities for their competitive success. Supplier development is defined as the buying firm's various efforts to improve supplier performance and capabilities and to maintain a network of competent suppliers. Among various supplier development efforts, buying firm's direct involvement has proven to be most effective. Extant research, however, has dealt with relatively limited types of direct involvement programs. This study aims to develop an integrated and comprehensive framework of direct involvement supplier development programs (DISDP). Grounded upon the resource based view and the knowledge based view, we conducted a multiple-case study of Asian manufacturers that are well known for their comprehensive supplier development programs. Within and between case analyses are conducted and theoretical propositions are generated.

011-0977: The Financial Crisis Impact on Global Sourcing

Jan Ola Strandhagen, SINTEF, Norway

Heidi Dreyer, NTNU, Norway

Marco Busi, Carismart, United Kingdom

The ongoing financial crisis is believed by leading economists to have the largest impact on the global economy in the period after the Second World War. Employees loose their jobs in many types of companies and business is slowing down. An immediate impact on logistics is the unwillingness to take the risks of large stocks and quantities in the retail part of value chains. What will this lead to? Immediately we see lower quantities and volumes, increase of transportation costs, longer lead times and decreased delivery performance. What about the trend of global sourcing and the constant seek of finding low cost areas for manufacturing of parts and products? This paper will present the latest statistics and elaborate of possible shifts in trends and solution to meet the crisis. Examples from electronics, car manufacturing and pharmaceutical industry will be used as basis for this reflection paper.

011-0518: Global Services Outsourcing: Critical Aspects and Future Directions

Martina Gerbl, University of Ulster, United Kingdom

Ronan McIvor, University of Ulster, United Kingdom

Paul Humphreys, University of Ulster, United Kingdom

Services outsourcing has gained increasing importance in today's global economy. Traditionally, operations literature has focused on manufacturing outsourcing. Services outsourcing has become increasingly complex and contrasts with manufacturing. This paper highlights the importance of operations management to the rapidly developing area of services outsourcing, and identifies important research areas for operations management scholars. Research is lacking in service design principles and outsourcing. Many service classification frameworks cannot fully explain global services outsourcing. Research is required to develop frameworks that consider the motives for location choice in services outsourcing, which will involve identifying the key influencing factors on offshore-nearshore-domestic services outsourcing arrangements. A further important area is the theories employed to understand global outsourcing. It is argued that theories from economics, strategy, and organizational behavior should be linked with operations management concepts such as business improvement, service design, location choice, and operations strategy to better explain outsourcing.

Saturday, 9:30-11:00 Sessions

9 00	Saturday, May 2, 9:30-11:00 Room: EC-D Session: Complex Adaptive Systems	Track: GENL, 4	Chair: Surya Pathak
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011-0157: A Multi-Agent Simulation (MAS) of the Pharmaceutical Supply Chain (PSC)

Gaurav Jetly, North Carolina State University, United Kingdom
Christian Rossetti, North Carolina State University, United States
Robert Handfield, North Carolina State University, United States

An MAS of the PSC was created based on a previous case study, COMPUSTAT, and FDA data. The model is initialized based on 1982 financial data with 30 manufacturers, 60 suppliers, and 60 distributors. Three types of drugs—blockbuster, average, and low—with a seven year log-normal product life cycle are released by manufacturers based on a random function normed to FDA and Congressional Budget Office data. Each quarter distributors bid for future market share and suppliers bid based on lowest acceptable margin. Intra-class mergers and acquisitions are allowed based on assets and perceived profitability. The results follow empirically derived supply chain structure seen in our case study and previous academic studies – consolidation, decreased productivity, and decreased profitability. Implications for PSC strategy and government policy are discussed.

011-0674: Effect of Supply Chain Practices on Product Innovation Capability

Murat Kristal, York University, Canada
Xiaowen Huang, Miami University, United States
David Johnston, York University, Canada

This study investigates how a focal manufacturing firm improves product innovation performance through implementation of effective supply chain management practices. Building upon the complex adaptive systems theory, organizational learning, and supply chain management literature, we propose that three supply chain practices—supplier openness, customer openness, and landscape awareness—lead to an implementation capability for supply chain innovation, which, in turn, affects the firm's product innovation performance. We empirically examine these relationships using survey data collected from 174 U.S. manufacturers. Our findings provide empirical evidence supporting our hypotheses.

011-0748: Co-opetition as an Emergent Phenomenon of Multi-Scale Firm Objectives

Jamison Day, University of Houston, United States
Surya Pathak, University of Washington, United States

This research shows that two firms will experience co-opetitive forces as a result of their relationship to overlapping communities across multiple scales. Set theory notation is used to model how firms' dispositions towards both competitive and/or cooperative interactions arise from the shifting priorities they attach to various community objectives. The resulting model provides clear evidence that competition and cooperation are not opposites. An illustrative example is provided from a real-world supply network situation in which firms maintain objectives across overlapping scales of organization, supply network, industry, and economy.

011-0874: Dyads and Triads in Supply Networks

Thomas Choi, Arizona State University, United States

Networks are made up of nodes and links. Supply networks are made up of companies in buyer-supplier relationships or in competing relationships. On the one hand, the smallest unit of a network that consists of at least one node and one link is a dyad. On the other hand, the smallest unit that reflects the characteristics of a network (i.e. a node interacting with another node and a link interacting with another link) is a triad. In this presentation, we will compare and contrast the characteristics of dyads and triads in supply networks.

9 00	Saturday, May 2, 9:30-11:00 Room: Senate Session: Lean/6 sigma tutorial	Track: GENL, 5	Chair: Uday Apte
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011-0850: Lean Six Sigma for Services

Uday Apte, Naval Postgraduate School, United States

Penchant for process improvement is inherent in human nature. Two major process improvement methodologies, "Lean" and "Six Sigma", emerged separately in the 20th century. Lean improvements focus on process speed and waste removal, while Six Sigma, like its predecessor Total Quality Management (TQM), focuses on the removal of process defects and reduction of process variability. Ironically, Six Sigma and Lean have often been regarded as rival initiatives. However, recent experience has convinced practitioners that these two approaches are synergistic, and there is benefit to be realized by blending the two. Therefore, in the new millennium, we are witnessing the emergence of Lean Six Sigma. In this tutorial, we will provide an introduction and an overview of Lean Six Sigma with a specific emphasis on its application to service industries. The tutorial should help researchers and practitioners alike in teaching, consulting and the practice of OM.

Saturday, 11:15-12:45 Sessions

1	Saturday, May 2, 11:15-12:45 Room: Cloister North Session: Managing Service Quality and Value	Track: SRVC, 5	Chair: Wei Zhang
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011-0560: Sequence of Service Bundles: The Importance of Event Placement within a Subscription Cycle

Michael Dixon, Cornell University, United States

Rohit Verma, Cornell University, United States

Service management scholars suggest that when considering a service encounter, the sequence or ordering of events influences the overall utility placed on the service. In this paper, we investigate whether the sequence of services within a bundle influences repurchase behavior in the context of performing arts season subscription purchases. Using an econometric model, we show that the probability of repurchase is influenced by the placement of highly demanded events within a subscription cycle. Additionally, we empirically test the impact that high and low variability of event popularity within a subscription has on repurchase behavior. Revenue management, service bundling, and capacity management implications of the results are discussed.

011-0064: Exploring Customer Experience: Level of Contact and Repurchase Intentions

Xiangyu Kong, Warwick Business School, United Kingdom

Jannis Angelis, Warwick Business School, United Kingdom

Although the current literature implies a positive relationship between customer experience and customers' repurchase intentions, how customer experience is affected by level of contact and what kind of experience leads to repurchase remain unclear. This research studies online retail services. It breaks it into several service activities and investigates the relationship between their levels of contact and customers' repurchase intentions. A mixed methods approach was employed. Focus groups and interviews were used to identify and explore the website design process of each activity. Online questionnaires were distributed to collect data on customers' experiences with each activity and how their repurchase intentions change after these experiences. The result suggests that: 1) different level of contact is desired in each activity according to its function; 2) high level of contact generates strong experience that affects repurchase intentions; 3) initiating contact is preferred rather than receiving unexpected help.

011-0085: Perceived Quality of Car Sales Services: A Comparative Analysis of Gaps in Perception of Customer, Concessionaire, and Assembler

Veridiana Pereira, University of São Paulo, Brazil

José Ferreira, University of São Paulo, Brazil

Marly Carvalho, University of São Paulo, Brazil

Rotondaro Rotondaro, University of São Paulo, Brazil

The process of globalization and technological revolution deeply transformed the automotive industry, changing the relations within the supply chain. Thus, when we focus on the assembly-concessionaire link, a gap of understanding of what is essential to the customer could be noticed. Furthermore, if we compare the perception of both, the assembly and the concessionaire, with the perception of the client, another gap can be verified. This study aims to identify and measure these gaps. The methodological approach was based on the quality gap models and uses the perceived quality as the unit of measurement. The results showed that each party of this triad perceived quality of sales services in a different way. For the customer the most important dimension is the "competence", while for sellers and managers of concessionaires it is the "reliability" and for the assembler the most important is the "courtesy".

011-0374: Outsourced After-Sales Service Contracting in Consumer Markets

Wei Zhang, Tsinghua University, China

Liwen Liu, Tsinghua University, China

The problem of how to effectively and efficiently increase customer satisfaction in outsourced after-sale services by contracting is discussed in this paper. In this setting, the uniqueness of the problem is that the service provider serves both the principal's customers and his own with the same facilities. Firstly, the customer waiting time (i.e., order lead time) is chosen to be the effective indicator of customer satisfaction. Then, through theoretical modeling, three kinds of after-sales service outsourcing contracts in consumer markets are analyzed and compared: 1) "fixed reimbursements" in the current practice, 2) performance-based, and 3) cost sharing. It is proved that under the risk-neutral assumption, the latter two contract forms are effective to overcome the moral hazard issue, but the first best solution could only be achieved under the performance-based contract. In the scenario of risk-averse service provider and asymmetric information, a contract menu composed of reimbursements and fines is proposed.

2	Saturday, May 2, 11:15-12:45 Room: Cloister South Session: Outsourcing Issues in Supply Chain Management	Track: SCM, 6	Chair: John Gray
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011-0683: How Quality Risk Influences Consumers' Purchasing Behaviors: An Exploratory Investigation

Aleda Roth, Clemson University, United States

The spate of product recalls over the past several years—from pet food to toys—has greatly exposed firms' quality risk. Yet little is known about how these product quality and safety problems influence consumers' concerns and buying behaviors. Arguably, sourcing strategies should consider a service component, namely the end customers' concerns that may influence their perceptions about the company and purchasing decisions. This paper explores these issues for food and pharmaceutical products using a sample of 1004 U.S. consumers. Not surprisingly, the majority who knew about problems expressed extreme concern about products from emerging market countries, and especially China; and more than half of the respondents who experienced problems had changed their buying habits. The results provide insights into sourcing strategies that are likely to influence consumer choices and perceptions of quality risks. It also reveals the need for more sustainable management of defective products.

Saturday, 11:15-12:45 Sessions

011-0842: Supply Chain Sourcing Practice and Information Technology Investment

Honggeng Zhou, University of New Hampshire, United States

WC Benton, The Ohio State University, United States

As for information technology, we use the quality of the information shared among supply chain partners as the surrogate of the investment in IT. The question facing companies is how to strategically balance the investments in information technology and supply chain sourcing practice. The purpose of this study is to (1) investigate different supply chain strategies on the basis of supply chain sourcing practice and information technology investment level, and to (2) identify which supply chain strategies are linked to good business performance. Although the importance of supply chain strategy is widely acknowledged, few studies have empirically analyzed manufacturers' supply chain strategies. In this study, we use sourcing practice and information quality to investigate 125 North America manufacturing firms. The business performance of the manufacturing firms will be compared to identify the most desirable supply chain strategy.

011-0245: The Impact of Alignment between Outsourcing Decisions and Manufacturing Strategy Configurations

James Kroes, University of Rhode Island, United States

Soumen Ghosh, Georgia Institute of Technology, United States

We use cluster analysis to identify three groups of manufacturing firms with distinct strategies, measured by the emphasis placed on the five competitive priorities (cost, flexibility, innovativeness, quality, and time). Within each of these groups we examine the performance impact of strategic outsourcing alignment, which we define as the level of agreement between the emphasis placed by a firm on outsourcing decision drivers and the competitive priorities of the strategy group to which the firm belongs. Across all three clusters, we find that alignment between the drivers of outsourcing decisions and highly emphasized competitive priorities is significantly associated with higher levels of supply chain and business performance.

011-0753: Mitigating Quality Risk in Production Outsourcing: An Empirical Study

John Gray, The Ohio State University, United States

Sean Handley, The Ohio State University, United States

There is significant anecdotal evidence--and emerging theoretical and empirical evidence--that the outsourcing of production may pose a finished-product quality risk. In this research, we build upon existing supply chain and TQM literature to propose a theoretical model. We define the relevant constructs (mitigation approaches and contextual factors) and create new survey instruments, developing new scales where necessary. We use our new instruments to survey both sides of the buyer-contract manufacturer dyad from companies in the food, drug and medical device industries to test our theoretical model.

03	Saturday, May 2, 11:15-12:45 Room: Captain Session: SC Strategy	Track: SCM, 20	Chair: Reinaldo Daniel Fioravanti
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011-0890: Supply Chain Sensitivity to Macro Factors

Reinaldo Fioravanti, Zaragoza Logistics Center, Spain

Mozart Menezes, Zaragoza Logistics Center, Spain

Jarrod Goentzel, Massachusetts Institute of Technology, United States

Global Supply Chains are heavily impacted by fluctuations in factors such as oil prices, labor costs, exchange rates, and trade barriers; therefore, managers have to understand how each factor can impact the performance to define the best supply chain strategy to respond. The purpose of this work, developed under the Supply Chain 2020 project by MIT, is to contribute to understanding how the supply network in a global company (composed by suppliers, factories and distribution centers) will behave under different scenarios and under different strategies. The work was developed by applying linear network optimization models in a real case for the electronics industry; working with various scenarios in the next 12 years, a detailed analysis was done based on three main performance indicators: supply chain costs, assets turns and responsiveness. Lastly, some insights were identified to help managers to develop robust strategies that will prove ultimately more efficient in the future.

011-0636: Manufacturing Strategy, Supply Chain Management and Their Relationship to Anticipation of New Technologies

Andrew Finger, Universidade do Vale do Rio dos Sinos, Brazil

Ely Paiva, Universidade do Vale do Rio dos Sinos, Brazil

This paper examines how manufacturing strategic orientation and supply chain management influence the anticipation of new technologies and the effects of this relationship on performance. We consider that manufacturing technology anticipation could be a source of competitive advantage. Based on the literature, we propose a theoretical model that links manufacturing strategy to supply chain. In order to build the model, we used the constructs from the High Performance Manufacturing (HPM) project. The model incorporates trust-based relationships and function integration concepts in the relationship between manufacturing strategy and supply chain management. We expect that the combination of all these aspects leads to early adoption of new technologies and consequently to performance enhancement.

04	Saturday, May 2, 11:15-12:45 Room: Yeoman Session: Modelling Issues	Track: SVCN, 2	Chair: Thomas Choi
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011-0270: Proactive Value Assessment of Delivery Reliability in Non-Hierarchical Manufacturing Networks

Volker Stich, RWTH Aachen University, Germany

Saturday, 11:15-12:45 Sessions

Alexander Kleinert, RWTH Aachen University, Germany

The complex market situation of non-hierarchical production networks leads to problems with missing delivery reliability. Delayed supplies cause wasteful turbulence throughout the entire network. On average, a machine and equipment manufacturer has to spend 5.8% of its turnover to compensate for the negative effects of delayed deliveries. Today only a minority of suppliers (< 5%) can be evaluated on their influence on the entire production. This paper outlines how the technology push of existing communication platforms permits the use of evaluation methods and market mechanisms to identify and assess the criticality of the delivery time adherence proactively. After a comprehensive overview of existing methods for risk evaluations in supply chains, the possibilities of the real-options method to assess the value of delivery time adherence will be presented. Finally, a short case study illustrates the possible impacts of the non-centralised coordination on the production network.

011-0852: Systems of Business in the Amazon Area using a Systemic Vision: A Theoretical Proposition

Raimundo Vieira, Universidade Federal do Amazonas, Brazil

Silvana Dacol, Universidade Federal do Amazonas, Brazil

Ely Sena, Universidade Federal do Amazonas, Brazil

Antonio Campos, Universidade Federal do Amazonas, Brazil

The Brazilian region north possess great territorial dimension and harnessed internal connections to the transport by river that doesn't interact with other modal transportation systems. Thus, the systems of business in the region deserve a vision more developed. A system of business is the combination formed by supply chain, sourcing, manufacturing and distribution of an industry. In this study we used the application of a rationale systemic that allowed the understanding both of the system as influences of market, whereas-if the scenarios and inter-relations possible. Created-is a cognitive map applying-systemic if vision to the system of business, its focused-propose is a theoretical model of management. It was found-that the concept of system has changed, being understood as a set of parts that relate to targets. These were based on the guidelines: flexibility, regional aspects, traceability, riddance fiscal, strategic thinking and environmental sustainability.

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Saturday, May 2, 11:15-12:45 **Room:** Scribe
Session: Special Session: Tutorial on CLSCs

Track: SUST, 10

Chair: Gil Souza

011-0040: An Investigation of the Structural Efficiency of EPR Legislation

Atalay Atasu, Georgia Institute of Technology, United States

Oznur Ozdemir, Sabanci University, Turkey

Luk Van Wassenhove, INSEAD, France

We investigate the differences between two commonly implemented forms of product take-back legislation from an economic perspective. In the tax model (common in the U.S.), the social planner undertakes the take-back task but requires the manufacturer(s) to pay a unit tax for each product sold. In the rate model (implemented in E.U.), the social planner decides on a take-back rate and assigns the take-back task to the manufacturer(s). We measure the efficiency of the two models from the perspectives of consumers, manufacturer(s), and the social planner for monopolistic and competitive environments and extend our analysis to possible scenarios with an externality of take-back rate assurance. Our results are useful in identifying the circumstances under which the environment, the manufacturers, or the consumers benefit more from one of the two models commonly used in practice.

011-0277: Capacity Planning and Cash Flow Management in a Reverse Logistics Environment with Remanufacturing Capability

Sergio Rubio, Universidad de Extremadura, Spain

Ernest Bedito, Universitat Politècnica de Catalunya, Spain

Albert Corominas, Universitat Politècnica de Catalunya, Spain

Reverse logistics has a considerable influence both on production planning and management and on the determination of optimal production and storage capacities. Few studies, however, have developed models that take account of reverse logistics when calculating optimal production capacities and policies. This article describes such a model and shows its use in guiding strategic decisions in the field of production management.

011-0513: The Alignment of Socially Responsible Practices with Stakeholder Expectations and Its Impact on Performance

Amrou Awaysheh, Instituto de Empresa - IE Business School, Spain

Robert Klassen, University of Western Ontario, Canada

Business sustainability has grown beyond the natural environment to include socially responsible practices that involve individuals and society. Through its operations, a firm can engage in a number of socially responsible practices that can impact various stakeholders. If operations managers work to align their plant's socially responsible practices with the expectations of different stakeholder groups, the plant is expected to perform better across multiple business metrics. Two data sources are combined to test this hypothesis: a cross-sectional survey of Canadian manufacturing plants, and archival data from a Canadian Social Responsible Investing Index (SRII). As a third-party examiner, the SRII offers an objective measure of stakeholder expectations. Moreover, expectations are likely to vary by stakeholder group; thus, two stakeholder groups are examined in depth: front-line employees and the local community.

011-0565: The ESCO Model for Sustainable Energy Investments

Sam Aflaki, INSEAD, France

Paul Kleindorfer, INSEAD, France

Saturday, 11:15-12:45 Sessions

An Energy Service Company (ESCO) is a business that develops, installs, and finances projects designed to improve the energy and/or carbon efficiency for facilities over a five to twenty-year time period. We address the problem that is faced by an ESCO considering (a) the proper inclusion of carbon-leveraged investments in a real options framework (b) the uncertainties (both market and regulatory) associated with ESCO projects and (c) related competitive and technology strategy issues. In the context of an illustrative case study, we propose a stylized model of risk/profit sharing between the ESCO and potential customers using a bargaining approach. The results highlight key issues to be addressed in developing a realistic framework for measurement and decision making for carbon-leveraged investments in energy efficiency and renewable energy technologies under an ESCO model.

011-0579: Valuing Emissions Flexibility

David Drake, INSEAD, France

Paul Kleindorfer, INSEAD, France

Luk van Wassenhove, INSEAD, France

Many European firms now make capital investment decisions under the realities of carbon regulation and a volatile carbon allowance market, and the likelihood is that this setting will expand to the US and other regions in the future. Within such an environment, investment decisions not only determine a firm's capacity and operating cost profiles, they also determine the firm's emissions profile. Within this paper we extend the diverse technology literature (pioneered in electric power) to investigate the conditions under which firms should adopt emissions flexibility, and to explore the ensuing capacity, profit and emissions implications. This research is intended to provide a theoretical foundation to help firms make capacity decisions in the face of emissions regulation and to provide a framework for the design of management metrics for the measurement of firm emissions performance.

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Saturday, May 2, 11:15-12:45 **Room:** Knave
Session: Improving Patient Flow and Access

Track: HLTH, 6

Chair: Michael Magazine

011-0452: Security Systems in Healthcare Organisations: RFID Technology Application

Susana Azevedo, University of Beira Interior, Portugal

João Ferreira, University of Beira Interior, Portugal

Healthcare organizations are looking to RFID as a way to maximize their use of equipment, boost patient volume and plug gaps in patient safety. The RFID technology is actually considered a hot topic in all scientific areas and has been described as a major enabling technology for the automation of many processes. Although it is not a new technology it has only recently come to the awareness of the public and is widely used in many sectors and particularly in healthcare. This paper aims to illustrate the utilization of the RFID technology in healthcare, more precisely in infant security systems inside the hospitals. To attain this objective a case study about the experience of Portuguese hospitals in this system is presented and highlights the main advantages and contributions to a better performance in terms of infant security.

011-0665: Scheduling of Multistep Medical Diagnosis Procedures in Nuclear Medicine

Eduardo Perez, Texas A & M University, United States

Lewis Ntamo, Texas A & M University, United States

Cesar Malave, Texas A & M, USA

Nuclear medicine procedures deal with medical imaging, diagnosis, and therapy using properties of radioisotopes. These procedures have to be performed under restrictive time constraints to get good images/diagnoses. The complex nature of nuclear medicine and the need to provide high levels of patient service leads to challenging scheduling issues such as uncertainty in patient/radioisotope arrivals. We present stochastic online scheduling models and a discrete event simulation towards improving patient service in nuclear medicine departments.

011-0671: Analyzing Patient Flow from the Emergency Department to the Intensive Care Unit

Jillian Berry, Harvard Business School, United States

Anita Tucker, Harvard Business School, United States

Christian Arbelaez, Harvard Medical School, United States

Admitting a patient to the medical intensive care unit from the emergency department is currently a timely and cumbersome process involving multiple patient care providers. This early stage study aims to understand and represent the existing process in a Boston hospital through interviews and the tracer method; identify areas where bottlenecks occur; and provide suggestions for improvements to the system.

011-0675: Deploying Service Policies to Minimize the Effect of Outpatient Clinic Variability

Denise White, University of Cincinnati, United States

Michael Magazine, University of Cincinnati, United States

Providers are striving to match competing system objectives with the need to accommodate a large amount of variability and uncertainty in the clinic environment. With variable patient punctuality, uncertain arrival probabilities, and variable service delivery requirements, clinic performance often suffers. This study explores the use of service policies and practices to improve clinic performance by exploring the sensitivity of these factors to performance measures.

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Saturday, May 2, 11:15-12:45 **Room:** EC-D1
Session: Connecting OM-SCM Research with Other Disciplines

Track: EMPR, 8

Chair: Ken Boyer

Saturday, 11:15-12:45 Sessions

011-0817: Empirical Research in OM and SCM: An Editor's Panel on Connecting with Associated Disciplines

Morgan Swink, The Eli Broad College of Business, Michigan State University, United States

Ken Boyer, Fisher College of Business, The Ohio State University, United States

Vicki Smith-Daniels, W.P. Carey School of Business, Arizona State University, United States

Vinod Singhal, Georgia Institute of Technology, United States

Vishal Gaur, Johnson Graduate School of Management, Cornell University, USA

Numerous authors have written that operations and supply chain management (SCM) form the core of a business by managing the process of providing goods and services. As such, much of the research in the field touches on other disciplines including marketing, management, information technology, finance and accounting. For example, the literature on supply chain is multi-disciplinary, including a great deal of work on channels in marketing and information exchange between companies in IT. Similarly, research on strategy includes work on the resource based view of the firm, resources that are managed as part of operations. While there is good cross-disciplinary research, we have noticed as editors that the literature in operations and SCM journals is not as widely disseminated as it could or should be. This panel will present approaches and strategies for increasing the impact of our research – both as a field and as individuals.



Saturday, May 2, 11:15-12:45 Room: EC-B

Track: PITM, 5

Chair: Sebastian Fixson

Session: Product Design & Development

011-0114: Product Complexity: Theory & Relationships to Sales Volume, Warranty, and Direct Cost

Morgan Swink, Michigan State University, United States

Mark Jacobs, Michigan State University, United States

Researchers have suggested that product portfolio complexity affects firm performance but that the effects are not well understood. This study enhances the understanding by clearly defining the construct, applying a theoretical framework, developing measures of the construct, and testing several hypotheses informed by the definition and theoretical perspective. The results reveal the nonlinear nature of the relationship between complexity and sales volume and various costs; empirically substantiate the multidimensional nature of the complexity construct thereby giving support to the definition offered; and suggest that the Theory of Performance Frontiers is extendable to intangible assets.

011-0458: Designing Products for Physical Obsolescence: The Effect of Snobs

Vishal Agrawal, Georgia Institute of Technology, United States

Stylianos Kavadias, Georgia Institute of Technology, United States

Beril Toktay, Georgia Institute of Technology, United States

It has long been recognized that customers are driven by not only the product characteristics but also their desire for exclusivity of the product (snob effect). There is an extensive body of literature that studies a firm's incentive to plan physical obsolescence by designing low durability products. This can help to stimulate the demand for new products over time or interfere with the secondary market. We incorporate exclusivity-seeking customer behavior to investigate the joint physical obsolescence and pricing strategy of a monopolist firm. We show that in the presence of snobs, the firm does not have an incentive to plan physical obsolescence. Instead the firm should design products to retain their value, charge higher prices and sell a lower quantity, increasing exclusivity. Our results not only offer a demand-side explanation for variation in strategies adopted by firms in practice but also provide guidance to firms designing products for such customers.

011-0768: Multidisciplinary Product Development Teaching in the U.S.

Sebastian Fixson, Babson College, United States

Successful product development often incorporates multiple disciplines and uses learning by iteration. In this paper, I compare and contrast sixteen product development courses at leading U.S. schools that strive to teach product development by creating an experience that is multidisciplinary and involves hands-on learning. The overall finding is that while the courses appear similar on a high level, there exists substantial variation in the details. In particular, I find that the way in which multiple disciplines are involved in these courses varies significantly. Similarly, while a team-based term project tends to be the common element across the courses, the degree of fidelity to which products, and sometime services, are developed varies considerably. Overall, although these courses are very labor and coordination intensive, their success appears to have established the legitimacy of multidisciplinary, experiential product development courses at leading institutions of higher education in the U.S.

011-0239: Tolerance for Failure and the Incentives for Collaborative Innovation

Jeremy Hutchison-Krupat, Georgia Institute of Technology, United States

Stylianos Kavadias, Georgia Institute of Technology, United States

Innovation is widely recognized as a key enabler of competitive advantage and long term success. The popular business press has long cited the importance of a firm's "tolerance for failure" as a key ingredient for successful new product development (NPD) initiatives. This paper takes a first step towards formalizing and conceptualizing the interaction between a firm's tolerance for failure and the incentive system. We explore how this impacts collaborative innovation efforts. Specifically, we analyze how the interactions between two functional managers who collaborate during an NPD initiative, affect their resource commitments to the project. We find that certain aspects of the firm's culture that promote tolerance for failure may result in a double-edged sword regarding innovation. On one hand, a tolerance for failure may allow more innovative projects to be pursued, yet such a directive suffers from the inability to control for overly risky choices.



Saturday, May 2, 11:15-12:45 Room: EC-C

Track: EDUC, 6

Chair: Roberta Russell

Session: Teaching with Technology: Three Authors' Perspectives (Invited)

Saturday, 11:15-12:45 Sessions

011-0001: Incorporating Sustainability in Operations and Supply Chain Management Courses

F. Robert Jacobs, Indiana University, USA

Although sustainability is not a particularly "new" topic it has recently been gaining significant interest in the Operations and Supply Chain Management community. Many companies have embraced "green" initiatives that often significantly impact processes related to the Operations and Supply Chain knowledge domain. We will share ideas on how this might be incorporated in our courses, particularly the core operations course. Using a "scorecard" type framework key concepts and measures will be developed. Ideas for incorporating this into the "strategy", "lean", "quality" and "supply chain" modules in a course will be discussed.

011-0002: Teaching with Technology: an Update on Advances in Connectivity, Collaboration and Assessment

Roberta Russell, Virginia Tech, USA

The technology of teaching has taken a giant step forward in recent years with dramatic advances in connectivity, collaboration and assessment. Three years ago, we presented a technology-in-the-classroom workshop on podcasts, blogs, wikis, inking and clickers. This year we'll give an update on those technologies and introduce you to the latest teaching and learning tools -- from podcasting to lecture webcasting, from clickers to DyKnow, from blogs to twitter, from wikis to Scholar, from YouTube to Second Life. Join us for an exciting session on the possibilities of truly engaging your students in the learning process through the enlightened use of technology.

100	Saturday, May 2, 11:15-12:45 Room: Gallery Session: Teaching human behavior in operations-related courses - panel	Track: BDOM, 1	Chair: Urban Wemmerlov
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011-0315: Teaching Human Behavior in Operations-Related Courses

Peter Ward, ,

Kevin Linderman, ,

Urban Wemmerlov, University of Wisconsin, United States

While OM scholars continue to promote the importance of behavioral considerations in research, we have another critical obligation to demonstrate this criticality in the classroom and ultimately to practice. In this session we motivate why and explain how we integrate human behavioral phenomena into operations-related courses on lean/six sigma, project management, and change management.

101	Saturday, May 2, 11:15-12:45 Room: EC-A Session: Creating operational advantage through collaboration with practitioners	Track: OAG, 2	Chair: Steve Brown
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011-0192: Achieving Sustainable Advantage in Energy Sourcing through Collaborative Research

GERMAINE SAAD, WIDENER UNIVERSITY, United States

This paper develops a conceptual approach for guiding energy sourcing decisions, and shows how sustainable operational advantages can be achieved by collaboration with practitioners in the field. Such advantages can be easily achieved at both the micro level of the firm, as well as the macro level of the national economy.

Examples on alternative energy sourcing decisions will be presented for different decision levels, and implementation scope.

011-0693: How Inclusive and Fragmented Operations Strategies Impact upon Operational Performance

Steve Brown, University of Exeter Business School, United Kingdom

Brian Squire, Manchester Business School, United Kingdom

This paper examines the relationship between the process and content of operations strategy within firms and plant performance in a range of operations parameters. Further, the paper examines the explicit links between business mainstream and operations strategies within firms by exploring the strategy formulation process and possible links between this relationship and subsequent operations performance. Although there is a substantial body of work that explores the links between operations strategy (OS) and a range of performance outcomes there is more ambiguity in establishing links between how OS is formulated and operational performance. Empirical investigations of the link between how organisations formulate operations strategy - both in terms of process and content - and subsequent operations performance represent a significant research opportunity, which we explore in this presentation.

102	Saturday, May 2, 11:15-12:45 Room: EC-E Session: Disaster Relief Logistics Networks	Track: LAPS, 3	Chair: Angela Lewis
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011-0422: Canadian Forces Logistics Needs Assessment for National Operations

Bertram Simms, Royal Military College of Canada, Canada

Needs Assessment is a process used by the Canadian Forces to establish the needs of different classes of mission. The situation being studied is the assessment of domestic or national missions, such as the historical events at Oka, Quebec, the Manitoba floods and the Toronto ice storm. In this paper, we will focus on logistics support for national missions. A macro-model of the logistics process will be introduced with the major decisions, including resource allocation, the major consequences of alternate decisions, feedback and resource reallocation included in the model. The problem of resource allocation occurs on at least two levels: a) the resources that should be available, given the annual budget cycle and time constraints and b) how these resources should be allocated and what should be kept in reserve.

011-0215: Designing an Efficient Emergency Logistics Network in Response to Anthrax Attacks

Jiaxiang Hu, Southeast University, United States

Amy Zeng, Worcester Polytechnic Institute, United States

Lindu Zhao, Southeast University, China

When a bioterrorism attack such as anthrax happens, it will be important to deploy the necessary medical supplies to the affected areas. How can we establish an effective emergency logistics network composed of local warehouses and points of dispensing in order to achieve the least mortality from such an anthrax attack? This paper develops a two-stage procedure to solve this problem. In the first stage, a compartmental model that formulates the progression rule of the anthrax is developed. In the second stage, a mixed integer programming model is established based on the results from the first stage, and is solved by the genetic algorithm. A practical example is finally given to illustrate the application of the solution procedure.

011-0353: Logistics Based Research on Supernetwork Disaster Relief Operations

Haifeng Zhao, School of Economics & Management, Tong Ji University, China

Zhaobo Wang, Suzhou Littelfuse OVS LTD - Shanghai office, China

The biggest problem came from the logistics area during the disaster relief processes of snow disaster and earthquake that occurred in China in 2008. The key issue is how to deliver the devices, medical and commodity, to the disaster area as fast as possible. Disaster relief logistics is kind of paroxysmal logistics. By use of the supernetwork method, this paper analyzes the appearance of redundant logistics. The key findings are as follows. The materials supply is increasing rapidly as time goes by. The logistics distribution channel is blocked by unnecessary materials, which causes the delay of necessary materials. Requirements are changing day-to-day. However, as the result of the bullwhip effect, it is enlarged due to the delay. Therefore, damage is upgraded due to the accumulation of unnecessary materials. Finally, this paper points out that the bottleneck during disaster relief is the distribution channel. And it is hurt continuously during the whole disaster period.

011-0242: Preparedness by International Humanitarian Aid Agencies for Responding to Natural Disasters

Soaleh Khan, University of Manitoba, Canada

Ron McLachlin, University of Manitoba, Canada

This paper addresses the efforts of international not-for-profit humanitarian aid agencies in preparing to respond effectively to natural disasters. The emphasis is on issues of training, the role of logistics within the organization, collaboration with various partner organizations, and learning from previous disasters. The research methodology follows a grounded, case-based approach to the systematic analysis of mainly qualitative data, aimed at theory development. Data were collected primarily through interviews with representatives of two international humanitarian aid agencies, one a large secular organization and the other a smaller faith-based organization. We advance several themes, with an emphasis on the broad theme of the development of local community capabilities by international agencies, in preparation for the onset of natural disasters. We report some preliminary results and propositions from the ongoing study.

011-0558: Real-Time Team Management in Logistic Systems

Fernando Oliveira, ESSEC Business School, France

Nalan Gulpinar, Warwick Business School, United Kingdom

In this paper we develop a set of models in order to improve the coordination between the members of a team (or teams) in dynamic and uncertain environments, such as in humanitarian and peace keeping situations, in war scenarios, or in non-mature industries. In this paper we propose a computational platform to dynamically (re-)allocate resources and tasks to teams in order to maximize the probability of success in the mission, and in order to increase the team's ability to deal with uncertainty. We integrate a dynamic planning system taking into account resource uncertainty.

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Saturday, May 2, 11:15-12:45 **Room:** EC-F
Session: Service

Track: BNCH, 6

Chair: Chikong Huang

011-0298: Trade-Off Occurrence at Asset Frontiers for Service Sector Industries

Maria Cristina Gramani, Faculty IBMEC/SP, Brazil

The service sector is in great expansion, having today more than 60% of the Brazilian GDP; thus, a lot has been presented about performance strategies and improvement actions in this sector. The performance objectives classification in the service sector can be varied, depending on some competitive particularities. However this classification leads, if resources are limited, to conflict of choice, such as between costs and quality. In this way, this study intends to classify the performance objectives and to verify these conflicts generated by this categorization in some service industries, like airline companies. We show some real-world data that quantifies the existent trade-offs when analyzing the performance objectives, concluding that in the existence of trade-offs, the company operates closer to their asset frontier. The results should be very useful for strategic decision-makers in improvement processes.

011-0629: Export Performance: A Review of the Empirical Literature

Alexandre Pignanelli, FGV - EAESP, Brazil

Manoel Reis, FGV - EAESP, Brazil

Bianca Stamato, FGV - EAESP, Brazil

Juliana Santos, FGV - EAESP, Brazil

Saturday, 11:15-12:45 Sessions

The increasing globalization of trade practices and markets has put export activities as one of the key points for business success and expansion. During the last years, many empirical studies on export-related subjects have been conducted, and one of the central questions in these studies has been the utilization of export performance measures. Despite the intensification of this research interest, there is a lack of synthesis and agreement on the conceptualization and operationalization of the construct, often leading to inconsistent and conflicting findings on the determinants of export performance. This paper reviews a set of the most representative empirical studies on the measurement of export performance published in the last fifteen years (1994 – 2008). The concepts and the operational definitions of export performance employed in the literature are identified, reviewed, and synthesized. Findings and directions for future studies are discussed in the conclusions.

011-0533: Designing a Simulation Laboratory Environment for Service-Oriented Supply Chain Information Management

Stephen Shih, Southern Illinois University, United States

Chikong Huang, National Yunlin University of Science & Technology, Taiwan, Republic of China

The primary objective of this research is to propose a simulation laboratory environment to examine the interactions and information exchanges between various levels of the service-oriented supply chain network. The research involves the exploration of three areas: (1) the essential characteristics and associated requirements underlying various service-driven supply chain transactions, (2) business assumptions underlying conventional service-driven supply chain models, and (3) modeling theories adopted to redefine the new models. Furthermore, the laboratory will be used as a viable base to develop fundamental theories for improved network communications and increased operational efficiency. An important thesis of this research is to explore the synergy between service supply chain logistics and information exchange. Ultimately, this research has the potential to extend simulation techniques and information technology to an important economic sector—the service sector—that has long been overlooked in the past.

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Saturday, May 2, 11:15-12:45 **Room:** EC-G
Session: Multiple Marketing Strategies

Track: MKTG, 6

Chair: Fuqiang Zhang

011-0140: Impact of Capacity Limitations on the Product Line Design under Competition

Muge Yayla-Kullu, RPI Lally School of Mgmt. & Tech., United States

Ali Parlakturk, UNC-Chapel Hill Kenan-Flagler Business School, United States

Jayashankar Swaminathan, UNC-Chapel Hill Kenan-Flagler Business School, United States

We study multiproduct oligopoly competition in a vertically differentiated industry. The products are differentiated by their quality, unit cost, and resource consumption levels. The customer base is heterogeneous in their willingness to pay for quality. There are n symmetric firms engaging in a Cournot competition. The firms take capacity limitations into account at this stage. We show that capacity availability has significant impact on the firms' decisions. We also study the effects of increasing number of firms on the product line decisions of the firms with capacity limitations. As opposed to the literature, we find that under some conditions, market clearing price of a product may increase as the market concentration decreases. Moreover, under some conditions, total supply of a product may decrease as the number of firms increases in the market. We also study the effects of changing market concentration on the product variety offered in the market.

011-0377: Consumer Response to Stockout

Mauro Sampaio, Fundacao Getulio Vargas, Brazil

Claude Machline, Fundacao Getulio vargas, Brazil

This paper reports the results of research concerning the short-range consumer response to stockout. In this study, the authors investigate the relationship between consumer response to stockout and several independent variables such as: purchase situation, consumer characteristics and perception of store type. The results show that it is possible to estimate the probability of a consumer leaving the store or purchasing a substitute. The authors conclude that a tool of this nature may contribute to more qualitative retail decision-making and help logistics practitioners compute the cost of stockouts.

011-0078: Repeated Interactions in Decentralized Assembly Systems

Xuan Zhao, Wilfrid Laurier University, Canada

This paper considers an assembly system with multiple complementary suppliers repeatedly selling to a manufacturer that faces uncertain demand. It demonstrates that the long-term interaction motivates suppliers to behave cooperatively, which benefits the suppliers, manufacturer, and the entire system. It then provides insights into how and why suppliers' cooperation on pricing during repeated interactions can be sustained. It explores the impact of various relational agreements (punishment strategies) employed by complementary suppliers, such as the grim trigger strategy commonly used in economics and recently in operations, the finite punishment period strategy, and the repentance strategy. We show that the efficiencies of the various punishment strategies are different and that the repentance strategy can sustain cooperation for a wider range of situations and it is strongly renegotiation-proof. Suppliers who are more powerful have a stronger desire for cooperation and harsher punishment is needed for less powerful suppliers to prevent deviations.

011-0050: Using "Last-Minute" Sales for Vertical Differentiation on the Internet

Ori Marom, RSM Erasmus University, Netherlands

Abraham Seidmann, University of Rochester, United States

Saturday, 11:15-12:45 Sessions

In Internet based commerce, sellers often use multiple distribution channels for the sale of standard consumer goods. We study a model of second degree price discrimination in which a monopolist sells to risk-averse buyers. The seller uses two channels that differ in their risk attributes. In one channel prices and qualities are fixed and availability is assured. In the second channel, the seller offers a joint-distribution of prices and qualities and may not guarantee availability. We characterize optimal two-channel selling policies. We show that it can be optimal to offer multiple identical items in a random sale event. However, the seller cannot benefit by offering two distinct quality levels in a sale event that is held with an availability probability of less than one. We use the model to offer explanations for observed behavior of online sellers and discuss implementation issues in recent e-commerce environments.

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Saturday, May 2, 11:15-12:45 **Room:** EC-H
Session: Six Sigma and SPC

Track: QUAL, 6

Chair: Marly Carvalho

011-0254: Six Sigma: Literature Review, a Critical Analysis, and Future Research

Weiyong Zhang, Virginia Commonwealth University, United States

Arthur Hill, University of Minnesota, United States

Glenn Gilbreath, Virginia Commonwealth University, United States

Since its inception at Motorola, Six Sigma has been widely adopted by many different types of organizations. Anecdotal evidence seems to support its effectiveness in improving performance. However, academic research on Six Sigma is still in its early stage. This paper first reviewed the current literature on Six Sigma, and then performed a critical analysis of Six Sigma in light of the management literature. The review and analysis showed that Six Sigma is a new approach to quality management and provides an interesting research context for a number of questions. Several research questions were subsequently proposed. This study laid a foundation for future research on Six Sigma.

011-0743: Enhancing Student Progression Using Statistical Process Control

Mark Hanna, Georgia Southern University, United States

Nilesh Raichura, Georgia Southern University, United States

Public interest in educational cost, efficiency and outcomes has markedly increased in the most recent decade. Indeed, many academic units now face targets for student retention, progression and graduation (RPG) that are tied directly to their funding levels. This paper utilizes data from an undergraduate degree program in business administration at Georgia Southern University to illustrate the use of the Deming Cycle in academic administration and the linkage between statistical control of instructional standards and student progression .

011-0681: Application of Multi-Variate Control Charts to Detect Out-of-Control Signals in Autocorrelated Processes

Majid Jaraiedi, West Virginia University, United States

Wafik Iskander, West Virginia University, United States

Tao Zhao Zhao, West Virginia University, United States

Autocorrelation results in too many out-of-control false alarms when traditional T2 control charts are used in practice. In order to improve the accuracy of identification of out-of-control signals, one common method is to remove autocorrelation at first by using autoregressive integrated moving average (ARIMA) models, and then proceed to build residual based T2 control charts. However, the ARIMA based T2 control charts are not effective when correlations between variables are strong. In this research, a vector autoregressive (VAR) based T2 control chart is built to improve the effectiveness of the traditional T2 control charts when variables are autocorrelated and cross-correlated. Datasets generated by a SAS program are used to test the performance of the proposed method. Computational results showed that the proposed method outperforms the ARIMA based residual T2 control chart with respect to identification accuracy and average run length.

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Saturday, May 2, 11:15-12:45 **Room:** EC-D
Session: Terminal design and operations

Track: FCLT, 1

Chair: Georg Kartnig

011-0304: Analysis of the Relationship between Control Strategy, Layout Complexity and Performance in Facility Logistics

Jan Nopper, Fraunhofer Institut für Materialfluss und Logistik, Germany

Michael ten Hompel, Fraunhofer Institut für Materialfluss und Logistik, Germany

Today, companies are faced with globalized markets, shorter product life cycles, and a trend towards more individualized products. This increases both the performance requirements and the complexity of material flow systems. Thus, the development of improved control strategies seems promising. Various approaches are proposed in the literature, e.g. bio-analogous strategies like swarm intelligence or ant algorithms. Conceptually, the performance of all possible strategies is located in a space defined by a hypothetical "best possible" and a "worst reasonable" strategy. This concept is developed for facility logistics and the dependency of throughput time and capacity utilization on layout and throughput is investigated for both strategies by using a scalable generic layout. Implications for the importance of quality of the control strategy depending on complexity and performance are discussed and the outline of a methodology for the analysis of any given layout is provided.

011-0386: The Berth Position Problem: A Case Study

Maarten Hendriks, Eindhoven University of Technology, Netherlands

Guido Karsemakers, Eindhoven University of Technology, Netherlands

Erjen Lefeber, Eindhoven University of Technology, Netherlands

Jan Tijmen Udding, Eindhoven University of Technology, Netherlands

Saturday, 11:15-12:45 Sessions

A container terminal operator takes care of the container handling in a port to service a number of vessel lines. Commonly, the schedules of the vessels of one line are such that the inter arrival time is constant. Since a terminal operator aims to satisfy the vessel lines' schedules, the cyclic arrival and departure times are uncontrollable. Given the time schedule, appropriate berth positions are to be found. A terminal operator provided a representative schedule and yard lay-out depicting the designated container areas for the different container types. From this data, we construct the straddle carrier travel distance between a vessel and its container types in the yard as a function of the berth position of that vessel. An MILP is used to find berth positions such that the total carrier travel distance is minimal. Results suggest that the carrier distance in the representative allocation can be reduced by 10%.

011-0113: A Novel Design Approach to Optimize the Expected Revenue of Third-Party Warehouses

Rene de Koster, Rotterdam School of Management, Erasmus University, Netherlands

Yeming Gong, Rotterdam School of Management, Erasmus University, Netherlands

This paper proposes a new warehouse design approach based on our survey of international third-party warehouse cases in USA and Europe. This paper applies revenue management theory as a methodological foundation to facility design, and identifies a new research direction, the interface between revenue management and facility logistics. We also report a new revenue management application industry, third-party warehouses.

011-0359: Development of an Automated Container Terminal with Rail Guided Vehicles

Georg Kartnig, Graz University of Technology, Austria

Joerg Oser, Graz University of Technology, Austria

To enable automated transshipment in a container terminal a novel rail guided system was developed including the layout, a closed loop rail system, turntables and carriers. The purpose of this container terminal is to pickup empty containers at a loading station, to transport them on the rail system to container loading stations and to move the full containers to a ship loading crane. The rail guidance enables a fully automated low cost operation as compared to conventional solutions with manned equipment like straddle carriers. After an introduction, the paper describes the operation strategies of the system. The next section deals with estimation of the number of vehicles required for satisfactory terminal operation. This question is treated with three solution approaches. An analytical estimation procedure will be compared to closed queuing network solutions. Also, simulation results are included to verify performance calculations and operational issues.

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Saturday, May 2, 11:15-12:45 **Room:** Senate

Track: PRCH, 1

Chair: Tobias Schoenherr

Session: Panel Discussion: Frontiers in Procurement Research for the Global Economy

011-0906: Frontiers in Procurement Research for the Global Economy

Sachin Modi, University of Toledo, United States

Tobias Schoenherr, Michigan State University, United States

This panel discussion of invited distinguished academics in the procurement field will provide new perspectives and opportunities for purchasing research in today's globalized economy. Panelists include the following individuals (in alphabetical order):

W.C. Benton (Ohio State University),
Thomas Choi (Arizona State University),
Lisa M. Ellram (Miami University),
Paul D. Larson (University of Manitoba),
Vincent A. Mabert (Indiana University),
Ram Narasimhan (Michigan State University),
Aleda V. Roth (Clemson University), and
Stephan M. Wagner (Swiss Federal Institute of Technology Zurich).

The panel discussion will be lead by the purchasing track co-chairs, Sachin Modi (University of Toledo) and Tobias Schoenherr (Michigan State University).

Saturday, 1:30-3:00 Sessions

109	Saturday, May 2, 1:30-3:00 Room: Cloister North Session: Internet and Geographic Information System Uses	Track: SRVC, 6	Chair: Suresh Tadisina
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011-0013: A Structured Methodology for Developing a Service Operations Strategy: The Case of BTC-Egypt

Sherwat Ibrahim, American University in Cairo,

Ahmed Khodeir, Maastricht School of Management, The Netherlands

This paper aims to present a structured methodology that can be used to assist decision-makers in developing their service operations strategy and their leading competitive priorities. In this constructive case study for BTC-Egypt; an IT service provider, we relate the previous success of the company's sales with the prioritized operational strategy for that sale using an AHP model to measure relative importance ratings given to a comprehensive set of competitive priorities derived from accumulated literature. Qualitative analysis and quantitative analysis including logistic regression and correlations are used to analyze the data. While Quality as an operation strategy was rated the highest across all sales for BTC-Egypt, Customer Focus and Service Provision were the two most differentiating variables. The methodology used in this study is unique. The simple classification of sales according to their success, while has its limitations, is also an attractive alternative compared to other more complicated performance measures.

011-0829: Improving Quality of Service in E-business: Resource Locking and Capacity Planning

John Fowler, Arizona State University, USA

Antonios Pritezis, Arizona State University, USA

Mohammad Alam, Arizona State University, USA

Srimathy Mohan, Arizona State University, United States

Mohan Gopalakrishnan, Arizona State University, United States

Capacity planning of web-based applications that deals with determining and maintaining the balance between demand and server configuration has a direct impact on response time. In such systems a critical interaction called resource locking occurs when an upstream resource is locked until all further downstream processing is completed for an arriving request. In this research, we present an analytical model to understand the impact of resource locking on quality of service (QoS). The model studies the relationships using a continuous time Markov chain embedded in a queuing network as the basic framework. Using several structured aggregation schemes and simulation as a benchmark, we show that our model produces results within 5% accuracy at a fraction of the time, even at high traffic intensities. This knowledge would help managers decide how many servers to assign to each application and when to bring more servers online to maintain desirable levels of QoS.

011-0774: Customer Satisfaction and Loyalty Effects of Service Recovery in Online Environments

Suresh Tadisina, Southern Illinois University Carbondale, United States

Michael Abebe, University of Texas-Pan American, United States

Daisy Wang, Southern Illinois University Carbondale, United States

The findings in the literature are based on service recovery efforts in the "traditional" service setting, i.e. service provided with direct physical contact between the customer and service provider. Consequently, there is a limited understanding of service recovery activities in an online environment (Harris et al., 2006; Holloway and Beatty, 2003). Studying the impact of service recovery activities in online environments is particularly important given the phenomenal growth of online commerce both in the form of business to business (B2B) and business to consumers (B2C) transactions. Online service recovery is significantly different from a brick-and-mortar setting primarily due to the lack of interpersonal interaction (Forbes et al., 2005). It is also different because of customers' perceived insecurity about internet transactions (Holloway, Wang and Parish, 2005). This study empirically examines the effect of the speed and magnitude of online service recovery activities on customer satisfaction and loyalty in an online context.

110	Saturday, May 2, 1:30-3:00 Room: Cloister South Session: Retail Operations	Track: SCM, 7	Chair: Nicole DeHoratius
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011-0080: Evaluation of Supply Chains with Inventory Record Inaccuracy and Implications on IT Investments

Gurhan Kok, Duke University, United States

Kevin Shang, Duke University, United States

We consider serial supply chains with cycle-counts at each location to correct inaccurate inventory records. We provide a recursion to evaluate the average supply chain cost per period. For fixed cycle-count policies, we construct an algorithm to compute the optimal local base stock levels. Based on these results, we provide guidelines on how to design effective cycle-count policies and at which locations RFID systems should be installed.

011-0123: Financing News Vendor Inventory

Qiaohai (Joice) Hu, Purdue University, United States

Maqbool Dada, Purdue University, United States

If the cost of borrowing is not too high, the capital-constrained news vendor borrows funds to procure an amount that is less than would be ideal. The lender charges an interest rate that is decreasing the newsvendor's equity. Furthermore, we derive a non-linear loan schedule that coordinates the channel.

011-0079: Lost-Sales Inventory Models with Handling Costs and Batch Ordering

Jan Fransoo, Eindhoven University of Technology, Netherlands

Saturday, 1:30-3:00 Sessions

Alina Curseu, Eindhoven University of Technology, Netherlands

Tom van Woensele, Eindhoven University of Technology, Netherlands

Nesim Erkip, Bilkent University, Turkey

We consider a grocery retailer who manages inventory facing stochastic demand under periodic review. The retailer may only order in multiples of a fixed batch size, while the consumer demand may be for individual units. The lead time is less than the review period length. Unmet demand is lost, which is a realistic situation for a large part of the assortment of grocery retailers. We consider a cost for holding inventory in the store, a cost associated with the demand that is lost and a replenishment cost, which includes fixed ordering and in-store shelf stacking costs. We formulate the problem as a Markov decision process and use it to characterize the structure of the optimal policy. We compare the performance of the optimal policy against a frequently used (R,s,nq) policy, and find that the latter generally performs poorly.

111	Saturday, May 2, 1:30-3:00 Room: Captain	Track: SCM, 21	Chair: Dean Chatfield
111	Session: Managing the Bullwhip Effect		

011-0404: The Impact of Cascading Failures on the Bullwhip Effect

Dean Chatfield, Old Dominion University, United States

Jack Hayya, Penn State University, United States

The bullwhip effect (BWE) is a common and costly operating phenomenon in supply chains. Most investigations of the BWE have relied on decomposing the supply chain into a set of node pairs, which are examined independently. We believe that such decomposition is inappropriate, resulting in BWE estimates that are systematically low. This is due to the fact that the independent node pairings do not accurately represent the interdependencies and interactions that are a supply chain reality. We believe that decomposition-based models do not accurately reflect inventory stockout propagation, which we refer to as "cascading failures," within the supply chain. Using simulation modeling, we investigate and characterize the impact of cascading failures on the bullwhip effect, examine possible ways to mitigate, or "firewall" against the effect, and attempt to assess the value of such mitigation.

011-0592: Bullwhip Effect in Durable Goods Sector and the Great Moderation

Shitao Yang, University of Richmond, United States

Before the current recession, the US economy had seen a marked improvement in its stability since the early 1980s. This phenomenon, called "great moderation," is well documented in the economics literature. Three hypotheses stand out as its possible source. The first is a more credible monetary policy. A second is "good luck," a hypothesis that argues that economic shocks have been both milder and less frequent. The third is better business practices — in particular, inventory management techniques which have enabled firms to respond to shocks in a manner that dampens aggregate fluctuations. In this study, we explore the third hypothesis further. Specifically, we use the ratio of the volatility of production to the volatility of sales as a proxy to measure the bullwhip effect at the macroeconomic level and show that the bullwhip effect in the durable goods sector has been substantially reduced since the early 1980s.

011-0680: Rethinking RMI: Test of Competing Hypotheses

Byungku Lee, university of nebraska - lincoln, United States

Jinsung Rha, university of nebraska - lincoln, United States

Donghyun Choi, university of nebraska - lincoln, United States

Generally, Vendor Managed Inventory (VMI) is known for reducing the bullwhip effect by the elimination of a decision-making process and time delays by late information flow. At the same time, the stocking level of each brand under VMI may be lower than that under Retailer Managed Inventory (RMI). Conversely, if product demand is changed, there may be situations in which no advantages can be gained in that the benefits of VMI vary in different supply chains. In addition, RMI works better than VMI in some conditions in which products are in competition, because vendors put higher inventory levels so as not to experience stock out loss. The aim of this research is to analyze the effectiveness of RMI according to product types such as functional products, innovative products, seasonal products, and market demand driven products.

011-0785: Volume and Time Order Variance: Two Sides of the Same Coin?

Rogelio Oliva, Mays Business School, Texas A&M University, United States

Santiago Kraiselburd, MIT- Zaragoza Logistics Center, Spain

Mario Monsreal, MIT - Zaragoza Logistics Center, Spain

Bjorn Claes, Instituto de Empres, Spain

Variance in the order stream has been a traditional measure to assess the difficulties (and cost) of supplying a particular demand. Order variability, however, can have two distinct manifestations: variations in the quantities that are ordered (volume variability), and variations in the intervals between consecutive orders (time variability). We use order and shipment data from a confectionery manufacturer to compare the order patterns of distribution centers and end-point retailers for different types of products and channels. We find significant evidence that distribution centers are shifting variance from volume variance to time variance. Thus, while giving the impression of reducing order variance by tightening the order size, the distribution centers in this supply chain increase their order interval variance by a larger factor than the corresponding reduction in volume variance. We explore the cost implications of this shift of variance.

112	Saturday, May 2, 1:30-3:00 Room: Yeoman	Track: SVCN, 3	Chair: Ben Clegg
112	Session: Technology Issues		

011-0269: Viable Production System for Adaptable and Flexible Production Planning and Control Processes

Volker Stich, RWTH Aachen University, Germany

Carsten Schmidt, RWTH Aachen University, Germany

Jan Meyer, RWTH Aachen University, Germany

Henrik Wienholdt, RWTH Aachen University, Germany

High Resolution Supply Chain Management (HRSCM) aims at designing adaptable and flexible production planning and control (PPC) processes according to the needs of the company's supply chain environment. To reach this goal a model for a Viable Production System (VPS) has been elaborated and is presented in this paper. Based on the Viable System Model (VSM) developed by Stafford Beer, current production systems are analyzed in terms of integrity. With the gained knowledge a complete recursive framework of a VPS is developed. The framework allows the design of a decentralized production system that meets all requirements of a dynamic environment. Flexible and adaptable PPC processes can be developed for each identified subsystem of the VPS. Hence, further research focuses on the development of process and control loops in order to assure the application of the framework. As an exemplar, the decentralised control loop for inventory management is elaborated in a case study.

011-0617: Differentiation through Industrial Product-Service Systems in Knowledge-Based Industries

Günther Schuh, RWTH Aachen University, Germany

Wolfgang Boos, RWTH Aachen University, Germany

Bastian Schittny, RWTH Aachen University, Germany

Georg Oschmann, University of St. Gallen, Switzerland

Today's turbulent economic environment confronts the global tooling industry with serious challenges. Cost competition and the high demands of globalized value-adding chains put pressure on small- and medium-sized toolmakers. As an exclusive differentiation in price is not an option, new means for achieving sustainable competitive positions have to be found. A promising approach for differentiation is to enhance the existing range of products by offering customer-specific services. However, the lack of local presence inhibits the toolmakers' abilities to deliver these services to their global customers. To address these challenges the European R&D project TIPSS has two major objectives: based on an extensive survey, a global footprint of the existing service landscape and a portfolio of value-adding services are created. Innovative business models, enabled by so-called smart tools incorporating sophisticated sensor technology, allow toolmakers to efficiently manage their global customer and partner networks.

011-0728: Mobile Payment Concept and Value Creation in the Credit Card Chain

Guilherme Martins, Fundacao Getulio Vargas, Brazil

Michele Martins, Fundacao Getulio Vargas, Brazil

Joao Mario Csillag, Fundacao Getulio Vargas, Brazil

Luiz Carlos Di Serio, Fundacao Getulio Vargas, Brazil

The article's purpose is to discuss mobile payment's incorporation into the credit card chain by a technology that allows transactions to be conducted using mobile phone networks. A case study was structured in the single company that operates this different transaction in the credit card chain. The analysis identified value creation sources based on value chain framework, Schumpeter's theory of creative destruction, the resource-based view of the firm, strategic network theory, and transaction costs economics. Aspects related to competitive criteria and to operations performance are presented and results indicated that the mobile payment technology allows value creation for the various ties in the credit card chain, including the insertion of new agents that have not taken part due to the traditional system's inefficiencies. Finally, it was discussed that chain members have the potential to complement each other, in terms of resources and capabilities, as well as products and solutions.

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Saturday, May 2, 1:30-3:00 Room: Scribe

Track: SUST, 11

Chair: Dan Guide

Session: Empirical Research 2

011-0009: Understanding the Evolving Supply Chain of Biofuels: The Case of *Jatropha Curcas*

Ahu Soyly, London Business School,

Increasing demand for energy by a growing population and higher quality of life makes it impossible to achieve the greenhouse gas reduction targets without transition to new technologies. Being subjects of excessive debate, biofuels are one of the promising renewable energy technologies. This paper examines the operational risks in the dynamic and emergent nature of an emerging biofuel's supply chain: the supply chain of biofuel from *Jatropha curcas* in particular. This plant is able to grow in extreme conditions and this might create an opportunity for the developing countries and possible investors. Understanding the risk involved in this opportunity enables the investor to make better informed decisions. The paper models the supply chain from plantations to refineries compares different operational models namely, managed plantations and contract farming. A structural solution has been derived suggesting a new operational model which is a combination of these models. A simulation model has been developed incorporating the greenhouse gas emissions throughout the chain and is run with different scenarios in order to observe the affects of possible operational risk factors.

011-0433: Empirical Research Opportunities in Sustainable Purchasing

Carol Prahinski, Michigan State University, United States

Rajesh Srivastava, Florida Gulf Coast University, United States

Sustainability is fast gaining a prominent role in business practice. A key area often overlooked is Sustainable Purchasing (SP). A question that largely remains unanswered is: what promotes sustainable purchasing? In this research, we present empirical research opportunities in SP along a framework of four dimensions. The first dimension focuses on sustainable development and the level of emphasis along the three aspects of the triple bottom line: environmental, social, and financial. A second dimension of SP is the purchasing process, including all aspects of sourcing, such as supplier selection and evaluation. The third dimension that impacts SP is stakeholders, e.g., customers, suppliers, NGOs, and employees. The various stakeholders exert pressure and the supply chain structure constrains alternatives. The fourth dimension that we incorporate is time, where considerations include the product life cycle and the relationship longevity between the organization and its suppliers. Research propositions are suggested.

011-0305: Towards a Process Model for Environmental Supply Chain Management

Iuri Gavronski, Federal University of Rio Grande do Sul, Brazil

Robert Klassen, University of Western Ontario, Canada

Stephan Vachon, HEC Montreal, Canada

Luis Nascimento, Federal University of Rio Grande do Sul, Brazil

In recent years, some academic effort has been done to define and provide theory on Environmental Supply Chain Management (ESCM). The practitioners, however, lack a model for successful implementation of ESCM, empirically validated in a larger sample of manufacturing plants. This study proposes a dynamic model of ESCM, based on the concept of path-dependency of the Resource-Based View (RBV) of manufacturing strategy. In this dynamic model, the successful implementation of an ESCM program is achieved by the sequential implementation of three independent but related sets of Green Supply Chain Practices (GSCP): environmental selection of potential suppliers (stage 1), environmental monitoring of supplier base (stage 2) and environmental collaboration with suppliers (stage 3). The model was tested with survey data. The mediated model of ESCM provides a process model to manufacturing plants that want to improve the systemic environmental performance, that is, the environmental performance of their whole supply chain.

011-0218: Operations Strategy and Sustainability: A Discussion about their Locus and Boundaries

Edson Pinheiro de Lima, Pontifical Catholic University of Parana/Industrial and Systems Engineering, Brazil

Sergio Gouvea da Costa, Pontifical Catholic University of Parana/Industrial and Systems Engineering, Brazil

Paula da Rosa Garbuio, Pontifical Catholic University of Parana/Industrial and Systems Engineering, Brazil

Firm theoretical concepts are being redefined in order to match new value propositions, which are being managed in a multivariable perspective. These multi aspects that define value cover economic, environmental, and social issues and they are the new design requirements for the operations systems. These new concepts result in new models for describing and explaining production processes, operations strategy and performance measurement systems. The main purpose of this paper is to discuss and position these new drivers of value creation in an operations strategic management framework. A model is constructed based on a literature review and secondary data obtained from enterprise sustainability reports. Secondary data is used to populate the proposed framework. The framework proposed in this paper was discussed previously in two research seminars that took place in Norway and Brazil. Some evidence shows how sustainability factors are related to technical system design, operations strategy, decision areas, and performance dimensions.

011-0184: Managing Sustainability

Daniel Guide, The Pennsylvania State University, United States

James Abbey, The Pennsylvania State University, United States

Michael Galbreth, University of South Carolina, United States

We develop a framework on how companies organize and measure their sustainability efforts from a business perspective. This framework is based on semi-structured interviews with multiple managers and site visits to a variety of companies. We also explore a series of propositions about the drivers of sustainability based on the resource-based view of the firm.

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Saturday, May 2, 1:30-3:00 **Room:** Knave

Track: HLTH, 7

Chair: Vikram Tiwari

Session: System Level Capacity Management in Healthcare

011-0316: Increasing Access to Healthcare Services through Service Time Process Improvements

Linda LaGanga, Mental Health Center of Denver, United States

Stephen Lawrence, University of Colorado at Boulder, United States

Increasing access to services, reducing costs, and improving patient satisfaction are challenging issues in healthcare today. System performance can be negatively impacted by high variability in service delivery times and show rates, and compliance requirements also can add significant time and cost to direct and overhead activities. Through a case study, we examine data on initial intake appointments before and after a lean process improvement project that streamlined intake appointments to reduce the average appointment duration, reduce service time variability, and increase the speed and rate of admitting new patients into outpatient treatment. We examine the impact of shorter, more consistent service times on the healthcare delivery system's performance, discuss information system requirements to implement such solutions, and propose strategies for achieving high satisfaction for patients, payers, and providers while standardizing important aspects of service delivery.

011-0344: Coordinating Hospital Capacity through Information Sharing

Vikram Tiwari, University of Houston, United States

Kurt Bretthauer, Kelley School of Business, Indiana University, Bloomington, United States

M Venkataramanan, Kelley School of Business, Indiana University, Bloomington, United States

This research provides insights on how to use increasing levels of information sharing to coordinate capacities across the inpatient units of a hospital, and hence mitigate the ill-effects of variability. Using a simulation model and data collected from a large U.S. hospital, we show that information sharing among units leads to improvement in system performance and an overall improved patient flow, without the need to invest in additional capacity. Since the units in a service delivery network such as a hospital are interconnected, sharing information among units enables improvement in system-wide performance by addressing performance issues of the system as a whole, rather than focusing on performance improvements at each unit individually. Coordinating capacities at the system-level to improve performance is superior to managing the individual units in isolation. Also, as the results indicate, understanding the trade-offs between performance measures would help decision-makers make better informed decisions about capacity changes.

Saturday, 1:30-3:00 Sessions

115	Saturday, May 2, 1:30-3:00 Room: EC-D1 Session: Fundamentals of the Empirical Toolkit	Track: EMPR, 7	Chair: Kamalini Ramdas
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011-0888: Fundamentals of the Empirical Toolkit

Kamalini Ramdas, London Business School, United Kingdom

Marshall Fisher, Wharton School, University of Pennsylvania, United States

Jonathan Williams, Department of Economics, University of Virginia, United States

In this tutorial we will discuss the key elements of empirical research. We'll start with problem definition, data collection, sample selection and sample size issues and move on to common problems such as omitted variables and endogeneity. Using real life examples and visuals, we will highlight the basic intuition behind these problems and how to deal with them via methods such as instrumental variables and experiments. Along the way we hope to debunk some commonly held misconceptions about empirical methodology. The intended audience is any researcher who is interested in starting to do empirical work but who lacks formal training in this field. We will share from our own experience in trying to bridge the gap between the typical Operations skill set and the methods and theory of empirical research, with the intention of stimulating a conversation on how researchers in our field can effectively acquire the empirical skill set.

116	Saturday, May 2, 1:30-3:00 Room: EC-B Session: Distributed Innovation and New Product Development	Track: PITM, 6	Chair: Edward Anderson
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011-0223: The Impact of Product Modularity on NPD Time Performance: Moderating Effect of Interfunctional Integration and Supplier Involvement

Pamela Danese, University of Padova - Department of Management and Engineering, Italy

Roberto Filippini, University of Padova - Department of Management and Engineering, Italy

Product modularity is a strategic approach to product development that, according to several authors, can be used by manufacturers to speed up the new product development (NPD) process. Although the potential benefits of product modularity seem compelling, there is rarely even anecdotal evidence of these advantages. Moreover, some doubts can be expressed whether a clear relationship between NPD time performance and product modularity always exists. This paper analyzes the influence of product modularity on NPD time performance and the moderating effect on this relationship of interfunctional integration and supplier involvement in NPD. Data from a sample of 251 manufacturing firms settled in several countries around the world demonstrates that there is a positive relationship between product modularity and NPD time performance, and that interfunctional integration in NPD acts as moderator in this relationship. Differently, supplier involvement has only main effects on NPD time performance.

011-0626: Platform and Feature-Choice in the Videogame Industry

Burcu Tan, University of Texas, U.S. Minor Outlying Islands

Edward Anderson, University of Texas, United States

Geoffrey Parker, Tulane University, United States

We examine the development of product platforms in markets that exhibit network externalities. We focus on the trade-off firms must make between investing new product development resources to increase a platform's core functionality versus investments designed to change or leverage the platform's network externalities. Abstracting from examples drawn from multiple industries, we use a strategic model to gain intuition about how to make such trade-off decisions.

011-0784: Dousing the R&D Fires: Does Screening Reduce Fire-Fighting and Enhance Portfolio Value?

Paulo Figueiredo, Boston University, United States

Paulo Goncalves, University of Lugano, Switzerland

Nitin Joglekar, Boston University, United States

It has been argued that when R&D projects progress through a sequence of stages that share resources, teams engage in firefighting at the end of the pipeline and are stuck in a myopic cycle of imbalance such that diverting resources towards current firefighting begets future firefighting. We investigate the impact that project screening and project complexity may have on firefighting in R&D pipelines. We define a firefighting index (FI) that tracks the degree of such imbalance, and deploy this index to assess rework, complexity and screening control strategies that regulate the introduction of new projects in order to enhance the NPD portfolio value.

011-0803: An Empirical Investigation of Global Footprint, Innovation, and Performance

Jie Zhang, Boston University, United States

Justin Ren, Boston University, United States

Anil Khurana, PRTM, United Arab Emirates

Nitin Joglekar, Boston University, United States

Extant literature offers conflicting theories on the performance implication of operating in multiple geographic regions. We propose a composite measure of global footprint which takes account not only of the number of regions in which a firm operates but also the dissimilarity among these operating environments. We draw upon a survey of 60 global firms and publicly disclosed financial performance to find a positive correlation between the global footprint construct and firm profitability, after controlling for the asset size, heterogeneity in the innovation choices, home region bias, and product or service orientation.

Saturday, 1:30-3:00 Sessions

117	Saturday, May 2, 1:30-3:00 Room: EC-C Session: Panel Discussion: Teaching Operations Management in an International Environment (Invited)	Track: EDUC, 7	Chair: Daniel Heiser
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011-0770: Panel Discussion on Teaching Operations Management in an International Environment

Daniel Heiser, DePaul University, United States

Rhonda Lummus, Indiana University, United States

Roger Schmenner, Indiana University Kelley School of Business, United States

What is it like to teach operations management to a global audience? How culture-bound is OM? In this session, the panelists will discuss their experiences teaching operations management and related topics in Europe, Asia, and the Middle East, as well as online to an international audience. Topics of discussion will include teaching across cultures when visiting in a program outside North America and leading short-term seminars of American-based students to an international locale. The initial discussion will be followed by an open forum for discussing best practices and common problems.

118	Saturday, May 2, 1:30-3:00 Room: Gallery Session: Human behavior in operations management - practitioner's panel	Track: BDOM, 2	Chair: Robert Prescott
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011-0396: Practitioner Session

Robert Prescott, Rollins College Crummer GSB, United States

This is a session which will have a panel of local Orlando industry leaders discussing Human Behavior issues in Operations Management. It will be led by Professor Robert Prescott of Rollins College.

119	Saturday, May 2, 1:30-3:00 Room: EC-A Session: Researching Operations Management - Routledge 2009 Book	Track: EMPR, 16	Chair: Christer Karlsson
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011-0520: Researching Operations Management - Routledge 2009 Book

Christer Karlsson, Copenhagen Business School, Denmark

Most important empirical research approaches used in Operations Management are presented and discussed. The session is based upon and introduces the just-published book "Researching Operations Management" (Routledge 2009). A couple of the authors present key issues on what is good research. It provides a platform for choosing appropriate and complementary approaches. Subjects are: characteristics of good OM research; planning the research; surveys using questionnaires but also general issues on sampling, validity, reliability; case research both for studies with a few or multiple cases; longitudinal field studies in single or few organizations; action research where the researcher enters the organization with the combined aim of making changes in the organization while studying it; modelling and simulation with the possibilities of analysing rather holistic perspectives and trying out "what if" analyses; and a brief reflection on important basic values, combining methods, and on quality, ethics and morality of research.

120	Saturday, May 2, 1:30-3:00 Room: EC-E Session: Logistics Performance in Healthcare	Track: LAPS, 4	Chair: Claudia Rebolledo
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011-0151: Operational Performance of an Emergency Room (ER): Trade-offs in Speed, Number of Patients in the System (WIP), and Resource Utilization

Gyula Vastag, Corvinus University of Budapest, Hungary

Jacob Wijngaard, University of Groningen, Netherlands

Taco Vaart, University of Groningen, Netherlands

This paper, using detailed time measurements of patients, examines three facets of an Emergency Room's (ER) operational performance: (1) effectiveness of the triage system in reducing the patient lead-time and its conformity to stated triage standards; (2) factors influencing ER's operational performance in general and the trade-offs in speed, inventory levels (that is, the number of patients waiting in the system) and resource utilization in particular; (3) the impacts of potential process and staffing changes to improve the ER's performance. Specifically, four proposals for streamlining the patient flow are discussed: establishing designated tracks ("fast track," "diagnostic track"), creating a "holding" area for certain types of patients, introducing a protocol that would reduce the load on physicians by allowing a registered nurse to order testing and treatment for some patients, and, potentially and in the longer term, moving from non-ER specialist physicians to ER specialists.

011-0189: Material Management at Military Healthcare Facilities

Christopher Estridge, Air Force Institute of Technology, United States

Pamela Donovan, Air Force Institute of Technology, United States

Claudia Rebolledo, HEC Montreal,

Saturday, 1:30-3:00 Sessions

This research examined whether certain military healthcare facility characteristics could be used as determinants in setting materials management policies. Costs in military healthcare are as important as they are in the civil sector, which has led to an emphasis on materials management. The Air Force Medical Service uses a Days of Stock model with defaults set for operating level and safety levels based on source of supply. The current policies are relatively static with a one-size-fits-all approach. This study examined the total relevant costs of the (Q, s), (s, S), and stockless inventory policies available in the Medical-Surgical Prime Vendor contract at Air Force facilities located within the United States. Current and past acquisition data were analyzed to draw conclusions on the best cost minimizing inventory policy based on number of personnel, beds, relative value units, and dollar value of annual medical-surgical supply purchases.

011-0392: A PMS for Facility Services Supply Chain: A Case in the Healthcare Sector

Mattia Montagner, University of Udine, Italy

Alberto De Toni, University of Udine, Italy

Supply chain (SC) performance measurement is attracting the attention of practitioners and academic researchers. Many studies report the importance of measuring and managing SC performances to improve the understanding and cooperation among partners, to raise SC integration and finally to pursue SC excellence. But, whereas literature about SC performance measurement is rich in theoretical approaches, empirical research is still poor. The work aims to increase fieldwork on this topic. This paper results from a three-year case study within a SC of facility services in the healthcare sector. The proposed performance measurement system adopts a balanced approach for performance evaluation and uses different levels of measurement and accountability: strategic, tactical and operational. The model shares measures and results among customer, prime contractor and subcontracting companies of the considered SC and supporting partners in highlighting opportunities for services improvement, getting better collaboration and coordination along SC and defining Service Level Agreements.

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Saturday, May 2, 1:30-3:00 Room: EC-F
Session: Quantitative Modeling

Track: BNCH, 5

Chair: Randall Napier

011-0566: Performance Evaluation of the Main Terminal Containers in the Iberian Seaports: A Benchmarking Approach

Susana Azevedo, University of Beira Interior, Portugal

João Ferreira, University of Beira Interior, Portugal

João Dias, Instituto Superior de Engenharia de Lisboa, Portugal

Sérgio Palma, Instituto Superior de Engenharia de Lisboa, Portugal

The efficiency of the operations of an intermodal terminal of containerised cargo has been a focus of analysis of many researchers. The most effective method to quantify the performance key indicators is DEA (Data Envelopment Analysis). Nowadays, this method used together with the Data Mining represents a more reliable diagnosis tool when comparing the ports' operational data. The present study applies this methodology to assess the ports' performance of the containerised cargo terminals in the Iberian seaports hinterland during 2007. The analysed performance indicators are fundamental to a detailed operational description of the studied ports and highlight the aspects that should be improved within the port management level. Taking into account that ports are global logistical networks junctions, the evaluation concerning the performance is essential in order to enable effective decision making with the goal of improving their efficiency, their productivity and, therefore, their competitiveness.

011-0124: When Supply Chain Collaboration Does Not Pay Off

Bo van der Rhee, Nyenrode Business University, Netherlands

Jack van der Veen, Nyenrode Business University, Netherlands

Venkataraman Venugopal, Nyenrode Business University, Netherlands

Reddy Vijayender, Nyenrode Business University, Netherlands

Over the last decade the issue of supply chain coordination has attracted a lot of attention. One of the fundamental observations is that when a supplier and a buyer work together in the two-firm supply chain, they can achieve higher profits and serve customers better, when compared to myopic optimization. However, this observation cannot be extended to n-echelon supply chains. This paper models a simple serial n-echelon supply chain facing stochastic demand. It is demonstrated that when pricing decisions are made in a Stackelberg fashion each firm would prefer other firms to collaborate rather than collaborating themselves. Even worse, when pricing decisions are made simultaneously, all firms have an incentive to set up additional business units in the supply chain over collaborating with existing links. We develop several profit allocation rules that do lead to the supply chain optimal solution by ensuring both coordination and win-win opportunities for all echelons.

011-0115: Cost Not to Solve: Quantitative Modeling for Supply Chain Performance Improvement

Randall Napier, University of Texas at Arlington, United States

Change management problems often impede supply chain improvement. This presentation stems from an ongoing action research project in a mid-market manufacturer of electronic components. Project objectives include supply chain performance improvement for the manufacturer, and insight into change management phenomena for the researcher. The presentation advocates a Cost Not to Solve analysis as a useful approach to support change management initiatives for supply chain performance improvement. The presentation also details a quantitative model that was developed to meet a need identified during the project. The subject company faced long and unpredictable lead times on critical materials. The company had responded by keeping excessive safety stock, but lacked a mechanism for quantifying the economic impact of the lead time problem. The model calculates the economic benefits of alternative scenarios in terms of reduced inventory levels and carrying costs, and can be used as process alternatives are identified and negotiated.

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Saturday, May 2, 1:30-3:00 Room: EC-G
Session: Customer Satisfaction and Segment

Track: MKTG, 7

Chair: Tim Kampen

Saturday, 1:30-3:00 Sessions

011-0037: Social Marketing for Self Care

Jannis Angelis, University of Warwick, United Kingdom

Claire Bourne, University of Warwick, United Kingdom

Amy Grove, The University of Warwick, United Kingdom

Mairi Macintyre, The University of Warwick, United Kingdom

This concept paper aims to move away from traditional social marketing methods for preventing "risky" behaviours and work towards a campaign for promotion of self-care. In conjunction with the right to good healthcare people are also responsible for their own health; a balance between health service control and personal responsibility without ethical compromise is required. We will apply aspects of current commercial and social marketing concepts and campaigns to create a new conceptual theory for self-care marketing. The effectiveness of social marketing to deliver patient centered health care will be evaluated. In addition to incorporating marketing concepts the research will cover theories from Health Psychology and Operations Management. We will tackle matters such as immediate/long-term public gain, stakeholders required for sustainable self-care, services for the worried well versus the hard-to-reach and how the campaign would affect current community service delivery.

011-0081: A Real Time Customer Satisfaction Measurement: The Case of the B2B Printed Wiring Boards Industry

Adam Maamoun, BAE-Manufacturing Technology Incorporation, United States

Ahmad Rahal, University of Arkansas-Fort Smith, United States

Accepting its considerable value to customer retention and loyalty, marketing and customer behavior researchers are still heavily relying on surveys to determine and understand the state of customer satisfaction. Contrary to this belief, this research methodology is a lagging indicator to customer satisfaction, as customers would have already formed an opinion about their satisfaction or lack thereof with the rendered product or service, and may not allow the sponsoring supplier the chance or the opportunity to implement any corrective actions. This research proposes the use of surrogate data to develop a customer satisfaction leading indicator capable of signaling in real time probable shifts in customer satisfaction. By alerting the sponsoring organizations to such occurrences, quick responsiveness to quality gaps for performance improvement is possible, as well as the implementation of customer driven initiatives or corrective actions for the enhancement of customer satisfaction and retention.

011-0087: Are Tech Savvy Users More Likely to Use Technology? A Study of Service Design Planning in Online Financial Services

Yang Huang, University of Houston, United States

Rohit Verma, Cornell University, United States

Xin Ding, University of Houston, United States

This study presents an analysis of the service design planning model in the context of online financial services. Utilizing data from surveys of over 600 customers of fourteen different service providers, the model investigates how customer needs can be better linked with the service design process, meanwhile meeting the strategic intention of the organization. Specifically, we examine how individual technology beliefs affect the perception of service delivery systems, which further influence customers' actual flow experience and their further behavioral intentions. The results reveal that the revised service design planning model can help service providers to target their customer segments with customized service and product offerings. Our empirical results also clarify the important antecedents and consequence of experience clues and flow experience in online financial services and support the viability of using a dual-layer experience construct to investigate behavioral intention.

011-0361: Classification of Customer Demand Patterns in Production and Inventory Management

Tim J. Kampen, University of Groningen, Netherlands

Renzo Akkerman, Technical University of Denmark, Denmark

Dirk Pieter Donk, University of Groningen, Netherlands

Companies struggle with the question of how to control their production and inventory systems, especially when their products have different demand characteristics. In real-life situations it is mostly seen as advantageous if a (limited) number of product classes can be distinguished based on their demand characteristics. A well-known approach is the "ABC-analysis" which classifies product groups based on turnover. Other approaches combine demand characteristics, such as volume, variability, unit cost, dollar value and criticality. There seem to be many studies that use different approaches but there is no systematic analysis of what methods are available, which characteristics are used, and under which circumstances they are useful.

This paper contributes by developing a framework for demand classification that builds on demand characteristics, and shows which techniques are used in the literature to classify demand. Further, we show case examples to illustrate these demand classification approaches and their usefulness under different circumstances.

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Saturday, May 2, 1:30-3:00 **Room:** EC-H
Session: Supply Chain and Sustainability

Track: QUAL, 7

Chair: Xiang Wan

011-0008: Performance Improvement at a Color Sample Manufacturing Industry: A Case Study

Bimal Nepal, Texas A & M University, USA

Bharatendra Rai, University of Massachusetts- Dartmouth, USA

Tally gallons estimation is one of the most critical operations in color sample manufacturing. It involves an estimation of paint volume to cover a given surface area of paper. Ideally, this quantity should be enough to cover a target surface area regardless of color appearance. However, the as-is process is rudimentary and largely depends upon the human experience. Currently, for the same surface area, lighter colors run out in the middle of the production run while darker color appearances have significant amount of left over paint. The amount of leftover waste is as high as 15% (by volume) in some cases. The objective this paper is to present a predictive model to better estimate the tally gallons by minimizing the waste due to leftover paint. It presents a case study of an American color sample manufacturing company. The results show that the proposed regression approach reduces the leftover paint significantly.

Saturday, 1:30-3:00 Sessions

011-0070: Contracting Quality Management along the Supply Chain

Xiang Wan, University of Maryland, United States

Yan Dong, University of Maryland, United States

Kefeng Xu, University of Texas at San Antonio, United States

Managing product quality in a supply chain has become more challenging with the increasing trend of globalization and outsourcing across manufacturing sectors. The main issues are focused on aligning supply chain incentives to preempt potential quality problems before they happen and to resolve such problems afterwards. Supply chain members may choose to invest in quality control processes, quality inspection technologies, and reorganizing their relationships, but the effectiveness and efficiency of these options are unclear. This research establishes an incentive contracting framework of multi-level supply chains to study firm behavior and decisions regarding product quality. We specifically investigate contracting alternatives, supply chain relationship structures, and the effect of quality inspection at various levels of the supply chain. The results indicate that while solutions to supply chain quality problems can be complicated, firms can improve product quality by making right choices in where quality inspection is done, and what contracting structure is established.

011-0619: The Theory and Practice of Sustainable Reporting: Corporate Reporting Applications

Petros Christofi, Duquesne University, United States

Seleshi Sisaye, Duquesne University, United States

Andreas Christofi, Monmouth University, United States

Social and environmental responsibility reporting have become a fact of normal operating activities for publicly traded companies. While regulatory oversight keeps growing and expanding to "green" considerations, corporations are prepared to respond to this type of reporting to sustain their normal business operations. This paper will identify companies that have been proactive in these measures and show how they are currently practicing sustainability reporting.

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Saturday, May 2, 1:30-3:00 Room: EC-D
Session: Warehouse operations

Track: FCLT, 2

Chair: Ananth Krishnamurthy

011-0285: Organizing Warehouse Management

René De Koster, Rotterdam School of Management, Erasmus University, Netherlands

Ale Smidts, Rotterdam School of Management, Erasmus University, Netherlands

Nynke Faber, Royal Military Academy, Netherlands

We study the organization of warehouse management, as determined by task complexity (internally oriented) and market dynamics (externally oriented). We define and operationalize warehouse management by its process planning and control structure and by the complexity of decision rules used. We develop hypotheses relating the drivers to warehouse management. To test our hypotheses, we survey 215 warehouses with different supply chain functions (production and distribution warehouses) and outsourcing relations. We find support for our hypotheses that task complexity and market dynamics are main drivers of warehouse management, measured by Planning Extensiveness, Control Sophistication and Decision Rules Complexity. When analyzing warehouses based on outsourcing relations and supply chain position, we find production warehouses to exhibit low task complexity, little market dynamics, and using generic information systems, in contrast to distribution warehouses. Our findings may serve as a first step in aiding managers to decide on proper software for their warehouse operations.

011-0282: Empty Space Management in Warehouses

Yugang Yu, Rotterdam School of Management, Erasmus University, Netherlands

René De Koster, Rotterdam School of Management, Erasmus University, Netherlands

Warehouses need sufficient open locations to be able to store incoming loads. After some time of operation open locations spread over the storage area. Unfavorable positions of open locations negatively impact the average load retrieval times. We present a new method to manage these open locations such that the average system travel time for processing storage and retrieval jobs in an automated warehousing system is minimized. We introduce the effective storage area (ESA), a well-defined part of the locations closest to the depot; where only a part of the open locations –the effective open locations- together with all the products, are stored. We determine the optimal number of effective open locations and the ESA boundary. Using this policy, the travel time of a pair of storage and retrieval jobs can be reduced by more than 10% on average. Its performance depends hardly on the number or the sequence of retrievals.

011-0318: Managing Warehouse Efficiency and Worker Discomfort Through Enhanced Storage Assignment Decisions

Jose Antonio Larco, Erasmus University Rotterdam, Netherlands

M.B.M. De Koster, Erasmus University Rotterdam, Netherlands

Kees Jan Roodbergen, Erasmus University Rotterdam, Netherlands

Jan Dul, Erasmus University Rotterdam, Netherlands

Both in practice and academics, there is a tendency not to take human factors into account when searching for new ways to optimize warehouse operations. However, humans are often at the heart of crucial processes such as order picking. Besides the common economic goal of minimizing cycle time, we therefore also consider the human well-being goal of minimizing workers' discomfort in this paper. Our approach is data driven, since little of the needed information is readily available. We first build empirical models for estimating cycle times and discomfort in order picking operations. These empirical models are then used to formulate a bi-objective assignment model for product to storage location assignments. The results and subsequent trade-off analysis show moderate trade-offs and considerable alignment between both goals. We also provide practical recommendations based on these results for storage assignment decisions.

011-0797: Effect of Cross-Aisles and Zoning on the Performance of an Autonomous Vehicle-based Storage and Retrieval System

Saturday, 1:30-3:00 Sessions

Ananth Krishnamurthy, *University of Wisconsin-Madison, United States*

Debjit Roy, *University of Wisconsin-Madison, United States*

Autonomous Vehicle-based Storage and Retrieval (AVSR) systems are an alternative to crane-based automated storage and retrieval systems. Design decisions such as the location of cross aisles and allocation of resources to zones could have significant impact on the performance of AVSR systems. In this research, we investigate the effect of the location of the cross-aisle and the number of zones on the average cycle time to process transactions. We model the system as a multi-class semi-open queuing network model with class switching and develop a decomposition approach to evaluate system performance and obtain design insights. We validate the models using detailed simulations.

011-0308: A Comparative Study of the Development and Application of the Automated Guided Vehicle Systems in Global Supply Chains

Amy Zeng, *Worcester Polytechnic Institute, United States*

Lindu Zhao, *Southeast University, China*

The efficiency of transportation plays a valuable role in achieving the overall competitiveness of global supply chains. The automated guided vehicle systems (AGVS) are exemplary tools for providing such transportation efficiency, as they are widely applied in many points of a supply chain, which may range from assembly lines to warehouses. This research reviews and compares the developments and applications of AGVS in the US, Europe and China respectively, investigates the possible impacts of recent new technologies on AGVS, identifies the worldwide best practices, and suggests future trend and research directions from a global perspective.

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Saturday, May 2, 1:30-3:00 **Room:** Senate
Session: OM during Economic Downturns

Track: GENL, 6

Chair: Marko Johnson

011-0026: Use of Information Technologies in Retail Operation: Opportunities and Challenges

Ying Xie, *University of Greenwich, United Kingdom*

The innovation in Information Technologies (IT) and their uses in the retail operation increase the efficiency of the whole system itself. RFID, Auto-ID, Web based POS, and various data mining technologies enable retailers to radically change the way they do business within the retail supply chain and achieve increased supply chain efficiency in terms of labour cost reduction, inventory accuracy improvement, lead time reduction, and order fill rate increment. The paper aims to offer an outline of the characteristics of these technologies and identify the opportunities for adopting these technologies in helping retail sectors to improve supply chain efficiency and customer relationship as a result of refined operation systems. A deductive approach is adopted in the paper; literature is reviewed to develop an outline of characteristics and a structured survey is conducted to identify opportunities and challenges.

011-0060: Mobile Inventory: An Analysis of a Materials Supply Model at Ericsson Corporation

Stefan Eriksson, *University of Gävle, Sweden*

The study analyzes the telecom company Ericsson's supply/replenishment model, called Mobile Inventory (as named by the author). The study is focused from the customer's point of view. The concept means that specially designed carts (the size of a big refrigerator) with electronic components required for production circulate between a third-party logistics provider (3PLP) and Ericsson. The carts are transported by trucks and rolled out close to the assembly line at Ericsson, where they work as production storage sites. The supply model, which works without a traditional purchase ordering process, could be an uncomplicated materials planning method for manufacturing companies to manage some of their products with small resources and a high level of customer service. The intended contribution to academia of this study is to increase the knowledge of an alternative approach for materials supply, which could be applied to manufacturing companies other than Ericsson.

011-0176: Material Planning under Theory of Constraints

Davood Golmohammadi, *University of Massachusetts Boston, United States*

Mahdi Ghazanfari, *Iran University of Science Technology*,

This paper concerns the implementation of theory of constraints (TOC) rules for large-scale firms. Since most of the literature research has applied TOC concepts and rules for very simple process flow, realistic application with the nature of complexity of job shop systems is an interesting issue. Applying TOC concepts and its general rules for material planning in a real and complicated job shop system is investigated here. In this research, a production line of an auto parts manufacturer has been studied based on TOC and four new executive rules by using a simulation tool are developed. These rules are based on investigation of several simulation models.

011-0431: Managing a Secret Project

Edieal Pinker, *Yale University, United States*

Vera Tilson, *University of Rochester, United States*

Joseph Szmerekovsky, *North Dakota State University, United States*

In traditional project planning the objective is to complete the project as quickly as possible given a resource budget. In both commercial and military domains, there are situations in which the element of surprise can be essential to a project's success. Surprise hampers the ability of one's adversaries/competitors to react to one's actions. To attain the element of surprise at least some aspects of the project must be kept secret. In such a setting, the project manager's objective changes. He must manage the project so as to minimize the time the adversaries/competitors have to react to the project. In this talk we describe an optimization model for secret project management and illustrate its implications using the example of a clandestine nuclear weapons development program.

011-0667: From Boom to Bust: Investigating Changes in Firms' Operations Strategy in Times of Recession

Mark Johnson, *Cranfield School of Management, United Kingdom*

Christos Tsinopoulos, *Durham University Business School, United Kingdom*

Saturday, 1:30-3:00 Sessions

The current financial crisis is well documented in the popular press and with consumer confidence low, manufacturing firms are seeing a vast decrease in sales and orders. These phenomena impact most firms, including industry bellwethers like Toyota, and often lead them to change their corporate strategy. Research in strategy has indicated that overall performance is increased when corporate and operations strategy is aligned. When external conditions change, such as a recession, corporate strategy is changed in an attempt to improve financial performance. It is therefore reasonable to expect that operations strategy will also change to be aligned with the new corporate strategy and improve performance. Our research uses qualitative and quantitative data to investigate how firms change their operations strategy in times of recession. We suggest that in times of recession firms move away from a focus on profit to that of survival.

Saturday, 3:30-5:00 Sessions

127	Saturday, May 2, 3:30-5:00 Room: Cloister North Session: Service Resource Management	Track: SRVC, 7	Chair: Rogelio Oliva
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011-0737: Staffing Methods in Operation and Production

Claude Machline, Escola de Administração de Empresas da Fundação Getulio Vargas, Brazil

The paper describes five methods used by operation managers to dimension the staff required for an operation, either in manufacture or in service: work measurement; legal or unions standards and byrules; benchmarking, the best practices; previous experience; heuristics, rules of thumb. A survey conducted by personal interviews with fifty executives of various economic segments showed that these five methods are equally used by the operation managers, with relative success, in spite of the many factors and constraints which influence the staffing decision.

011-0808: The Effect of Incentives on Employee Scheduling

John Goodale, University of Oregon, United States

We study the effects of agent productivity and control on the performance of employee schedules in front-line service environments. We introduce an economic model for employee scheduling that incorporates these effects and that is effective in allocating service capacity. Insights into the scheduling issues in this environment are provided.

011-0759: Managing Individual Learning Curves in High-Contact Services

Rogelio Oliva, Mays Business School, Texas A&M University, United States

Learning-by-doing is well documented in a range of industries, including service-delivery organizations. In professional service settings, however, knowledge has proven difficult to capture and transfer and employees have to rely on their own expertise to complete the engagement. Furthermore, because of the high degree of customization, engagements are slightly different from each other, making the notion of cumulative production, the traditional way to capture learning curves, difficult to track. The fact that learning in high-contact services is being embodied as human capital in individual workers and is a function of the employees' unique accumulation of experience, has created new set of managerial challenges. In this work I propose a model to capture individual learning curves, and use it to assess the return of initiatives to accelerate the learning curve, improve the selection process or employee retention, and estimate maximum, optimal and sustainable growth rates.

011-0731: Service Supply Chains - Selecting Service Providers to Manage Demand Shift with a Flexible Labor Pool

Roger Solano, Missouri University of Science and Technology, United States

Sanchoy Das, New Jersey Institute of Technology, United States

A Service Supply Chain (SSC) may be described as a network of service provider facilities, each of which is able to process one or more service tasks on an as-needed basis. SSCs are increasingly being developed by companies that experience a high variability of demand for their services. The primary advantage of a SSC, relative to a traditional dedicated facility, is that the processing capacity (labor) can be economically adjusted (lower hiring and firing costs) to match changes in the current demand level. In SCC a strategic problem is which candidate service providers are selected to form the SSC network, and how the service tasks are assigned within the provider network. The problem is formulated and solved as a binary program. A method to quantify cumulative demand variation per seasonal cycle is presented to derive aggregate demand parameters from the forecast.

128	Saturday, May 2, 3:30-5:00 Room: Cloister South Session: Collaboration	Track: SCM, 8	Chair: Sarah Wu
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011-0815: The Moderating Role of Absorptive Capacity and Collaborative Communication in a Buyer-Supplier Learning Collaboration

Zach Zacharia, Lehigh University, United States

Nancy Nix, Texas Christian University, United States

Robert Lusch, University of Arizona, United States

Buyers and Suppliers collaborate for many reasons such as to pool skills and knowledge, to take advantage of a unique opportunity, to solve a complex problem or to access and deploy resources and capabilities not found in their own firms. However one ancillary benefit of collaboration is the learning that takes place between the firms throughout the collaboration. Two factors that specifically moderate the learning or knowledge gained in a collaboration are the absorptive capacity of the firm, and the collaborative communication between the firms. A research study of 285 collaborations between buyers and their suppliers found the relationship between high levels of collaboration and knowledge gained was moderated by the absorptive capacity of the buying firm and collaborative communication between the firms.

011-0894: A Lean Approach to the SC Operations in the Japanese Housing construction: From the Architect's Design Office to the Construction

Lumbidi Kupanhy, Wakayama University, Japan

Nsenda Lukumuena, Kwansai Gakuin University/ Jun Setomoto & Aｒchitects, Japan

Eustache Ebondo Wa Manzila, Euromed Ecole de Management, France

The house building operations seem not to attract enough attention from the academic world despite their importance to our lives and to any national economy, in addition to the fact that these are amongst the oldest production operations being performed throughout the entire existence of mankind. We contend that there is a lot to learn from house building operations in terms of customer focus and operations coordination between SC stages. Furthermore, these operations might profit from the inputs of modern SCM theories. The customer is an integral part of any SC. The core functions in the value creation for the customer include design and production. In the housing industry, these core functions usually work each as a stand-alone company making up altogether a SC that this study will analyze in the light of modern lean SCM concepts, to shed the light on their unnoticed affordance, strengths and weaknesses.

011-0191: The Impact of Holdup Problems in Early Supplier Involvement on New Product Development Performance

Sarah Wu, Fordham University, United States

Worawat Margsiri, Fordham University, United States

While early supplier involvement has been adopted in many industries to facilitate product innovation, its impact on new product development performance is mixed. This study examines the dynamic relationship between the manufacturer and the supplier using cooperative investment framework. Due to the nature of the investment, post-contract holdup can lead to a longer development lead time and a reduced probability of radical innovation. It is shown that competition among suppliers reduces holdup problems but lowers their effort to collaborate. The study has policy implications on the manufacturer's optimal commitment strategies and the best timing to involve the supplier in the project. It also offers testable hypotheses for future research.

011-0634: The Effect of Supply Chain Integration on Supplier Switching Cost, Quality, and Fashion Turnover

Arash Azadegan, New Mexico State University, United States

Mahour Mellat Parast, University of North Carolina-Pembroke, United States

The purpose of this study is to address the effect of firm integration (across the supply chain) on cost, quality, and fashion turnover. Data has been gathered from 244 firms in the Egyptian garment industry. The findings suggest that garment quality is significantly correlated with cost and fashion turnover, indicating that higher quality is achieved at the expense of increasing transactions cost and social switching cost. In addition, there is significant correlation between fashion turnover and social switching cost (before and after integration), referring to the fact that as fashion turnover increases social switching cost increases. Neither quality nor fashion turnover appears to be a significant predictor of profitability.

129	Saturday, May 2, 3:30-5:00 Room: Captain Session: International SC	Track: SCM, 22	Chair: Tomi Solakivi
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011-0538: Finland State of Logistics 2008

Tomi Solakivi, Turku School of Economics, Finland

Lauri Ojala, Turku School of Economics, Finland

Juuso Töyli, Turku School of Economics, Finland

Harri Lorentz, Turku School of Economics, Finland

Hanne-Mari Hälinen, Turku School of Economics, Finland

Tapio Naula, Turku School of Economics, Finland

The 5th national logistics survey in Finland assesses the level of logistics in manufacturing, wholesale and retail and logistics firms through logistics costs, logistics performance indicators, competence, development needs, outsourcing and operating preconditions in Finland. The survey was executed in October-December 2008 and received a total number of 2705 responses from Finnish manufacturing and trading companies, as well as logistics service providers. The key areas of interest are the development of logistics costs, performance indicators and logistics outsourcing in Finland since the previous national survey in 2005, as well as the views on the future logistics development needs and the largest threats to business the Finnish companies are facing in the near future. Differences among industries, company sizes and regions within the country, as well as comparisons with international reference data are presented.

011-0541: State of Logistics in the Baltic Sea Region: Survey Results from Eight Countries

Lauri Ojala, Turku School of Economics, Finland

Tomi Solakivi, Turku School of Economics, Finland

Hanne-Mari Hälinen, Turku School of Economics, Finland

Harri Lorentz, Turku School of Economics, Finland

Torsten M. Hoffmann, Turku School of Economics, Finland

This international survey assesses the level of logistics in manufacturing, wholesale and retail and logistics firms through logistics costs, logistics performance indicators, competence, development needs, outsourcing and choice of location in the countries around the Baltic Sea Region. The survey was executed during the year 2006 in Estonia, Finland, Germany (Hamburg and Mecklenburg-Vorpommern), Latvia, Lithuania, Poland, Sweden, and NW Russia (St. Petersburg) and the analysis was performed during 2007 and 2008. A key area of interest is the cross-regional comparison of the main variables (logistics costs, performance indicators, competence, development needs, outsourcing). Also the logistics efficiency, infrastructure and other operating conditions in different parts of the Baltic Sea region are discussed.

011-0578: Collaborative Mechanisms and Integration Capabilities: The Strategic Role of the Purchasing Function

Angel Diaz, Instituto de Empresa Business School, Spain

Elena Revilla, Instituto de Empresa Business School, Spain

This paper develops a typology of supply chains based on two collaborative mechanisms: joint decision making and strategic cooperation. It also analyzes how these mechanisms are associated with operational and managerial logistic practices. The research methodology uses a two-step approach: a cluster analysis is used to categorize supply chain integration capability according to joint operational and to strategic cooperation; then variances in logistic practices (operative versus managerial) are analyzed. The proposed hypotheses are empirically tested through the analysis of 133 Spanish supply chains, and valid and reliable measures for each variable are developed. Preliminary results suggest that supply chains with higher capabilities of integration at the strategic and operational levels are those for which purchasing is considered a strategic function and is supported by other identified logistic practices. This result supports the growing practitioner and academic literature that emphasizes the critical role of the purchasing function.

Saturday, 3:30-5:00 Sessions

011-0624: Building Winning Supply Chains

Claire Navarra, Public Research Centre Henri Tudor, Luxembourg

Riad Aggoune, Public Research Centre Henri Tudor, Luxembourg

Supply Chain Management is an important source of competitive edge for hard industry and services companies. It is an efficient trust-based long term partnering of geographically and legally separated organizations, always fostering win-win relationships. It is as well the synchronization of materials, information and financial flows. This paper presents the latest results of an ongoing study performed within companies and administrations in Luxembourg and the Great Region. The aim of this study is to identify the main and common problems regarding supply chain management practices. A dual objective is to show what problems are specific to the different activity sectors. Working groups involving key management persons were thus formed in each company, in order to discuss the problems they were encountering inside the company as well as with other links of their supply chains. These diagnoses allowed highlighting that most companies were not maintaining trust-based relationships with their respective partners.

130	Saturday, May 2, 3:30-5:00 Room: Yeoman Session: College of SCM Student Paper Award Finalists	Track: SCM, 34	Chair: Saif Benjaafar
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011-0011: College of SCM Student Paper Award Finalists

Saif Benjaafar, ,

131	Saturday, May 2, 3:30-5:00 Room: Scribe Session: Empirical Research 3	Track: SUST, 12	Chair: Matthias Vodicka
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011-0921: The Effect of Inspection Technologies on Investing in Product Remanufacturing of End of Use Products of Uncertain Quality

Andreas Robotis, HEC Paris-OMIT Dept., France

Tamer Boyaci, McGill University, Canada

Vedat Verter, McGill University, Canada

Uncertainty in the quality condition of EOU (End Of Use) products has been identified by academics and practitioners as an obstacle for firms to invest in and undertake closed loop operations. In this paper, we consider the effects of uncertainty in the quality condition of EOU products for a firm who invests in (a) increasing the remanufacturability (reusability) level of a product and (b) in collecting and remanufacturing EOU products. We consider a 2-period setting where in Period 1 the firm makes investment decisions, while in Period 2 the firm collects, remanufactures and sells EOU products in addition to selling new ones. Taking into account cannibalization effects between new and remanufactured products, we show that the effect of uncertainty in the quality condition of EOU products to these investments is not detrimental but it depends on the inspection capabilities and technologies at the firm's disposal.

011-0203: Adoption of Profitable Energy Efficiency Related Process Improvements in Small and Medium Sized Enterprises

Suresh Muthulingam, UCLA Anderson School of Management, United States

Charles Corbett, UCLA Anderson School of Management, United States

Shlomo Benartzi, UCLA Anderson School of Management, United States

Bohdan Oppenheim, Loyola Marymount University, United States

We study the adoption of energy efficiency initiatives using a database of over 100,000 recommendations provided to more than 13,000 small and medium sized manufacturing firms. The recommendations run the entire gamut of operational improvements. Even though the average payback across all recommendations is just over one year, many of these profitable opportunities are not implemented. Using a probit instrumental variable model we find evidence of four biases in the adoption of these recommendations. First, managers are myopic as they miss out on many profitable opportunities. Second, managers are more influenced by upfront costs than by net benefits. Third, adoption of a recommendation depends not only on its characteristics but also on the sequence in which the recommendations are presented. Adoption rates are higher for those initiatives appearing early on in a list of recommendations. Finally, adoption is not influenced by the number of options provided to decision makers.

011-0778: Green Purchasing: Comparing Producer and Purchaser Perspectives

Shane Schvaneveldt, Weber State University, United States

For companies seeking to green their supply chain, green purchasing is an essential area of activity. Green purchasing depends on both the availability of environmentally preferable products from producers as well as the willingness of purchasers to incorporate environmental considerations into their purchasing decisions. However, do producers and purchasers share common perspectives regarding green products and their evaluation? This paper will explore such issues through a comparative analysis of survey data from producers and institutional purchasers in three product categories. Specific issues addressed include: perceived importance and reported use of information sources on the environmental performance of products; perceived importance and reported consideration of various environmental attributes of products; and reported concerns and issues in the implementation of green purchasing in organizations.

011-0460: Energy Efficient Manufacturing as Driver of Competitiveness - Consolidation of Literature Review and Interviews with Manufacturing Industry

Matthias Vodicka, ETH Zurich - Center for Enterprise Sciences (BWI), Switzerland

Oliver Schneider, ETH Zurich - Center for Enterprise Sciences (BWI), Switzerland

Saturday, 3:30-5:00 Sessions

Worldwide, policy makers strive for sustainable development by imposing obligations. Manufacturing companies are challenged by the seemingly opposing goals of operating both competitively and environmentally friendly. The area of energy efficient manufacturing holds the opportunity to facilitate both. In order to prepare a basis for future research in energy efficient manufacturing, a review of the state-of-the-art has to be undertaken. One aspect is the mapping of past research activities in this field. The aim of this paper is to provide a picture of activities related to manufacturing industry and an overview over the drivers and barriers for energy efficiency improvements. With this, the basis for the current project IMS2020 can be complemented, supporting the goal to establish a roadmap for future research activities within manufacturing. A qualitative analysis and content analysis of papers found is conducted. Results prove the topic to be timely and important also in the future.

011-0228: Value Recovery in the Built Environment: A Supply Chain Perspective

Gregory Graman, Michigan Technological University, United States

The demolition of buildings that have reached their end-of-useful life can place enormous burdens on landfills and contain environmentally hazardous materials. This work-in-process describes the development of a foundation paper on how supply chain management concepts help to better understand the business issues that affect recovering value from buildings using a deconstruction approach instead of traditional demolition. Information to date on the topic was obtained from conference presentations and proceedings, practitioner publications, as well as academic journals. Several questions are raised that will lead to establishing hypotheses and propositions for empirical research to be undertaken to better understand the business process related to recovering value from buildings.

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Saturday, May 2, 3:30-5:00 **Room:** Knave
Session: Perioperative Operational Decision Making

Track: HLTH, 8

Chair: Franklin Dexter

011-0345: Predicting Anesthesia Workload for a Multi-Specialty Group Practice: Classifying Referral Patterns Using Mixed Effects Modeling

Liam O'Neill, University of North Texas, United States

Ruth Wachtel, University of Iowa, United States

Franklin Dexter, University of Iowa, United States

We use data from an ambulatory surgery center to determine the main sources of patient referrals. We test the hypothesis that primary care clinics generate a significant share of ASC referrals. High-volume outpatient procedures are examined, such as cataracts, myringotomy, and corneal transplants. For many procedures, the median number of visits was found to be small (e.g., 2), whereas the median waiting times were nearly three months. Mixed-effects models were used to predict the duration of the patient's first visit with the surgeon based on patient characteristics. Results were found to be robust regardless of whether workload was defined as surgical cases or as a percentage of ASA-RVG units. The primary care visit was found to be an unimportant source of ASC referrals. The pattern of long waits and few visits was insensitive to the patient's relative distance from the hospital. Our results have important implications for identifying bottlenecks to surgical workflow.

011-0346: Biting the Bullet: Investing in a New Health Information System (HIS)

Vera Tilson, Simon School of Business, University of Rochester, United States

David Tilson, Simon School of Business, University of Rochester, United States

As regulations, best clinical practices, patient service expectations, and workflows evolve additional "fixes" to the legacy HIS systems become increasingly awkward both in terms of IT implementation and in terms of workflows. What factors should a hospital consider in deciding to "bite the bullet" and invest in a new HIS? What benefits and costs are conferred on different stakeholders by the introduction of a new HIS system? We draw on the literature of cost-benefit analysis of HIS and the wider Information Systems literature to present decision-making frameworks, and discuss the factors and the measurements that have been identified as important decision drivers behind these major investments.

011-0347: Reducing Tardiness from Scheduled Start Times by Making Adjustments to the Operating Room Schedule

Franklin Dexter, University of Iowa, Department of Anesthesia, United States

Ruth Wachtel, Department of Anesthesia, University of Iowa, United States

Data from two surgical suites were used to compare the effectiveness of several interventions to reduce tardiness from scheduled start times. Moving cases when rooms were running late reduced tardiness 50-70% for those cases that were moved. However, overall tardiness in each suite was reduced by only 6-9%, because few cases were moved. Scheduling a gap between surgeons if the day was expected to end early reduced tardiness by more than 50% for those cases that were preceded by gaps. However, overall tardiness in each suite was reduced by only 4-8%, because few gaps could be scheduled. In contrast, correcting for the combination of lateness in first cases of the day and service-specific case duration bias reduced overall tardiness in each suite by 30-35%. The latter intervention does not change the official schedule or case sequencing and does not depend on changing surgeon, anesthesia provider, or nursing behavior.

011-0372: A Simulation Model for Determining the Optimal Size of Emergency Teams on Call in the Operating Room at Night

Markus Klimek, Erasmus University Medical Center, Netherlands

Gerhard Wullink, Erasmus University Medical Center, Netherlands

Ewout Steyerberg, Erasmus University Medical Center, Netherlands

Geert Kazemier, Erasmus University Medical Center, Netherlands

Erwin Hans, University of Twente, Center for Healthcare Operations Improvement and Research, Netherlands

Jeroen van Oostrum, Erasmus University Medical Center, Netherlands

Mark Houdenhoven, Erasmus University Medical Center, Netherlands

Manon Vrieling, Erasmus Medical Center, Netherlands

Saturday, 3:30-5:00 Sessions

Jan Klein, Erasmus University Medical Center, Netherlands

Hospitals that perform emergency surgery during the night face decisions on optimal operating room staffing. Emergency patients need to be operated on within a predefined safety window to decrease morbidity and improve their chances of full recovery. We develop a process to determine the optimal OR team composition during the night, such that staffing costs are minimized, while providing adequate resources to start surgery within the safety interval. We applied a discrete event simulation in combination with modeling of safety intervals. We tested the model using data from the main operating rooms of Erasmus University Medical Center. Our case study shows that by modeling safety intervals and applying computer simulation, an operating room can reduce its staff on call without jeopardizing patient safety.

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Saturday, May 2, 3:30-5:00 **Room:** EC-D1
Session: Outsourcing, Offshoring, & Emerging Markets

Track: EMPR, 9

Chair: Sriram Narayanan

011-0426: The Diffusion of Standardised Quality Management in the Hotel Industry in Spain

Marti Casadesus, UNIVERSIDAD DE GIRONA, Spain

Frederic Marimon, Universitat Internacional de Catalunya, Spain

Maria del mar Alonso-Almeida, UNIVERSIDAD AUTONOMA DE MADRID, Spain

The implementation of quality management systems (QMSs) has become common in the tourism industry. A forerunner in this development has been the Spanish tourist sector, in which 17 specific quality-management standards have been developed over several years in various tourist sub-sectors, including hotels, rural accommodations, restaurants, spas, and travel agencies. The present study, which is exploratory in nature, analyses the diffusion of hotel standards using a model that has been well-tested in the specialised literature. The study concludes that the standardisation of quality management in hotels will increase in coming years. The worldwide diffusion of international standards in many service sectors and the findings of the present study with respect to the increasing implementation of the Spanish standards provide an indication of what is likely to happen in the service sector as a whole in most countries.

011-0722: Outsourcing in High Technology Industries

Sriram Narayanan, Michigan State University, United States

Nandini Lahiri, University of North Carolina at Chapel Hill, United States

In this paper, we examine the role of outsourcing on innovation and firm performance in the semiconductor industry. We investigate the role of vertical scope in its influence on the impact of outsourcing on firm innovation and firm performance. Using panel data on 282 publicly listed firms over a thirteen year period, our results imply that in industries where innovation is critical for competitiveness, outsourcing may be a mixed blessing. Our results indicate that while outsourcing has an inverted U and positive impact on innovation and firm performance respectively, the presence of vertical integration dampens the effect of outsourcing on innovation while enhancing its effect on firm performance. Our findings have implications for both theory and practice.

011-0287: Revisiting the Theory of Competitive Progression: Extensions and Cross-Validations in Emerging Markets

Tobias Schoenherr, Michigan State University, United States

Damien Power, The University of Melbourne, Australia

Danny Samson, The University of Melbourne, Australia

This study revisits and extends Rosenzweig and Roth's Competitive Progression Theory (CPT). The CPT suggests that the four basic manufacturing capabilities of quality, delivery, flexibility, and cost, are acquired both cumulatively and in that sequence. The present research validates this theory of competitive progression and confirms its applicability in emerging and developing markets. Evidence is also found to support the associated concept of firms being constrained in their development of competitive capability by the natural limits of their performance frontiers. As a result, the implication is drawn that ongoing competitive progression needs to be supported by continuous investment in infrastructure that is supportive of specific operational capabilities.

011-0588: Comparative Evaluation of Efficiency across Distributed Project Organizations: A Stochastic Frontier Analysis

Anant Mishra, University of Minnesota, United States

Kingshuk Sinha, University of Minnesota, United States

Sriram Thirumalai, University of Utah, United States

Concerns about the efficiency of project execution, such as the execution of information technology and product development projects, have been exacerbated as projects are increasingly distributed across firm and geographical boundaries. The purpose of this study is to present an econometric approach to measure project efficiency and investigate its enablers and barriers. Using stochastic frontier analysis (SFA), we measure a specific form of project efficiency called technical efficiency, which is defined as the ability of a project (or any productive entity) to obtain maximal attainable outputs from a given set of inputs. A technical efficiency model that includes structural and infrastructural factors to explain the variation in technical efficiency across projects is specified and estimated. The empirical analysis is based on primary data collected from more than 700 information technology and product development projects. Projects from 26 industries and across 65 countries are represented in the study sample.

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Saturday, May 2, 3:30-5:00 **Room:** EC-B
Session: Business and Project Management Practices in New Product Innovation

Track: PITM, 7

Chair: Nitin Joglekar

011-0775: Does IPO Foster Profitability Rather than Innovation?

Moren Levesque, University of Waterloo, Canada

Nitin Joglekar, Boston University, United States

Saturday, 3:30-5:00 Sessions

We use the concept of growth equilibrium to derive prescriptions on the growth of new business enterprises, considering the law of motion of their revenues and R&D expenses. We use a sample of enterprises that went public between 1992 and 2002 to test these prescriptions 5 years after their respective initial public offering.

011-0630: Hedging New Product Development Contests

Saurabh Bansal, *University of Texas, United States*

Edward Anderson, *University of Texas, United States*

In this paper, we develop an analytic model of a firm that employs a contest for a component of a new product development effort. The firm, however, may hedge this contest with a simultaneous internal NPD effort to protect against the case in which the best solution of the contest is of insufficient quality. We characterize the situations under which such hedging will occur as well as the potential benefits to be realized from a hedging strategy.

011-0638: Current Practices in Videogame Project Management

Edward Anderson, *University of Texas, United States*

John MacDuffie, *Wharton School, United States*

Geoffrey Parker, *Tulane University, United States*

From qualitative data from structured interviews, we discuss current project management in the videogame industry. We focus on (1) the management of distributed innovation (outsourcing) in a creative environment, (2) the non-adoption of many software industry practices by the videogame industry, and (3) the complex interaction of modular design with virtual worlds.

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Saturday, May 2, 3:30-5:00 **Room:** EC-C
Session: Educational Approaches

Track: EDUC, 8

Chair: Marco Santoro

011-0952: MyOMLab: A New Online System for Giving Homework and Exams

Barry Render, *Rollins College, United States*

Jay Heizer, *Texas Lutheran University, United States*

Textbook authors Heizer and Render have developed a new approach to improving the learning process. Their MyOMLab software contains a large data base of algorithmically generated homework/exam problems that can be assigned for online work. Each student receives the same problem(s), but with different data, submits his/her answer within the time frame set by the instructor, and instantly receives a grade. Grades are directly entered into the instructor's spreadsheet grade book. If a student needs additional help, he or she may view a similar problem with a video solution worked out by Professors Render and Heizer. The presenters will provide an online demonstration of creating an assignment, and then complete the assignment from the student's perspective. We will be able to follow the whole process from start to grade book.

011-0252: Integrating a Multi-Disciplinary Program Using Concept Mapping

Dana Johnson, *Michigan Technological University, United States*

Leonard Bohmann, *Michigan Technological University, United States*

Kris Mattila, *Michigan Technological University, United States*

Amlan Mukherjee, *Michigan Technological University, United States*

Nilufer Onder, *Michigan Technological University, United States*

John Sutherland, *Michigan Technological University, United States*

Concept mapping allows for the integration of any curriculum. This technique was used in the design and development of eight new courses in Service Systems Engineering. Service System Engineering spans multiple disciplines within engineering, sciences, and business so the concept mapping was a particularly useful activity. Concept mapping identified purposeful overlaps, eliminated significant redundancy, and identified building blocks between courses. This also aided in ensuring programmatic objectives were achieved throughout the entire curriculum. The next step in the concept mapping process will be to look at all the other courses in the degree program and expand the concept map so that it is more comprehensive. This paper will outline the process, discuss resultant modifications to the curriculum, and provide a sample of the concept map.

011-0333: Impact of Service Learning Pedagogy on Perceived Value of Corporate Community Service

Gregory Frazier, *University of Texas at Arlington, United States*

Corporate community service (CCS) is defined as community service sponsored by a company in some way, such as allowing employees to volunteer in the community during work time, or paying the expenses related to community service. Service Learning is a pedagogy that incorporates community service as a tool to enhance learning about specific course topics. A company's level of involvement in CCS is determined in large part by the perceived value of CCS by the company's executives. Since many graduate business students will eventually become executives, and since one can better understand the value of an activity by being involved with it, the following research question is addressed by this study: does participation in Service Learning impact the perceived value of Corporate Community Service? Results are presented of a survey given to 46 graduate students before and after a Service Learning project.

011-0992: Green Education Innovation Process in Higher Education Context

Chih-Cheng Lin, *Nottingham University Business School, United Kingdom*

Zheng Ma, *University of Southern Denmark, Denmark*

J. Wey Chen, *Southern Taiwan University of Technology, Taiwan, Republic of China*

Saturday, 3:30-5:00 Sessions

E-learning perhaps is the hottest topic related to higher education in the current decade. Most of the e-learning vendors promoted their technology, but less attention was paid to the issues surrounding implementation or to the usage of e-learning by the end users. Included in a whole e-learning development strategy should be a detailed analysis and action plan to obtain a comprehensive overview of innovation processes: technological and services (product) innovations with their interaction. This paper tries to understand e-learning processes by providing double aspects of technological and service innovation individually, and maps the e-learning innovation processes in different aspects. A qualitative case study approach is chosen to establishing empirical evidence and describing the phenomenon of the e-learning innovation process in higher education. The series of detailed analyses indicates that technological and service (product) innovations are inseparable and show a strong link with each other.

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Saturday, May 2, 3:30-5:00 Room: Gallery

Track: BDOM, 3

Chair: Amy Grove

Session: Managing the human factor in lean production

011-0719: The Application of Lean to Complex Systems

Mairi Macintyre, University of Warwick, United Kingdom

Denise Conroy, The University of Auckland, New Zealand

Amy Grove, University of Warwick, United Kingdom

Claire Bourne, The University of Warwick, United Kingdom

Jannis Angelis, The University of Warwick, United Kingdom

The categorisation of systems is used to help explain how the success or failure of lean techniques can be predicted. The findings come from research undertaken in the UK's National Health Service and the New Zealand's Local Government.

011-0183: The Human Side of Lean Manufacturing Implementation in a Mid-Sized Manufacturer

Robert Prescott, Rollins College Crummer GSB, United States

Henrique Correa, Rollins College Crummer GSB, United States

Lean manufacturing is already in the bloodstream of large manufacturing firms. This is not necessarily true for small and medium-sized manufacturers, mainly those who are not part of supply chains that are at the forefront of innovative manufacturing and operations practices. Some of these manufacturers are only now starting to make the transition toward lean manufacturing. From the behavioral standpoint, sometimes, neither are they up to date on best practices nor are they proficient in people management. In this paper we try to analyze the behavioral and people management-related challenges for lean manufacturing implementation in American small and medium-sized manufacturers. We use one in-depth case study research and literature review to formulate a number of hypotheses to be tested at a later stage of our research.

011-0035: Leadership Skills at Different Levels within a Lean Organization

Foster Fei, ,

Desiree van Dunn, House of Performance, Netherlands

Pauline Found, University of Cardiff, United Kingdom

Research suggests senior management commitment is essential to a successful and sustainable transition to a lean enterprise but less focus has been given to the role of middle managers in the change. This paper represents two strands of connected research that explore the behaviours and competencies of highly effective leaders at different levels of the organization and identifies the skills they require to support and sustain a lean transition. The Cardiff University (UK) SUCCESS programme discovered that there are subtle differences in top management leadership skills required to facilitate successful change from those required to sustain the change. Further, research at the University of Twente (NL) concluded that middle managers in established lean organizations display higher levels of aptitude in certain skills from those in earlier stages of transformation. Hence, both top and middle management need to adopt double-loop learning in order to improve their leadership style through time to sustain lean.

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Saturday, May 2, 3:30-5:00 Room: EC-A

Track: INV, 1

Chair: Arnab Bisi

Session: Shipment errors and censored demands

011-0847: Inventory Planning under Shipment Errors

Vinayak Deshpande, Purdue University, United States

Leroy Schwarz, Purdue University, United States

The health-care supply chain consists of many similar, but not the same, products. As a result, a wrong product may be shipped. We analyze an inventory model for two products under shipment errors. The optimal inventory policy under shipment errors is established. We also show that increased uncertainty about supply may result in a decrease in safety stock.

011-0761: Integrated Contract and Market Procurement By A Risk Averse Buying Firm

Santosh Mahapatra, Clarkson University, United States

Arnab Bisi, Purdue University, United States

Ram Narasimhan, Michigan State University, United States

Shlomo Levental, Michigan State University, United States

Saturday, 3:30-5:00 Sessions

We study the issue of optimally integrating “contractual” and “open market” procurement arrangements for a risk-averse buying firm. The arrangements involve deterministic and stochastic price processes respectively. The risk-averse firm is concerned about the magnitude and uncertainty of expenses. The problem is of increasing significance due to the emergence of electronic markets that facilitate procurement from the competitive open market. Models are developed to determine the optimal procurement policy across the two arrangements for specified price and risk aversion parameters. Both the cases when the contract price parameter is exogenously specified and when it is endogenously adjusted according to procurement policy are examined. We find that the optimal strategy includes simultaneous procurement from both contract and open market arrangements. The application of the model on illustrative datasets provides insights into the advantage of integrating the two modes of procurement over alternate procurement arrangements.

011-0337: Non-parametric Inventory Control with Censored Demand

Woonghee Huh, Columbia University, United States

We develop a non-parametric algorithm for a stochastic inventory model with lost sales and censored demand, where the demand distribution is not known a priori. In the repeated newsvendor problem, we prove the convergence of our algorithm to the optimal solution, and demonstrate it numerically.

011-0777: A Non-Parametric Adaptive Algorithm for the Censored Newsvendor Problem

Karanjit Kalsi, Purdue University, United States

Arnab Bisi, Purdue University, United States

Golnaz Abdollahian, Purdue University, United States

We study a periodic-review inventory problem when no information on demand distribution is available. The inventory decisions are to be made solely based on censored demand data. We develop a non-parametric algorithm that produces inventory policies based on history of stocking decisions and information on whether demands were censored or exact. We establish that T-period average expected cost of our inventory policy converges to the optimal cost at the rate of $O(\{\log T\}/T)$. This result significantly improves upon earlier results known for this problem.

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Saturday, May 2, 3:30-5:00 **Room:** EC-E
Session: Motor Vehicle Safety & Environment

Track: LAPS, 5

Chair: Francois Charvet

011-0741: Complex Systems Modeling of the EPA SmartWay Program

Kwan Tan, MIT, United States

Edgar Blanco, MIT Center for Transportation & Logistics, United States

The SmartWay Transport Partnership is an innovative collaborative voluntary program between the Environmental Protection Agency (EPA) and the freight industry designed to improve energy efficiency and lower greenhouse gas (GHG) emissions and air pollution. The MIT Center for Transportation and Logistics (CTL) initiated a collaborative study with the EPA SmartWay Program staff in May 2008. A systems dynamics model was constructed to aid understanding of the program dynamics and to conduct simulations for various scenarios. This presentation will focus on discussing the advantages of public-private partnerships in this context as well as share some of the findings from the study that could be used to leverage similar initiatives in other sectors and other areas of the world.

011-0747: Perceived Value of Common Safety Improvement Practices

Stephen Swartz, University of North Texas, United States

Matthew Douglas, University of North Texas, United States

This research investigated how safety professionals and commercial motor vehicle operators perceived the relative value of 35 of the most commonly used safety practices. Over 600 drivers and managers from interstate and local transportation companies were surveyed on the specific practices and categories of practices. Disagreement was found on both the broad categories and individual practices within categories, between drivers and managers, and between long-haul and local drivers. This disagreement involved both most highly valued and least valued practices and categories. It is recommended that safety professionals consider the relative values placed on safety practices and the categories of safety practices by the drivers and their peers who participated in this study. The safety professional could “benchmark” their program practices against the practices identified in this report in order to achieve higher levels of safety performance with the limited resources available.

011-0805: A Study of Trucking Accidents and Their Time of Occurrence

Markham Frohlich, Indiana University / Kelley School of Business, United States

Mohan Tatikonda, Indiana University / Kelley School of Business, United States

This study investigated over 500 accidents in a 12 month period at a major trucking company and analyzed the time of day that they occurred. Circadian rhythms (commonly known as biorhythms) have been studied before in other contexts such as factory workers and pilots but to the best of our knowledge this is the first such analysis done in modern trucking. Many other variables including road conditions, driver training, and previous accidents were controlled for in the study. Evidence suggests that Circadian rhythms may play a role in trucking accidents. Implications for managers, as well as future research, are also considered.

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Saturday, May 2, 3:30-5:00 **Room:** EC-F
Session: LEAN Case Studies

Track: JIT, 1

Chair: Li Qian

011-0621: Improving SMED: A Case Study in the Automotive Industry

Ana Alves, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal

Alexandra Tenara, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal

Saturday, 3:30-5:00 Sessions

The Single Minute Exchange of Die (SMED) is one important lean tool to reduce waste and improve flexibility in manufacturing processes allowing lot size reduction and manufacturing flow improvements. SMED reduces the non-productive time by streamlining and standardizing the operations for exchange tools, using simple techniques and easy applications. However the process doesn't give the specific actions to implement which can result in overlooking improvements. To overcome this, common statistical and industrial engineering tools can be integrated in the SMED approach to improve SMED implementation results. The applicability of the proposed SMED approach was tested for injection machines changeovers in the automotive industry. The implementation has enabled reduction in setup time, through company's internal resources reorganizations without the need for significant investment.

011-0467: Deciphering POLCA

Steven Harrod, University of Dayton, United States

John Kanet, University of Dayton, United States

Paired-cell Overlapping Loops of Cards with Authorization (POLCA) is a wip-limiting, "pull" manufacturing control method first introduced in 1998. POLCA has been advocated for make-to-order and quick response manufacturing environments. After a short technical illustration, the authors provide functional and statistical comparisons with other wip-limiting controls including kanban, conwip, and GPOLCA, "generic" POLCA. The presentation concludes with the presentation of a discrete time network mathematical programming model formulation.

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Saturday, May 2, 3:30-5:00 **Room:** EC-G
Session: Impact of Pricing Policy

Track: MKTG, 8

Chair: Dennis Yu

011-0150: Impacts of Pricing and Demand Uncertainty on Optimal Investment Strategies for Flexible Resources

Dennis Yu, Clarkson University, United States

Chester Xiang, Clarkson University, United States

We consider a two-product firm which makes resource investment in two flexible production facilities. A modeling framework is presented to evaluate the impact of pricing and demand uncertainty on optimal investment strategies for flexible resources. The demand function of each product has a downward sloping demand curve and a stochastic element, which can be represented in either additive or multiplicative format. The production capacities of the two facilities are determined before the uncertain demands realize, and can be allocated to produce both products after demand uncertainties resolve. We consider both ex ante and ex post pricing schemes. We derive the firm's optimal decisions and provide comparison study based on different scenarios by coupling pricing schemes and demand function formats.

011-0430: The Impact of Pricing Policy on Sales Variability with ARIMA (p,d,q) Demand

James Hamister, Wright State University, United States

Recent work in fast-moving goods supply chains suggests that pricing behavior may influence demand volatility, with pronounced impact on upstream participants in these supply chains. This paper seeks to enhance our understanding of these phenomena by studying the effect of dynamic versus static pricing models on demand volatility when consumer demand can be characterized by an ARIMA(p,d,q) model. These models are tested using simulation methods to quantify the effect of static versus dynamic pricing approaches using supermarket scanner data to suggest appropriate model parameter estimates. The managerial impacts of this research are discussed along with proposed multi-echelon supply chain extensions of this model.

011-0587: A Dynamic Approach to Bid-Price-based Revenue Management in Make-to-Order Production

Thomas Volling, Technische Universität Braunschweig, Germany

Derya Eren Akyol, Dokuz Eylul University, Turkey

Kai Wittek, Technische Universität Braunschweig, Germany

Thomas Spengler, Technische Universität Braunschweig, Germany

Capacity control problems in make-to-order revenue management typically are solved by applying bid-prices to approximate the opportunity costs of accepting a customer order. However, in the face of stochastic demand, this approximation becomes less accurate. To address this problem, we propose a dynamic bid-price policy, which exploits the informational dynamics inherent to capacity control problems in make-to-order production. Neural networks are applied to incorporate updated demand information. Computational experiments illustrate the superior performance compared to traditional revenue management methods like randomized linear programming. In addition to that, the dynamic bid-price approach features interesting characteristics for risk adverse decision makers. It dominates traditional methods in both risk and average expected contribution margin.

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Saturday, May 2, 3:30-5:00 **Room:** EC-H
Session: Purchasing Organization and Buyer-Supplier Relationships

Track: PRCH, 2

Chair: Stephan Wagner

011-0655: The Consequences of Economic and Social Rewards in Buyer-Supplier Collaborations

Stephan Wagner, Swiss Federal Institute of Technology Zurich, Switzerland

Eckhard Lindemann, Swiss Federal Institute of Technology Zurich, Switzerland

Christoph Bode, Swiss Federal Institute of Technology Zurich, Switzerland

Saturday, 3:30-5:00 Sessions

To better understand collaborative buyer-supplier relationships and the embedded value creation and value sharing efforts, these relationships must be studied from both sides of the buyer-supplier dyad. The results from the dyadic (matched-pair) approach applied in this research reveal several new insights and show that both buyers and suppliers strive for fairness in the collaboration and joint supply chain projects. Perceptions of high fairness increase the companies' willingness for future collaboration and build up a fruitful basis for additional value creation. Drawing from social exchange theory, this research also shows that the direct effect of perceived fairness regarding economic rewards is moderated by the companies' perception of fairness regarding social rewards. As a consequence, companies must consider and more holistically manage the economic and social rewards they grant to suppliers or buying firms if they intend to involve the other party in future supply chain projects.

011-0425: A Competence Management Framework for Chief Purchasing Officers: A Stakeholder-based Perspective

Roger Moser, European Business School, Germany

Naveen Sundaesan, IIM Bangalore, India

Purchasing and Supply Management (PSM) has started to play a strategic role in the success of the firm. Although surplus literature has been written about required competencies and practices there is a dearth of literature that focuses on the various stakeholders involved in PSM and how to manage them. The stakeholder view has significant relevance in PSM as the Chief Purchasing Officer (CPO) manages an intricate and cross-functional environment comprised of different interest groups like suppliers, internal customers and PSM staff. In this paper we address this research gap by developing a management competence framework for CPOs based on the stakeholder perspective. The framework has been tested based on data from a survey of 148 companies across major geographies and industries using confirmatory factor analysis and validated analyzing its predictive validity. The study provides insights into strategic initiatives required by CPOs to manage the PSM function and its major stakeholders.

011-0689: Impact of Culture on Contracts in Buyer-Supplier Relationships

Dina Ribbink, University of Maryland, United States

In today's economy, an ever-increasing number of companies are dealing with partners from across the world. Most relationships translate into contracts between partners but very few studies have investigated the effect of different cultural backgrounds on these written agreements. Contracts are adjusted based on the needs and requirements of specific partners in the relationship. The current study takes contractual data from a global Fortune 500 company and investigates the impact of culture on buyer-supplier relationships. The main focus of this study is the variations of contracts and contract terms specifically regarding the impact of culture.

011-0354: Maverick Buying as an Agency Problem

Katri Karjalainen, Helsinki School of Economics, Finland

Erik van Raaij, Rotterdam School of Management, Netherlands

Non-compliant purchasing behavior, also known as maverick buying (MB), is hindering organizations from attaining the benefits of centralized supplier contracts. Maverick buying can be viewed as an agency problem in which the purchasing department is the principal, and the operative buyers are the agents. We develop and test a model with maverick buying as a problem of "hidden action," and goal incongruence and information asymmetry as its antecedents, and we show that incentives and output monitoring can be used as governance mechanisms to directly reduce opportunistic behavior, while guidance and training can be used to reduce problems of honest incompetence.

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Saturday, May 2, 3:30-5:00 Room: EC-I

Track: BDOM, 4

Chair: Kleber Nobrega

Session: Human behavior in service operations management

011-0727: Bad Behavior in Crowds and Waiting Lines

Helene Caudill, St. Edward's University, United States

When a temporary worker at a Wal-Mart store was trampled to death on Black Friday in 2008, people were horrified. How could normal human beings become, as one witness described, "savages" with no concern for others? Bad behavior in crowds and waiting lines such as this one is not a new occurrence. Similar deaths and injuries have taken place at concerts, sporting events, religious gatherings, and during riots and demonstrations. Although we as operations management academics and professionals have made great strides in our understanding of waiting line structure (such as fair versus unfair waits) and mathematical models related to queuing theory, a deeper understanding of human behavior in lines and crowds warrants additional attention. In this session, I will present crowd behavior and waiting line management theories and research results from other fields such as psychology, social psychology, organizational behavior, marketing, traffic engineering, and public safety management.

011-0250: Servant Supermarket: A New Approach to Increase Customer Satisfaction in Service Delivery

Kleber Nobrega, Universidade Potiguar, Brazil

Janaina Martins, Universidade Potiguar, Brazil

With the increase of competition, businesses seek to adopt innovative strategies and work practices in order to maintain their businesses. Among the innovative features and tools arises the sense of serving, represented by the challenge of providing internal and external customers a sense of "being served" through comfort, responsiveness, friendly attitude, willingness to help and respect for people, with the overall objective of general welfare. This paper reports a survey carried out with 400 customers of two Brazilian supermarkets, which aimed to verify if customers perceive servant attitudes and behaviors during service delivery. The results show that customers perceive the sense of serving adopted by both companies, especially the items responsiveness, anticipating of client requests, willingness to help, problem solving and staff availability, allowing then to conclude that both supermarkets may be considered servant companies.

011-0264: Servant Organization: How Individual Behavior Can Be Expanded to a Business Approach

Kleber Nobrega, Universidade Potiguar, Brazil

André Athayde, Universidade Potiguar, Brazil

Saturday, 3:30-5:00 Sessions

Differentiation through the provision of services has been identified as a growing trend in the world of business. But are companies really prepared to serve? This article, originally of theoretical-reflective character, discusses the fundamentals of management services and shows how a simple concept can cause significant changes in the way of thinking and acting, both individually and organizationally. From the comprehension that serving is "conduct activities that provide benefits to those whom we serve," attributes for the servant behavior are listed through empirical research; they include responsibility, simplicity, renunciation, initiative, willingness to help, welfare practices and usefulness. From individual servant behavior, the concept is extended to a servant company, based on a servant strategy, which creates servant products, delivered through servant processes, in a servant cultural environment, promoted continuously by servant leadership.

011-0706: The Role of Information Technology in Call Centers: Help Desk Agents' Perspectives

Cynthia Ruppel, Nova Southeastern University, United States

Mike Bendixen, Nova Southeastern University, United States

Service operations usually involve a contact center as the primary means of communicating with customers. These centers are replete with technology for a myriad of purposes. For in-bound call centers, the technology can automatically distribute calls, monitor agents' activities and performance, provide a database of information needed to provide service to the customer and facilitate their complex work schedule. Three focus groups were conducted among helpdesk agents in a large call center. The role of available technology was questioned, allowing a wide variety of views and highlighting commonalities and differences among high performers, low performers and recent recruits. The issues of information sharing versus information hoarding, information quality, the number of different systems that need to be accessed, and their lack of integration were the main findings. This implies that the tools provided to helpdesk agents have an impact on their effectiveness as well as their efficiency.

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Saturday, May 2, 3:30-5:00 Room: EC-D
Session: Terminal location and scheduling

Track: FCLT, 3

Chair: Amy Zeng

011-0972: Locating Urban Logistics Terminals and Shopping Centers in a Chinese City

Douglas Moodie, Kennesaw State University, United States

Zhong Yang, Dalian Maritime University, United States

This paper demonstrates, through a case study of a Chinese city, a process to locate and size both logistics terminals and shopping centers, with the objective of minimizing the total costs of retail supply chains, including personal shopping trips. We modeled these supply chains from the intercity transportation nodes, through logistic terminals, through shopping centers, to the final consumers. We found a solution that approached minimizing all the operating and capital costs. We compared our solution to reality, and found our results closely mimicked real life. We concluded that this case study supports the use of our process.

011-0284: Maximizing Total Profit of Jobs with Stepwise Non-increasing Profit Under Multiple Common Due Dates

Wen-Hua Yang, Chaoyang University of Technology, Taiwan, Republic of China

This paper extends the single machine scheduling problem from a single common due date to multiple common due dates, accompanied by a stepwise non-increasing amount of profit. By assuming the penalty function to be job-independent, we first consider two special cases of penalties for late jobs. When the amount of penalty charged by each stage of due date is fixed, we prove that sequencing jobs in the SPT order could give an optimal solution for the maximization of total profit of jobs. With the same criterion, the other case assumes a fixed rate for each stage of due date. This case can be solved by dividing it into a series of sub-problems, each of which is equivalent to the traditional 0-1 knapsack problem. Relaxing the penalty function to be job-dependent, we develop a branch-and-bound algorithm to search optimal solutions; sub-optimal solutions are also located by our designed heuristics.

011-0358: An Algorithm for the Hot Rolling Mill Scheduling Problem in High-Grade Steel Production

Eva Schiefer, Montanuniversität Leoben, Austria

A steel hot rolling mill subjects steel blocks to high temperatures and pressures in order to form steel billets or bar steel. The rolling of high-grade steel is characterized as follows: (1) the production process includes multiple stages; (2) there exist linear, cyclic, converging and divergent material flows; (3) parts of the orders have to be pooled to rolling batches; (4) different setup times are required for different rolling batches to be processed; (5) product variety is frequently changed on the same equipment. The high-grade steel scheduling problem can be viewed as a Job-Shop scheduling problem with sequence dependent set-up times. The objective is to minimize the idle-time of the heating furnaces and the rolling units and to satisfy commercial objectives such as delivery on time. The algorithm presented in this paper was designed for an Austrian high-grade steel manufacturer and is based on the experience of the human planners.

011-0645: Solving the Location Routing Problem Based on a Simulated Annealing Heuristic

Shih-Wei Lin, Department of Information Management, Chang Gung University, Taiwan, Republic of China

Vincent Yu, Industrial Management, National Taiwan University of Science and Technology, Taiwan, Republic of China

Wenyih Lee, Department of Business Administration, Chang Gung University, Taiwan, Republic of China

Ching-Jung Ting, Department of Industrial Engineering and Management, Yuan Ze University, Taiwan, Republic of China

The location routing problem (LRP) is a relatively new research direction within location analysis that takes into account vehicle routing aspect. The goal of LRP is to solve a facility location problem and a vehicle routing problem simultaneously. We propose a simulated annealing (SA) based heuristic for solving the LRP. The proposed SA is tested on some well-known benchmark instances and the results are compared with other heuristics in the literature. The computational study indicates that the proposed SA heuristic is competitive with other well-known algorithms.

011-0161: An Integrated Inventory Control and Facility Location System with Capacity Constraints: A Multi-Objective Evolutionary Approach

Saturday, 3:30-5:00 Sessions

Chia-Lin Hsieh, *Aletheia University/Industrial Management and Enterprise Information Department, Taiwan, Republic of China*

Shu-Hsien Liao, *Tamkang University Department of Management Sciences and Decision Making, Taiwan, Republic of China*

A supply chain network system is to provide an optimal platform for efficient and effective supply chain management (SCM). SCM usually involves multiple and conflicting objectives such as cost, customer service levels (volume fill rate), and flexibility (responsiveness). In this research, a multi-objective capacitated location-inventory distribution network system is formulated which integrates the effects of facility location, distribution, and inventory issues and includes conflicting objectives such as cost, customer service level (order fill rate) and flexibility (responsiveness level). This model allows determining the optimal locations of distribution centers (DCs) and the assignment of buyers to DCs to find the set of Pareto optimal solutions. The study highlights the possibility of a hybrid evolutionary approach based on the elitist NSGA-II algorithm in understanding seemingly non-intuitive model performance. Sensitivity analysis is investigated to understand the model performance and to illustrate how parameter changes influence its output.

011-0049: A Dynamic Location Model with Application to the Brazilian Beef Supply Chain

José Vicente Caixeta-Filho, *ESALQ/USP - Brazil, Brazil*

Juliana Zucchi, *Worcester Polytechnic Institute, United States*

Amy Zeng, *Worcester Polytechnic Institute, United States*

Brazilian cut livestock has socioeconomic importance for the country, affecting not only job opportunities but also the expressive amount of foreign currency. Despite increased Brazilian beef exports, the chain suffers from poor coordination between its main links. Moreover, a spatial rearrangement of the chain is observed due to the cattle herd spatial displacement toward the Center-West region which, in turn, has influenced the slaughter industrial units' displacement toward that region. As a result, although the slaughterhouses are closer to the raw material suppliers, they are farther away from the ports of exportation. Thus, logistics efficiency is the critical instrument of integration between the chain links. In this research, a dynamic optimization model is developed to determine the best slaughterhouse locations in Brazil with the objective to minimize the transport costs and the slaughterhouses' installation costs, thereby increasing the chain competitiveness.

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Saturday, May 2, 3:30-5:00 **Room:** Senate
Session: Knowledge Management

Track: GENL, 7

Chair: Joao Albino

011-0014: Development of the Optimized Work Order Scheduling System for the Panel Welding Line of Panel Assembly Shop in Shipbuilding

Seung Ha, *Hyundai Heavy Industries Co. Ltd., South Korea*

Tae Baek, *Hyundai Heavy Industries Co. Ltd., South Korea*

Soon-Ik Hong, *Hyundai Heavy Industries Co. Ltd., South Korea*

Ji Kim, *Hyundai Heavy Industries Co. Ltd., South Korea*

Dae Kim, *Hyundai Heavy Industries Co. Ltd., South Korea*

Tae Choi, *Hyundai Heavy Industries Co. Ltd., South Korea*

In shipbuilding, ship is divided into hundreds of blocks. Blocks are made up steel plates and sections. Among various operations to build blocks, panel assembly shop plays an important part. Therefore, it becomes an important issue deciding work order schedule in panel assembly shop. We study on optimized work order scheduling for panel welding line. For improving productivity of panel welding line, we propose heuristic algorithm deciding optimized schedule. From algorithm, we develop POS (optimized Panel work Order scheduling System). Scheduler can decide schedule not exceeding capacity of panel welding line but being even with POS. As a result of POS, it is possible making optimized schedule easily and productivity of panel welding line is improved. Also POS deals with various situations of panel welding line, such as work delay and temporary stops of work processes, and provides modified schedules immediately.

011-0015: Reducing the Level of the Waiting Blocks in the Shipbuilding Industry by Using the Theory of Constraints

Kuy-Hoon Chung, *Hyundai Heavy Industries Company, Korea*

This paper describes an application of a systems approach known as the thinking process of the theory of constraints (TOC) not only to identify root-causes and core-problems of increasing block stocks in work-in-process, but also to suggest solution plans and develop a system.

To decrease waiting blocks in the shipbuilding industry, we perform the following sub-studies: (1) identifying root-causes and core-problems of increasing block stocks, (2) suggesting solution plans, (3) verifying the solution plans, and (4) suggesting development systems.

We applied TOC thinking process to identify the core problems of increasing block stocks on the shipbuilding yard. The Pre-Erection and Erection Operations turned out to be the Capacity-Constraint-Resource. We developed a production system based on the Drum-Buffer-Rope of TOC. The effectiveness of the developed system was verified with computer simulations. The developed system was very effective in reducing the size of the block stocks in work-in-process.

011-0994: A Proposal for System Performance Evaluation for an ERP Knowledge Extraction Model

Joao Albino, *UNESP, Brazil*

Alexandre Benedetti, *UNESP, Brazil*

Vagner Cavenaghi, *UNESP, Brazil*

Saturday, 3:30-5:00 Sessions

Much has been researched and discussed on the importance played by knowledge in organizations. We are witnessing the establishment of the knowledge economy, but this "new economy" brings in itself a whole complex system of metrics and evaluations and cannot be dissociated from it. Due to its importance, the initiatives of knowledge management must be continually assessed on their progress in order to verify whether they are moving toward achieving the goals of success. Thus, good measurement practices should include not only how the organization quantifies its knowledge capital but also how resources are allocated to supply their growth. Thinking about the aspects listed above, this paper presents an approach to a model for knowledge extraction using an ERP system, suggesting the establishment of a set of indicators for assessing organizational performance. The objective is to evaluate the implementation of projects of knowledge management and thus observe the general development of the organization.

011-0750: Developing Theory in Operations Management

Roy Stratton, Nottingham Trent University, United Kingdom

Operations management theories have started to emerge in an attempt to unify different OM perspectives now typified by the lean and agile paradigms. These have taken the form of laws, conceptual models and theories, to mention more prominent examples. They all address the need to conceptualise these developments in order to provide practical means of explaining and predicting OM phenomena and means of achieving improved performance. This paper aims to contribute to this process by further exploring the underlying significance of variation, uncertainty, buffering mechanisms and trade-offs. The paper reviews evidence of best practice and prior research before reporting on a multi-case study. The theory of variation and uncertainty buffering is proposed as a means of unifying and extending existing theory at a more abstract level. The paper finally evaluates the utility and parsimony of this theoretical proposal, acknowledging the need for further work in developing its practical application.

Sunday, 9:30-11:00 Sessions

145	Sunday, May 3, 9:30-11:00 Room: Cloister North Session: Analytical Studies in Service Organizations	Track: SRVC, 8	Chair: Long Gao
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011-0294: Choice Based Dynamic Programming Approach for Opaque Pricing

Chris Anderson, Cornell University, United States

Kristine Xie, Cornell University, United States

Opaque selling mechanisms like Hotwire and Priceline, where the consumer does not know the service provider until after they have purchased the service, are becoming increasingly important selling mechanisms as firms look for ways to reach price sensitive consumers while simultaneously selling to brand loyal customers at higher prices. Using data from a DC based hotel and Hotwire.com we integrate a nested multinomial logic choice model and logistic regression into a dynamic programming framework to determine optimal prices. The logistic regression model is used to determine the frequency at which the service provider is displayed at Hotwire.com. The MNL model determines the probability of being selected by the consumer given we are displayed. DP is then used to set revenue maximizing prices given these display and choice probabilities.

011-0402: Time Based Routing and Allocation of Resources to Tasks with Flexible Splitting of Work in Tasks between Resources

Pasi Porkka, Helsinki School of Economics / Logistics, Finland

In traditional production, production resources typically have fixed locations and tasks are brought to these resources. In other cases, resources have to be moved to tasks that have fixed locations. That kind of tasks exists in services, such as delivery, cleaning or maintenance, but also in production activities such as in construction of a building. Performing tasks, but also movements between tasks, consume time and cost money. Efficient allocation of capacity time between task performance, movements and slack becomes a critical optimization objective. In this routing and resource allocation problem traveling times between tasks and times needed to perform tasks are explicitly modeled in a way that work performed in tasks can be flexibly split between resources. A new mixed integer linear programming model is presented and savings potential of split tasks is demonstrated. Solution approaches for problems with realistic size are discussed.

011-0734: Optimal Load Tendering and Acceptance Policies for Intermodal Freight Transportation

Long Gao, UNIVERSITY OF CALIFORNIA, RIVERSIDE, United States

Michael Gorman, University of Dayton, United States

We study a load tendering and acceptance problem in freight transportation where the provider allocates limited short term inventoriable capacity to customers with different profitability levels. We consider both real time mode and batch mode cases. We formulate the problem as a Markov decision process, derive the optimal load acceptance policies for both modes, and analytically characterize the impact of the demand process. We develop an efficient algorithm capable of handling industrial applications. Based on real world data, we show that, among three drivers of the optimal policy, market segmentation and order fulfillment flexibility can significantly improve system profitability over all capacity ranges, and that intertemporal rationing is effective for supply shortages. Furthermore, we demonstrate that naive adoption of airline revenue management tactics cannot fully capitalize the profit opportunities specific in freight transportation. We also show that the optimal policy is robust relative to moderate forecast errors.

011-0382: Network Relationships in Servitized Environments: An Examination with Cannon and Perreault's Framework

Mark Johnson, Cranfield School of Management, United Kingdom

Marko Bastl, Cranfield School of Management, United Kingdom

Servitization, a strategy of bundling products and services in an integrated offering, is now widely recognised as a route for preserving competitive advantage on the market. The presence of a service in an integrated offering increases the complexity of exchange. In spite of suggestions that services are more easily employed through relational rather than transactional exchange, there is no empirical evidence to support this. This work adopts a case study approach to gather data from a tri-partite relationship and uses Cannon and Perreault's (1999) buyer-seller relationship framework to explore the data. The research seeks to indicate the differences in relationships between servitized and traditional manufacture. Our research indicates that servitized manufacture has increased information exchange; tighter operational linkages; a reliance on informal governance mechanisms as opposed to legal; increased co-operation; and increased levels of adaptation between customers and providers, but little difference between the two strategies for buyers and suppliers.

146	Sunday, May 3, 9:30-11:00 Room: Cloister South Session: Operations-Marketing Models in Supply Chain Management	Track: SCM, 9	Chair: Gurnani, Haresh Ray, Saibal AND
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011-0332: Consignment Contracting: Who Should Control Inventory in the Supply Chain?

Jun Ru, The University of Texas at Dallas, United States

Yunzeng Wang, University of California, Riverside, United States

Consignment is a popular form of business arrangement where supplier retains ownership of the inventory and gets paid from the retailer based on actual units sold. The popularity of such an arrangement has come with some continued debates on who should control the supply chain inventory, the supplier or retailer. This paper aims at shedding light on these debated issues. We consider a single period supply chain model where a supplier contracts with a retailer. Market demand for the product is price-sensitive and uncertain. Our results indicate that it is beneficial both to the supplier and to the retailer when delegating the inventory decision to the supplier rather than to the retailer in the channel.

011-0306: Capacity Reservation with Buyer Competition

Murat Erkoc, University of Miami, United States

Haresh Gurnani, University of Miami, United States

Sunday, 9:30-11:00 Sessions

David Wu, *Lehigh University, United States*

We study capacity reservation between a manufacturer and multiple competing buyers from independent markets. We propose a three-stage sequential game: in the first stage, the supplier announces upfront a deductible fee for each unit of capacity to be reserved. In response, the buyers play a Nash game to determine their reservation quantities. Finally, the supplier decides how much capacity to build. Our analysis leads to a number of useful insights. First, we show that when the capacity reservation fee is above a threshold, the buyers play a zero-sum, fixed-capacity game. Otherwise, the buyers compete in a nonzero-sum variable-capacity game. Second, we show that reservation does not always benefit the buyers. Nevertheless, a buyer always has incentive to reserve due to horizontal competition. Third, we show that by sharing the downside risk and the upside gain with the buyers, the supplier can design contracts that fully coordinate the channel.

011-0338: Inter-Temporal Price Dispersion in Multi-Product Pricing Strategies

Mehmet Gumus, *McGill University / Desautels Faculty of Management, Canada*

Multi-product pricing has been extensively studied in the marketing literature. However, most of the models consider static pricing problems with no reference to operational decisions. In this paper, we analyze dynamic behavior of multi-product pricing strategies in a joint pricing and inventory ordering framework. For this, we explicitly model two types of interactions between products and their capacities, and analyze the effects of these interactions on both magnitude and timing of inter-temporal price dispersion. We show that when there is (no) demand interaction between products, magnitude of price dispersion is smaller (larger) for more expensive products than for less expensive ones. Next, we show that synchronization of price changes depends on capacity allocation between products as well as demand substitutions between them. Finally, we design a computational study to measure the value of accounting for interactions between products in price changes.

011-0482: Price Partitioning and Free Shipping in E-Commerce

Saibal Ray, *McGill University, Canada*

Mehmet Gumus, *McGill University, Canada*

Shanling Li, *McGill University, Canada*

Wonseok Oh, *McGill University, Canada*

In this paper our focus is on analyzing the strategic and tactical pricing decisions of online retailers. Specifically, we study two price partitioning strategies used by them in this context. In the first scenario, retailers present customers with a price which is partitioned into a product price and a shipping and handling charge; in the second, customers are offered free shipping through a non-partitioned price format where the product price already includes, partly or wholly, the shipping cost, and so there is no separate delivery fee. We develop a stylized game-theoretic model that captures the competitive dynamics between (and within) these two strategies, and analyze the model to establish how both firm and product level characteristics drive the equilibrium partitioning strategy choice of a retailer. Subsequently, we conduct empirical analysis to validate the results of our theoretical model.

011-0826: Supply Chain Integration, Supplier Commercial Relationships, and Order Fulfilment Practices in Public Hospitals

Kabossa Msimangira, *The Open Polytechnic of New Zealand, New Zealand*

Supply chain integration (SCI), supplier commercial relationships (SCR), and order fulfilment (OF) have been acknowledged by academics and practitioners as key areas for reducing operational costs and improving service level to meet customers' requirements. Nevertheless, little is known concerning factors influencing SCI, SCR, and OF in public hospitals. This paper reports the critical factors influencing SCI, SCR, and OF identified in a pilot study conducted in New Zealand public hospitals. A survey methodology was used to collect data. The findings and suggestions to improve SCI in public hospitals are discussed.

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Sunday, May 3, 9:30-11:00 **Room:** Captain
Session: SC Performance

Track: SCM, 23

Chair: Claudia Rebolledo

011-0003: New Look: Aligning Product Design with the Supply Chain for Responsiveness and Resilience

Omera Khan, *University of Manchester, uk*

Research on concurrent design within the supply chain is a relatively unexplored, but a vital area for the success of global businesses. Even less visible is any empirical research to ground some of the theories that are beginning to emerge in this field. In order to bridge this gap, an in-depth longitudinal case study was undertaken to uncover the strategies adopted for aligning product design with the supply chain. The case study illustrates that successful companies will be those which seek to extend and develop the contribution of design into all aspects of their business in order to be responsive as well as resilient. Managers need to rethink both the processes of managing design, and the ways in which they communicate the strategic value of design to the success of their extended enterprise. This paper highlights the importance of the product design-supply chain interface in creating a more responsive and resilient enterprise. Furthermore the recommendations suggest ways in which managers and key decision makers can adopt a more 'design centric' approach to their supply chain, which has been shown to increase the resilience and responsiveness of a firm. The findings from this paper also contribute novel ideas to the growing debate on supply chain risk management.

011-0069: Models of Relationships between Automakers and Suppliers in the Brazilian Industry

Rosangela Vanalle, *Universidade Nove de Julho (UNINOVE), Brazil*

José Antonio Salles, *UNINOVE, Brazil*

Sunday, 9:30-11:00 Sessions

This article aims to present existing models of relationships between automakers and suppliers in the Brazilian industry. Results from technical visits and interviews with automakers were illustrated with results obtained in a multi-case study of auto suppliers. The interviews were conducted with professional managers and directors in the year 2007. It was concluded that new forms of relationships between automakers and their suppliers resulted in a hierarchical structure of supply of auto parts. It is not possible to generalize, but it was observed that the relations depended on the institutional features of the supplier, the technological complexity of the component, the productive capacities and the history of relations between manufacturer and supplier. Nowadays relations are closer to the characteristics of a cooperative model, with long-term relationships and greater mutual dependence, but cost is still used as the main criterion. The relationship cannot be regarded as strictly cooperative or competitive relationships.

011-0824: The Paradox of Weakness: How Weak Partners in Supply Chains Contribute to Productivity Increases

Daisy Wang, Southern Illinois University Carbondale, United States

This paper shifts the traditional focus on powerful members in supply chains to the weak members. Based on resource dependence theory, an organization has to hold certain critical resources to survive. On the observation of this paper, though, the weak members in supply chains do not have critical resources, but they still survive and create value to supply chains. Through discussions, this paper will expand the resource dependence theory to explain this phenomenon of weak supply chain members. Organizations without power, without critical resources, should improve productivity first in order to survive, especially when facing external pressure from other members in supply chains. That is how weak partners add value to supply chains and how they survive. Based on this, this paper also provides possible contributions to globalization and outsourcing.

011-0310: Knowledge Transfer in the Aerospace Supply Chain

Claudia Rebolledo, HEC Montréal, Canada

Haithem Nagati, HEC Montréal, Canada

In an increasingly complex dynamic environment, a firm's performance relies more than ever on its ability to create and use knowledge. Firms must be able to count on the knowledge acquired through relationships developed with partners in their supply chains. The literature nevertheless reveals that the exchange of knowledge between firms is complex and requires specific conditions to occur. To improve our understanding of the knowledge transfer occurring in the supply chain, we studied the case of a firm in the aerospace industry that has attempted to improve its performance working closely with one of its customers and, at the same time, has developed a program to improve the performance of its own suppliers. The core business of this firm involves the development, forming and assembly of wing panels for regional and business jet markets. The case illustrates well the challenges and opportunities of knowledge transfer in the supply chain.

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Sunday, May 3, 9:30-11:00 **Room:** Yeoman
Session: SC Performance

Track: SCM, 32

Chair: Mohammad Asif Salam

011-0086: A Conceptual Proposal to Measure the Competitiveness Degree of a Company

Wagner Lucato, UNINOVE, Brazil

Milton Junior, UNINOVE, Brazil

Rosangela Vanalle, UNINOVE, Brazil

José Antonio Salles, UNINOVE, Brazil

This study develops a conceptual model to measure the competitiveness of companies within the same industry by adopting a definition that includes various aspects: marketing, strategies, production, finances, environment, etc. It also establishes the concepts of competitive variables and competitive profile. We propose the concept of competitive distance as a parameter that measures the degree of competitiveness of a company compared to a standard. As a consequence, it will also allow knowing, among two or more companies, which is the most competitive. A practical example, considering companies from the Brazilian automobile part supplier industry is presented to show the feasibility of using the proposed concepts.

011-0213: An Empirical Study on the Impact of Strategic Skills on Supply Management Performance

Mohammad Salam, Mt. Allison University, Canada

Study examines the relationship between strategic supply management skills, supplier integration, the perceived status of the supply management function, and supply management performance. Conceptual model consists of strategic supply management skills, supplier integration, the perceived status of supply management, and supply management performance. To test the model a survey interview was conducted to obtain primary data from the purchasing managers or equivalent within the highly competitive garment industry in Bangladesh. Finally, the model was tested using Structural Equation Modeling. The findings from this study indicate that there is significant evidence to support the hypothesized model in which strategic supply management skills, supplier integration and the perceived status of supply management have a direct impact on supply management performance. This implies that firms can improve their supply management performance through an increased emphasis on strategic supply management skills, supplier integration and improving the perceived status of supply management.

011-0241: Performance Measurement in a Supply Chain: A Study of the Automotive Industry

Sílvio Pires, Methodist University of Piracicaba, Brazil

Mario Neto, Methodist University of Piracicaba, Brazil

Fernando de Souza, UNESP – São Paulo State University, Brazil

Sunday, 9:30-11:00 Sessions

Most conceptual bases concerning the companies' performance measurement system has been constructed from an internal perspective, i.e., companies being treated individually. With the emergence of the supply chain management concept, it became imperative to review these conceptual bases from a supply chain point of view instead of isolated companies. On the other hand, the introduction of new productive configurations (such as the modular consortium and the industrial condominium) in the automotive industry has stimulated the development of a new standard of relationship, bringing new ways of controlling among the companies in the supply chain. In this context, this article presents exploratory research conducted with the main purpose of verifying the current stage of the performance measurement system within a relevant supply chain of the Brazilian automotive industry, which embraces an automaker (using an industrial condominium configuration), four suppliers, and one dealer.

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Sunday, May 3, 9:30-11:00 **Room:** Scribe
Session: Product Re-X 1

Track: SUST, 13

Chair: Vered Doctori-Blass

011-0781: Closed-Loop Supply Chains: Coordination Structures and Pricing Decisions

Hamid Faramarzi, Wilfrid Laurier University, Canada

Ignacio Castillo, Wilfrid Laurier University, Canada

We model a closed-loop supply chain (CLSC) that includes a retailer, a manufacturer, and a remanufacturer. The retailer sells both new and remanufactured versions of the same product. We investigate the pricing decisions for these products that are made by the CLSC members. In addition, we consider several CLSC coordination structures and compare the optimal prices and quantities as well as the optimal profits across these structures. We show how the coordination structures compare with each other under different levels of quality of returns and the consumers' perceptions of the remanufactured products versus new. We expect our results to help the CLSC members decide on who to coordinate with under different circumstances.

011-1002: Applying Fuzzy Preference Relations to Third Party Reverse Logistics Provider Selection

kannan govindan, University of Southern Denmark, Denmark

In the competitive market a growing number of firms are seeking to differentiate themselves from their competitors via the provision of superior logistical support services. Apart from a growing interest in integrated supply chain management, another topic of great interest to logistics today is the use of contract or third-party services. The selection of third-party logistics providers is an exciting practical and research question. With the development and advancement of reverse logistics concepts and practice, the selection of providers for the specific function of reverse logistics support becomes more important. In this paper, fuzzy preference relations methodology is proposed for the selection of third party reverse logistics provider and the proposed model is validated using AHP.

011-0500: Valuation of Assembly Equipment Reuse with Real Options

Timo Fleschutz, TU Berlin, Chair of Assembly Technology and Factory Management, Germany

Robert Harms, TU Berlin, Chair of Assembly Technology and Factory Management, Germany

Günther Seliger, TU Berlin, Chair of Assembly Technology and Factory Management, Germany

Assembly equipment, e.g. industrial robots, is often used for a shorter period than its possible life cycle. Companies could increase their cost efficiency while taking advantage of ecological benefits by reusing their equipment in closed loops. Surveys and studies show that currently a specific financial valuation of reuse, showing this potential, is not in practice. Companies often base their investment decisions on discounted cash flow analysis, which is insufficient for the evaluation of reuse flexibility. The real option approach overcomes these deficiencies by including uncertainty and active decision making. However, the valuation with real options is more sophisticated, time consuming and requires additional information. Knowledge based systems could simplify the valuation process with inferences. An exemplary evaluation of an industrial solution, using real options and life cycle costs, will be presented and analyzed regarding its applicability. A knowledge based concept supporting the valuation with real options will be shown.

011-0487: Measuring the Value of Information for Sustainable Product End-of-Life Management

Vered Doctori-Blass, University of California, Santa Barbara, United States

Roland Geyer, University of California, Santa Barbara, United States

The economic and environmental performance of product reuse and recycling has become a very active research area in production and operations management. Lack of pertinent information frequently leads to suboptimal decision-making and thus performance, but the difference between cost and benefit of such information is not always clear. In this research, we combine the principles and methods of industrial ecology, decision sciences, and operations management to investigate the value of information for product end-of-life management. We provide a generic framework for quantifying the economic and environmental value of information for strategic decision-making in product end-of-life management and apply this framework to the case of end-of-life cell phones. We present several models for measuring the effect of information availability on the overall performance. Using our findings, we suggest a tool to prioritize information needs based on the contribution of the information to the economic and environmental performance.

011-0302: Leveraging Waste: Implications for Competition and Welfare

Deishin Lee, Harvard Business School, United States

Sunday, 9:30-11:00 Sessions

We study the competitive and welfare implications when a manufacturer converts its waste stream into a by-product that can be used as valuable feedstock for another manufacturing process. By converting waste into by-product, the firm not only reduces its waste disposal cost, it may reduce its environmental impact by decreasing the amount of waste that is landfilled or incinerated. The distinguishing characteristic of this operation is that quantities of the primary product and by-product are linked. Conditions in the two markets determine whether the firm should increase production of the primary product in order to capture value in the by-product market ("partial conversion"). In addition to the managerial implications, this analysis can inform policy as we show how increasing disposal cost impacts welfare in the two markets.

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Sunday, May 3, 9:30-11:00 **Room:** Knave
Session: Strategic Management in Healthcare

Track: HLTH, 9

Chair: Norman Faull

011-0357: Exploring Focus Criteria in Health Care Operations

Justin Drupsteen, University of Groningen, Netherlands

Taco van der Vaart, University of Groningen, Netherlands

Jacob Wijngaard, University of Groningen, Netherlands

In hospitals a myriad of resources are shared by different patient groups. From the field of operations management we have learned that sharing resources presents many adverse effects (Hoekstra and Romme 1992) and that the principle of focus (Skinner 1974) helps overcome these adverse effects. Existing research on focus in health care has mainly aimed at the phenomenon "focused factory" (Hyer et al. 2008; Casalino et al. 2003), however little research has been undertaken to explore the possibilities of focus besides aiming to achieve a focused factory.

We developed a framework recognizing six different focus configurations along two dimensions (degree of focus and single or multiple resources). Based on a multiple-case study within the radiology department of a regional hospital in The Netherlands we discuss the implications of the current focus configurations on hospital service delivery and explore the conditions under which each of the focus configurations occur.

011-0438: A Double Dose of Process Improvement in Drug Delivery

Zameer Brey, University of Cape Town, South Africa

Norman Faull, University of Cape Town, South Africa

Lean is well established in healthcare contexts of many developed countries, yielding numerous success stories. The outcomes of Lean implementation in developing countries are less clear and research in this area is much needed. This paper forms part of a much broader research study aimed at understanding the effects of Lean implementation in multiple sites within a large tertiary hospital. In addition the research examines the factors that promote/inhibit the development of Process Improvement Champions. This paper focuses specifically on the results achieved in a hospital pharmacy where pilot results indicate a massive 70% reduction in waiting times. The depth of this paper explores how this was possible despite no additional resources. Research is conducted using the action research methodology yielding outcomes for both the researcher and the institution. The final part of the paper demonstrates how a single dose of Lean resulted in the cure of two possible problems.

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Sunday, May 3, 9:30-11:00 **Room:** EC-D1
Session: Individual Influences on OM Decisions

Track: EMPR, 10

Chair: Brent Moritz

011-0792: The Impact of Organizational Structure on Organizational Learning: A Study of National Culture

Xiaowen Huang, Miami University, United States

Joseph Rode, Miami University, United States

Roger Schroeder, University of Minnesota, United States

It is widely perceived that organic structure is conducive to the development of continuous improvement and learning within organizations. Yet whether such a relationship is universally effective across different national cultures has not been closely examined. We propose that the effectiveness of organic structure in facilitating continuous improvement and learning will differ dependent upon whether the organization is located in collectivism-dominated national cultures or individualism-dominated national cultures. We empirically examine the hypotheses using survey data collected from manufacturing plants located in multiple countries and industries. Our findings provide empirical evidence supporting the national specificity argument proposed in the international business literature.

011-0449: Cognition, Anchoring and Individual Differences in the Newsvendor Problem

Arthur Hill, University of Minnesota, United States

Brent Moritz, University of Minnesota, United States

Karen Donohue, University of Minnesota, United States

Previous research has shown that when faced with a newsvendor problem, individuals who make inventory planning decisions systematically and persistently deviate from the profit maximizing quantity. Dual Process Theory can explain at least some of these deviations. Using experimental results from practicing inventory professionals from several Fortune 500 firms, this research investigates the link between individual heterogeneity in cognition and inventory decision making. Specifically, this research compares overall performance, order quantity variance and anchoring heuristics relative to the dual process tendency of the individual decision maker. Implications include employee selection, training, task design and decision support systems.

011-0807: Does Training Matter? An Empirical Study of Trucking Accidents in the Supply Chain

Markham Frohlich, Indiana University / Kelley School of Business, United States

Mohan Tatikonda, Indiana University / Kelley School of Business, United States

Sunday, 9:30-11:00 Sessions

Trucking accidents are financially costly, can cause bodily injury and death, and disrupt the smooth flow of contemporary supply chains. This in-depth single-company study analyzed over 500 accidents in a 12 month period at a major trucking company, and compared the training levels of drivers that had accidents to those of over 2000 drivers that did not during that same time frame. Other factors were accounted for in the study including time of day that the accident occurred, road and weather conditions, previous accident history of the driver, and other demographic factors of the drivers. This study's findings have important implications for managers regarding timing and volume of employee training and re-training investments, and also set a foundation for further academic study of cost-effective mitigation methods to reduce trucking accidents.

011-0767: Change Capacity and the Profile of Entrepreneurs as Middlemen in Strategic Performance

Lorene Roque, FUMEC, Brazil

Carlos Goncalves, FUMEC, Brazil

Luciana Cristine Lessa, FUMEC, Brazil

Nowadays, entrepreneurs must seek competitive advantages in order to stay ahead of their competitors and obtain higher performance. The aim of this paper is to propose a model to contribute to the understanding of the relationship between the ability to change and the profile of entrepreneurs as middlemen in the performance of strategic construction company managers and wood companies of Belo Horizonte/Brazil. The study presents data collected from 100 entrepreneurs through a survey, as well as research on the profile of entrepreneurship and enterprise in literature. It was concluded that the entrepreneurs concerned take into account only a few variables (innovation, internal capacities and analysis of competitors) and do not consider fundamental variables to reach superior performance. It is hoped that the effort of this research will contribute to the advancement of work and help entrepreneurs on the skills and knowledge they need to develop, to achieve success.

011-0550: The Disappearing COO - The Missing Link in Effective Execution of Business Strategy

Joel Goldhar, Stuart Graduate School of Business, United States

Cheryl Druehl, George Mason University, United States

Current data suggests that the Chief Operating Officer (COO) is disappearing or becoming a CEO-in-Training. We argue that the presence or absence of a "strong" COO is a major variable in effective strategy implementation and thus the sustained superior performance of an organization. We suggest a strong COO fosters functional coordination and integration, furthering operational excellence and innovation. Early analysis of a database of 200 firms suggests some support for these hypotheses. Discussions with COOs suggest that the COO role may be most appreciated in smaller organizations. Our research offers tentative suggestions for the organizational structure of the "C-Suite" and for further research.

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Sunday, May 3, 9:30-11:00 **Room:** EC-B

Track: PITM, 8

Chair: Indranil Bardhan

Session: Information Technology

011-0965: Project Team Co-location and Performance: The Moderating Role of Information Technology

Indranil Bardhan, The University of Texas at Dallas, United States

Vish Krishnan, University of California, San Diego, United States

Shu Lin, Fresno State University, United States

A substantive body of research has explored the effect of project characteristics, such as team size, process capability, and colocation, on project performance. In this research, we explore the role of information technology usage and its moderating role on the relationship between project team colocation and performance. Specifically, we explore whether IT mitigates the effect of team dispersion on different dimensions of project performance. We further explore whether the magnitude of this moderation effect differs across low and high information processing environments. Our results suggest that enterprise communication and group collaboration technologies are especially important in moderating the effect of team colocation on project success.

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Sunday, May 3, 9:30-11:00 **Room:** EC-C

Track: EDUC, 11

Chair: Mridula Sahay

Session: Teaching Operations Management

011-0548: Operations Management Education (OME): Quality and Competitiveness in the Global Scenario

Mridula Sahay, Institute of Public Enterprise, India

J. Venkataratnam, Institute of Public Enterprise, India

The aim of this research paper is to present findings on enhancing quality of operations management education under the present global scenario in an Indian context. Some salient issues related to the coverage, teaching methodology and evaluation approach along with recommendations are included. Global competition, shorter product and service life-cycles, enlightened customers and technological advancement, etc., have placed more demands on the operations function than on any other managerial functions. The operations function is normally the hub of the systems wheel. Hence, this paper advocates adoption of a new focus on features and education of Operations Management (OM). Adequate inputs on contemporary manufacturing practices, manufacturing challenges and enabling technologies coupled with advancement in OM tools, techniques and strategies supported with methodologies for applying them into practice are some of the highlights of the paper. The goal is to enable OM to acquire its due importance and make OM education meaningful and purposeful.

011-0097: An Illustrated Introduction to Data Envelopment Analysis

R Sale, Lamar University, United States

Martha Sale, Florida Institute of Technology, United States

Sunday, 9:30-11:00 Sessions

In the three decades since the publication of Charnes, Cooper, and Rhodes' (1978) classic article on the topic, data envelopment analysis, or DEA, has become very popular. From 1978 to 2001, over 3,000 publications by over 2,000 authors have used DEA (Tavares, 2002). The purpose of this paper is to present DEA in a way that is appropriate for new users at all levels. This paper is written with a minimum of technical language and assumptions as to the readers' prior knowledge. In this way, it represents a stand-alone lesson in DEA that is appropriate for undergraduate students. On the other hand, rather than completely omitting advanced topics appropriate for more demanding users, these topics are touched on briefly and interested readers are directed to other works that address such advanced topics in more detail.

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Sunday, May 3, 9:30-11:00 **Room:** Gallery
Session: Human behavior and knowledge management I

Track: BDOM, 5

Chair: Foster Fei

011-0175: Abstract Conceptualisation of Human Behaviour in OM Research: A Grounded Theory Perspective

Foster Fei, Cardiff Business School, Cardiff University, United Kingdom

This paper suggests, from a grounded theory perspective (Glaser & Strauss, 1967), the approach of abstract conceptualisation of human behaviour in OM research. Contrary to its descriptive counterparts, such an approach to OM research focuses on the analysis of social process (Glaser & Holton, 2005) and the management of business realities on a global-local continuum (Fei, 2007). Considering its relevance and rigour, this approach to theory building integrates existing OM theories on the basis that "all is data" (Glaser, 2001), and reflects the changing nature of OM in terms of time, place, and people (Glaser, 2003).

011-0812: Evolving Artisan Skills to Strategic Competencies

Luis Antonio Gutierrez, UNIVERSIDAD DE GUADALAJARA, Mexico

Aida Lucia Montiel, UNIVERSIDAD DE GUADALAJARA, Mexico

Maria Elena Silva, UNIVERSIDAD DE GUADALAJARA, Mexico

This study shows how strategic competencies can be achieved by knowledge management from artisan skills and how it can be measured using efficiency, effectiveness, proactive talent and financial indicators. The strategic performance was implemented in an artisan organization by identifying the most important issues for the team workers as the core issues. This also helped to upgrade tasks to routines, then to functions, then to strategic competencies. This proved Knowledge Management model was developed in four stages: preparation, implantation, assimilation and growth, leading the organization to improve its performance and helping to develop strategic competencies in the work team. The conclusions of the study pointed out that the main changes that the organization needs to incorporate in its performance are: Knowledge Management, Competencies Development and Performance Evaluation. The purpose is to evolve towards new labor competencies to improved productivity and to handle its competitiveness.

011-0633: Learning Doesn't Look Back – Lessons in Continuous Improvement

John Hanson, University of San Diego, United States

Firms that have successfully adopted Lean practices and reduced variance may have difficulty learning from experience in the form of mistakes or random events, yet continuous improvement remains a cornerstone of Lean production. This study goes inside a series of kaizen continuous improvement events to observe how process improvements are created. It is found that cumulative experience with the process in question has negligible effect except for the ability to weed out ideas that are infeasible for non-obvious reasons. The principal source of improvements is individuals' interpretations of events observed elsewhere. This is important for two reasons; it suggests that improvements must originate outside the system and that individuals serve as important filters. Finally, it is shown through a conceptual model that the improvement trajectory (the learning curve) can be entirely explained as a function of future business opportunities and without reference to experience.

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Sunday, May 3, 9:30-11:00 **Room:** EC-A
Session: Lead times and customer classes

Track: INV, 2

Chair: Metin Cakanyildirim

011-0235: Inventory Policies for Systems with Updated Supplier Delivery Information

Mahesh Srinivasan, The University of Akron, United States

Douglas Thomas, The Pennsylvania State University, United States

We consider a single item periodic-review inventory system with lost sales having "iid" demand and lead times. Suppliers commit to delivery times as soon as an order is placed. We use dynamic programming based optimization and simulation to investigate improved inventory policies under such a system which uses updated delivery information. It is seen that such policies perform significantly better as compared to the classical base-stock order up to inventory policies. We demonstrate conditions under which such updated delivery information could be useful and the value of such information.

011-0766: On Palm's Theorem and Inventory Control

jack hayya, penn state university, United States

dean chatfield, Old dominion university, United States

valery pavlov, penn state university, United States

Sunday, 9:30-11:00 Sessions

Palm's theorem requires that demands be Poisson (with mean λ) and that the lead times (with mean τ) be independent; then the number of orders outstanding, N , would be Poisson with mean $\lambda\tau$. This leads to a notion in the inventory literature that with unit-sized Poisson demands the effect of lead time variability is nil, because, since the N is Poisson, its variance is equal to the mean, and thus the magnitude of the lead time variance becomes irrelevant. This notion could be in error, because of the theory of stochastic dominance, which states that increasing variability leads to increasing cost, and also because the notion violates the law of conservation of energy. In addition, the number of orders outstanding is not identical to lead time demand (it approximates it for constant lead time), and it is the latter that determines the inventory policy and inventory cost.

011-0686: Inventory Control with an Order-Time Constraint

Metin Cakanyildirim, University of Texas at Dallas, United States

Alain Bensoussan, University of Texas at Dallas, United States

Lama Moussawi, American University of Beirut, Lebanon

This paper analyzes a stochastic inventory problem with an order-time constraint that restricts the times at which a manufacturer places new orders to a supplier. This constraint stems from the limited upstream capacity in a supply chain, such as production capacity at a supplier or transportation capacity between a supplier and a manufacturer. Consideration of limited upstream capacity extends the classical inventory literature that unrealistically assumes infinite supplier/transporter capacity. We study the constraint under a Poisson demand process and allow for a fixed ordering cost. In the presence of the constraint, we establish the optimality of an (s,S) policy under both the discounted and average cost objectives. Under the average cost objective, we show the uniqueness of the order-up-to level S . We numerically compare our model with the classical unconstrained model.

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Sunday, May 3, 9:30-11:00 Room: EC-E

Track: LAPS, 6

Chair: William Simms

Session: Performance Evaluation

011-0934: Performance Based Life Cycle Cost Reduction Strategies and the Link to Supplier Investment

Wesley Randall, Auburn University, United States

Over the last few years the Department of Defense has been successful in reducing the life cycle cost of their weapons systems, while at the same time improving the performance of these systems by using multi-year collaborative Performance Based Life Cycle Cost (PBL) strategies. These strategies are now also finding success in non-defense markets such as high speed rail, industrial facilities management, and maintenance, repair, and overhaul (MRO) of high cost systems. This research examines the economic foundation at the center of the PBL strategy. Using field interviews, consultation with senior DoD leaders, and an archival research into the impact PBL has had on weapon system cost and performance this research provides a financial model that predicts supplier investment and the impact that investment has on life cycle cost reduction.

011-0454: Assessing Performance-Based Logistics Contract Results

Ferit Buyukgural, Air Force Institute of Technology, United States

Martha Cooper, Air Force Institute of Technology, United States

Jeffrey Ogden, Air Force Institute of Technology, United States

Performance-Based Logistics (PBL) is DoD's preferred product support approach to satisfy vital war fighter contracted needs. The elasticity of these needs makes it impossible to build a one-size-fits-all template PBL contract. Both economic metrics such as Cost per Unit Usage and non-economic metrics such as Availability, Reliability, Logistics Foot Print, and Logistics Response Time can be defined and tailored according to each individual program. However, evaluation of the success of a PBL contract gets harder proportional to the increased number and types of metrics. This research suggests an integrated model approach to combine multiple criteria when assessing the success of a PBL contract. This approach may be used in operational-level decisions such as reward and punishment decisions within a contract or strategic-level decisions such as extending the contract with the same contractor, terminating the contract, and negotiating with other contractors.

011-0383: A Case Study of the Port of Virginia and Its Supply Chains

Hector Guerrero, College of William and Mary-Mason School of Business, United States

James Bradley, College of William and Mary-Mason School of Business, United States

The Port of Virginia is comprised of four major terminal facilities located in the Hampton Roads area of Virginia and Front Royal, Virginia. The success of the Port and the associated supply chains has contributed greatly to the economic wellbeing of the community. Additionally, the transportation, warehousing, and distribution facilities that comprise the supply chains have grown dramatically. Along with the benefits of economic activity, there have also been problems throughout the metropolitan statistical area (MSA) of approximately 2 million inhabitants: debilitating traffic congestion, uncontrolled development, environmental degradation, and lack of job talent pools are a few. We are working on several grants that focus on these issues and possible solutions, as well as risk mitigation strategies that will continue to promote sustainable growth. In this study we present an in-depth analysis of area supply chains and recommendations for their future development.

011-0457: Pursuing Waste Vegetable Oil as an Alternative Fuel

Harvey Gaber, Air Force Insitutute of Technology, United States

Bradley Anderson, Air Force Institute of Technology, United States

Sunday, 9:30-11:00 Sessions

Alternative fuels have become a hot topic in the news as the cost of oil remains volatile. Questions of whether acquiring alternative fuels are worth the cost, logistics, and political implications are being asked. A possible solution may be currently thrown away by Wright Patterson Air Force Base's dining establishments in the form of waste vegetable oil (WVO). This study investigated the benefits and costs of pursuing the installation of a WVO to Straight Vegetable Oil fuel processing center and using the fuel to power some of the base's diesel vehicles. A pilot program was fielded utilizing the Wright Patterson Club for WVO and the Recycling Center for processing and use. From the pilot program, data was extrapolated to determine the total cost and payback period to operate the system. The benefits of reducing spills, emissions, and applying for credit under the Environmental Protection Act of 2005 were also realized.

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Sunday, May 3, 9:30-11:00 **Room:** EC-F
Session: LEAN: Strategy, Adoption, and Results

Track: JIT, 2

Chair: Sanjay Bhasin

011-0839: Just-In-Time Manufacturing – By Design or By Default

Shellyanne Wilson, The University of Trinidad and Tobago, Trinidad and Tobago

Just-In-Time (JIT) manufacturing implementation in small manufacturing companies is often not a sophisticated exercise, following a series of well-prescribed steps. Instead, JIT implementation can involve a series of incremental steps, and missteps, before the desired outcome is achieved. In some cases, JIT is less of a conscious design and more of a default position. This paper will examine the role of a company's resource configuration in leading to the use of JIT manufacturing. The research paper reports on a single case study of a small manufacturer that altered its resource configuration from a producer – consumer relationship separated by a buffer, to a simultaneity constraint. The results of the case study show that the removal of the buffer system increased the manufacturing system's need for mix flexibility, and the final implementation required unplanned structural and infrastructural changes to adequately meet marketing requirements.

011-0178: Manufacturing Processes and Management: Evaluation of Lean Manufacturing Adoption Patterns in Industrial Organizations in Emerging Countries

Alexandre Graeml, Positivo University/Federal Technological University for Parana - Brazil, Brazil

Jurandir Peinado, Positivo University, Brazil

Daniel Glaser-Segura, Tamuk San Antonio, United States

Lean manufacturing has existed since the late 1970s. From early on, many companies in industrialized countries deployed lean manufacturing more effectively than others. Successful lean implementation is often attributed to organizational culture. But organizations may also be influenced by the culture in the countries where they are located. We believe there may be comparative advantages of locating where the national culture is suited to lean. This paper presents the results of a survey of managers in approximately 210 companies in Argentina, Brazil, and Romania, considered emerging and transition economies. We measured practices relating to quality, waste reduction, and supplier management, as well as their managerial and HR support practices. We will present patterns of lean implementation among all three countries. The results of this study illuminate the transfer of manufacturing to emerging and transition economies and these may not be reaping the organizational gains found in the industrialized countries.

011-0090: Measuring the Leanness of an Organisation

Sanjay Bhasin, Aston University, United Kingdom

Evidently, there exists a void of a comprehensive Lean audit specifically examining: 1) whether Lean has been adopted by an organisation as a philosophy, and to 2) distinctively deduce the phase of a Lean journey an organisation has reached. This extensive audit establishes the juncture of the Lean journey an organisation occupies. Twelve categories with accompanying set of indices for each cluster were used in the assessment: overall safety, cleanliness and order; production and operation flow; processes; visual management; quality design; continuous improvement; change strategy; sustainability; culture – employee oriented; organisational culture – organisational practices; Lean treated as a business; and philosophy. The audit results validate that it is possible to split an organisation's Lean journey into seven distinct phases: Planning, Developmental, Mechanical, Enhanced, Holistic, Innovative, and Ideological.

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Sunday, May 3, 9:30-11:00 **Room:** EC-G
Session: Store Location and Customer Loyalty

Track: MKTG, 9

Chair: Jun Ru

011-0561: Private Label – National Brand Dynamics in Retail Channels

Marc Sachon, IESE Business School, University of Navarra, Spain

Victor Martinez de Albeniz, IESE Business School, University of Navarra, Spain

The current economic environment is supporting private label penetration in the retail industry. Consumer data shows that in 2008 sales of private label products in EU15 countries increased more than 10% - experts expect this number to be even larger for 2009. Previous work analyzed channel dynamics in settings with competing national brands, ignoring private labels. In our model we analyze the non-cooperative game between a national brand manufacturer and a vertically integrated private label in a channel with a common retailer. We find that the introduction of a private label in a channel induces price reductions of the national brand. Our model shows that the price reduction is more pronounced when there is little substitutability between the products. Finally, the introduction of a private label can reduce total supply chain profits.

Sunday, 9:30-11:00 Sessions

159	Sunday, May 3, 9:30-11:00 Room: EC-H Session: Electronic Procurement	Track: PRCH, 3	Chair: Alistair Brandon-Jones
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011-0164: Improving e-Procurement Compliance: The Role of User Perceptions

Alistair Brandon-Jones, University of Bath, United Kingdom

Whilst the advent of e-procurement creates significant potential for reduced purchasing costs, the realisation of savings requires the commitment of internal users towards systems and contracts. In turn, levels of compliance may be influenced by user perceptions of e-procurement, though the evidence for such claims remains largely anecdotal. This study uses a mixed-methods approach, incorporating 58 interviews and a survey of 295 e-procurement users, to empirically test the relationship between user-perceived e-procurement quality and both system and contract compliance. Analysis provides strong empirical support for the view that delivering higher levels of service to e-procurement users has a positive effect on the level of both system and contract compliance. The research provides support for the view that e-procurement benefits are ultimately dependent on delivering e-procurement in a way that meets user expectations. The study also illustrates the value of triangulating data, especially when exploring social phenomena.

011-0700: Vertical Electronic Coordination in B2B Relationships

Goril Hannas, University of Agder, Norway

Arnt Buvik, Molde University College, Norway

Otto Andersen, University of Agder, Norway

This paper examines how relation-specific IT investments affect vertical electronic coordination between firms. Recent research has conceptualized that the levels of specificity in IT investments and adjacent business processes lead the parties to increased vertical electronic integration (Kim and Mahoney, 2006). We propose that idiosyncratic investments in general may serve as a guide for electronic integration between firms, because specific assets induce the need for coordination and information exchange. Through a cross-industrial survey of 198 Norwegian businesses, we found vertical electronic coordination between firms to be conditionally dependent on specific assets that are not related to IT. The effect of specific IT investments on electronic collaboration is contingent upon the level of other specific assets deployed in the buyer-seller relationship. This suggests that substantial specific investments increase the need for customised information systems that can facilitate efficient coordination where assets are at risk.

011-0258: Dual Sourcing in a Volatile Commodity Market

Mojisola Otegbeye, New Jersey Institute of Technology, United States

Jian Yang, New Jersey Institute of Technology, United States

We derive commodity procurement policies tailored towards a manufacturer's risk attitude, where the price of the input commodity fluctuates and to mitigate his exposure to price volatility, the manufacturer seeks an optimal allotment policy for a dual procurement framework. The manufacturer can source his commodity needs through a contractual arrangement with a supplier as well as directly from the spot market. A risk sharing, win-win contract mechanism is proposed for the supplier-manufacturer relationship, and we offer managerial insights as to how changes in the model's parameters ultimately affect the chain's efficiency. One of the highlights of our research's contribution to documented literature is the concept of a floating contract price, with the final price contingent on the future realization of the commodity's spot market price, in contrast to existing works where the contract price is fixed at the time of negotiation.

011-0903: Attractiveness in Buyer-Supplier Relationships: An Agenda for Empirical Research

Kari Tanskanen, ,

Outi Kettunen, VTT Technical Research Centre of Finland, Finland

Anna Aminoff, VTT, Finland

Ketty Kortelainen, NSN, Finland

The paper is based on an attractiveness theme of an ongoing study "Sourcing and Service Operation Concepts." There are three globally operating companies in Finland participating in the attractiveness theme. The research questions are: 1) What are the elements of attractiveness as a customer? 2) How to become and sustain an attractive business partner; and 3) How to get suppliers to participate in development/innovation. The research is conducted as a multiple in-depth case study. Based on a theoretical framework from Hald et al (2008), an interview concept has been created. The interviews are performed both at the customer and the supplier levels. They include statements of different elements of attractiveness, and the interviewees are asked to evaluate them and their importance concerning each company's partner and the company itself. The results will be obtained in February 2009 and analyzed to draw preliminary conclusions for the research questions.

160	Sunday, May 3, 9:30-11:00 Room: EC-I Session: International Trade	Track: INTL, 1	Chair: Marco Sartor
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011-0369: Countertrade: Literature Review and an OM Research Agenda

Marco Sartor, UNIVERSITY OF UDINE, Italy

Guido Nassimbeni, UNIVERSITY OF UDINE, Italy

Sunday, 9:30-11:00 Sessions

The term "countertrade" refers to a set of (commercial) agreements between a buyer and a seller in which the primary transaction is accompanied by a variety of additional conditions (Banks, 1986). The relevance of this phenomenon can hardly be assessed; the estimates (Ammon, 1990, Hennart, Anderson, 1993; Forker, 1996), although heterogeneous (ranging from 5% to 30% of the total value of international transactions), demonstrate its importance. In the last three decades, many authors developed studies on this topic mainly focusing on legal or macroeconomic aspects; on the contrary in-depth analyses that investigated OM implications are rare. Through a literature analysis in the most known databases, we have identified 45 journals that have hosted articles on countertrade. The purpose of this work is to develop the first literature review on this topic, identifying a research agenda that could be useful for scholars to study OM aspects of these agreements.

011-0196: Impact of International Trade on Domestic Inventory Levels

Chaodong Han, Robert H. Smith School of Business, University of Maryland, United States

Yan Dong, Robert H. Smith School of Business, University of Maryland, United States

Martin Dresner, Robert H. Smith School of Business, University of Maryland, United States

This research argues that global sourcing and exports have offsetting effects on domestic inventory levels: an increasing impact due to risk considerations and a decreasing impact due to cost pressure from rising inventory costs. According to location theory, rooted in geographic economics, firms may be able to efficiently allocate inventory to low cost regions along their global supply chains. To the extent that allocative efficiency may only be realized once a certain level of global activity is reached, we hypothesize that the impact of international trade on domestic inventory is inverted-U shaped. Our hypotheses are tested using inventory at all three stages and industry operating data from U.S. manufacturers over 1997-2005. We find strong invert-U shaped relationships existing between import intensity and raw materials inventory level, and between export intensity and finished goods inventory level. The research is the first effort to connect international trade with domestic inventory performance.

011-0122: Comparative Research of Overseas Main Advanced Production Modes

Ji Li, Business School, Nankai University, P.R. China, China

With development of the global economy and information technology, international enterprises' production modes are profoundly varied. At present, because the concepts of production mode are complicated, we researched some production modes which were summarized in Japan and America in the last century, and summarized these advanced manufacturing production modes. We can sum up five modes: Cell Production, Lean Production, Computer-Integrated Manufacturing System, Agile Manufacturing, and Business Process Reengineering. In point of international manufacturing, they are top-drawer. This paper analyses these modes in order to enlighten Chinese manufacturing.

011-0970: Socially Responsible Outsourcing: A Fair Trade Label for Services

Leila Chirayath Janah, Stanford University, Samasource, United States

Currently, a growing number of organizations are working to utilize technology-based services as a means for economic and social value creation in developing countries, yet there is no common label for these activities. Socially responsible outsourcing is a new term to describe business process and information technology outsourcing that promotes sustainable economic development in poor parts of the world. The authors propose a definition for socially responsible outsourcing that considers the provider firm's size, location, employee base, and impact on job creation in economically distressed locations.

161	Sunday, May 3, 9:30-11:00 Room: EC-D Session: Supply Chain	Track: GENL, 15	Chair: Jerry Flatto
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011-0981: Modeling the Bullwhip Effect

Jerry Flatto, University of Indianapolis, United States

Leslie Gardner, University of Indianapolis, United States

The bullwhip effect has been modeled a number of different ways. This research looks at whether the type of modeling – discrete versus continuous – impacts the results of the model. This research also examines whether the damping of the bull whip is affected by stock adjustment and orders in the pipeline.

011-0088: Postponement Strategy in Competitive Manufacturing of Clothing Fashion - Jeanswear

Francisca Mendes, UNIP -, Brazil

José Fusco, UNIP, Brazil

José Sacomano, UNIP, Brazil

This study presents the competitive aspects of the jeanswear segment of clothing belonging to the Manufacturing of Fashion - MVM. Criteria have been established for an analytical framework based on the principles of analysis of competitive strategy, in addition to the Production Planning and Control (PPC) described by several authors. It is perceived that the segment of fashion jeanswear uses the mechanism for postponement in the last stages of production, when they make the process of differentiation of the product, which adds a high value in a short space of time and increases the number lots of different forms. Jeanswear, one of the segments of MVM, is the most affected by new visual effects, causing the development of a large number of new products. The time between creation of the product and its placement in retail is getting shorter and designers need to create new ways of adding more value to the treatment product.

162	Sunday, May 3, 9:30-11:00 Room: Senate Session: Technologies in Global Supply Chains I	Track: TECH, 1	Chair: Ying Xie
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011-0246: An Algorithm for Discrete Optimization Problems Based on a Classic Search Tree Approximation Method

Sunday, 9:30-11:00 Sessions

Rodolfo Teixeira Junior, Unesp, Brazil

This study proposes a general application algorithm for discrete optimization that is based on a classic search tree approximation method and also proposes a method for modeling optimization problems according to the proposed algorithm. The algorithm is presented in detail as its solution table for a hypothetical problem. This is aimed at creating greater understanding of the logic involved in its operation. The algorithm was formulated with the objective of maintaining application generality for several types of discrete optimization problems without making any distinction in terms of linearity or the type of problem. The proposed algorithm was implemented computationally and it has been successfully applied to discrete optimization problems in the industrial production programming area, representing a viable and efficient alternative in terms of cost/benefit for solving discrete optimization problems in production engineering.

011-0247: Analysis of the Main Functionalities of an Advanced Planning and Scheduling System (APS) Geared Towards Small Companies

Rodolfo Teixeira Junior, Unesp, Brazil

Advanced planning and scheduling systems (APS) have provided significant improvements in industrial production management by employing sophisticated mathematical and scheduling methods, considering the production environment's real characteristics and restrictions, contributing with reductions in stock levels, lead times, reliable delivery dates and improved production quality. These systems make it possible to effectively reply to the variability that may occur in the production environment, confirming their application in several business segments. However, the costs involved with the acquisition and implementation of these systems restrict their application in small companies. Nevertheless, systems geared towards small companies are already available for evaluation. This study thus aims at analyzing the main functionalities of an APS system geared towards small companies with the intent of proposing viable and effective technological alternatives to this type of business segment.

011-0248: An Example of an Advanced Planning and Scheduling System (APS) Implementation and Operationalization

Rodolfo Teixeira Junior, Unesp, Brazil

The objective of this study is to provide an overview of an advanced planning and scheduling system's (APS) implementation and operationalization process for elaborating a production schedule in a production environment similar to what is found in reality. The main characteristics and restrictions of a real production environment were thus considered, such as multi-level structure products, production routes with sequential, parallel and alternative operations, more than one resource per operation and alternative resources. In order to ensure the proposed objective's applicability, use of commercial APS systems available for industries was considered. A Brazilian APS system was chosen because it had an interesting alternative for application in developing countries. In terms of results, this study provides an overview of the main steps involved in the implementation and operationalization process of an APS system in an industry, providing an important indicator for choosing and using this sort of system.

Sunday, 11:15-12:45 Sessions

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Sunday, May 3, 11:15-12:45 **Room:** Cloister North
Session: Service Relationships

Track: SRVC, 9

Chair: Joy Field

011-0746: Dynamics of Relations on Service Operations Scientific Production: A Social Network Analysis Approach

Michele Martins, Fundacao Getulio Vargas, Brazil

Guilherme Martins, Fundacao Getulio Vargas, Brazil

Joao Mario Csillag, Fundacao Getulio Vargas, Brazil

The research has the purpose of describing the structure of relationships (co-authorships) between researchers and institutions in service operations management from 1995 up to and including 2008. Data were collected from the top three relevant operations journals identified by Barman et al. (2001). A search of the ABI/Inform Global (Proquest) database with the word "service" in the titles, abstracts or subjects, revealed a total of 341 documents: 128 in IJOPM, 115 in JOM and 98 in POM. Social Network Analysis was used and the unit of analysis was an entity that consisted of a collection of authors that published papers, a total of 1,295 actors. It was possible to identify the centrality and prestige of actors and groups in the network, using measures such as degree centrality and betweenness centrality. In addition, the relationship between those measures and service operations scientific production was analyzed.

011-0537: A Theoretical Framework for Developing Product-Services Strategies

Filippo Visintin, Florence University, Italy

Mario Rapaccini, University of Florence, Italy

The aim of this paper is to present a framework to help companies develop an effective after-sales service strategy. The paper is organized as follow: firstly, we identify the benefits that customers expect to receive from the after-sales support. Secondly, we identify the factors that influence such expectations (end-user characteristics, product's costs, product's working lifetime, product's lifecycle stage, technologies embedded in the product, etc.). Thirdly, we define four customers, each characterized by different expectations in terms of after-sales service. Fourthly, we identify and define four after-sales service strategies and we illustrate the strategies that fit better with each customer's profile. Such a framework can help service managers identify the profile that best describes their company's customers and devise an after-sales service strategy accordingly.

011-0036: Learning by Customers as Co-Producers in Financial Services: An Empirical Study

Joy Field, Boston College, United States

Mei Xue, Boston College, United States

Research on organizational learning and knowledge management has a long and rich tradition. However, despite increasing customer participation in creating service products (e.g. self-service), this literature has yet to address learning by customers in their role as co-producers. Recognizing that customers and employees differ in ways that are relevant to co-producer learning, we derive a number of hypotheses involving factors that are expected to affect the customer co-producer learning rate. Using a data set of 1,638 customers of a large, national U.S. bank, we find that the factors that impact customer co-producer learning are different from those that are usually associated with employee and organizational learning. The managerial implications of our findings with respect to the design of the co-production process are discussed.

011-0501: Dynamic Cruise Ship Revenue Management

Bacel Maddah, American University of Beirut, Lebanon

Lama Moussawi, American University of Beirut, Lebanon

Hussein Rida, American Univ of Beirut, Lebanon

Cruise ship revenue management is different from that of airlines and hotels. Among the main differences is that cruise ships are characterized by multiple capacity constraints, the number of cabins in different cabin categories and the number of lifeboat seats. In this paper, we develop a discrete-time dynamic capacity control model for a cruise ship characterized by multiple constraints on cabin and lifeboat capacities. Customers arrive sequentially according to a stochastic process and request one cabin of a certain category and one or more life boat seats. The cruise ship revenue manager decides which requests to accept based on the cabin and lifeboat capacities at the time of an arrival as well as the type of the arrival. We formulate this problem as a Markov decision process. Exact solution is impractical. Therefore, we propose several heuristics. We numerically test the heuristics and compare their performance.

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Sunday, May 3, 11:15-12:45 **Room:** Cloister South
Session: Humanitarian Supply Chain Issues

Track: SCM, 10

Chair: Pinar Keskinocak

011-0488: Exploring Equivocality in Buyer-Supplier Joint New Product Development Projects

Sunil Hwang, Yonsei University School of Business, Korea, Republic of (South Korea)

Daesik Hur, Yonsei University School of Business, Korea, Republic of (South Korea)

Kyungho Jeong, Yonsei University School of Business, Korea, Republic of (South Korea)

Buying firms often involve suppliers in their new product development projects to reduce development cost and lead time and improve manufacturability of the new product. To be successful, a supplier organization needs to understand clearly its roles and responsibilities expected by the buyer organization. We conceptualize project equivocality as perceived uncertainty arising from insufficient information, unclear definitions, conflicting interpretations, and misunderstandings of facts in carrying out relevant tasks. Although both organizations may face project equivocality, this study focuses on the supplier side. Underpinned in the knowledge based view of the firm, we suggest the following four antecedents to supplier perceived equivocality: product newness, buyer's protectiveness of core knowledge, supplier absorptive capacity, and degree of buyer-supplier routine communication. 103 joint new product development projects are sampled from the automotive, electronics, and machinery industries in Korea. A structural equation modeling methodology is employed to test the hypotheses.

Sunday, 11:15-12:45 Sessions

011-0990: The Effect of Unplanned Donations on Humanitarian Logistics Coordination

Lauren Davis, North Carolina Agricultural and Technical State University, U.S. Minor Outlying Islands

Daniel de Oliveira Mota, North Carolina Agricultural and Technical State University, U.S. Minor Outlying Islands

Nolan Applewhaite, North Carolina Agricultural and Technical State University, U.S. Minor Outlying Islands

The management of unplanned donations stemming from the public's response to a disaster event is a challenging process within humanitarian logistics. Unplanned donations represent a source of supply that is unpredictable in timing, quantity, and condition. In order to characterize the flow of unplanned donations, a discrete-event simulation model for a humanitarian supply chain is developed. We assume unplanned donations are received by a central agency and then pushed to the local relief organization. Three coordination mechanisms associated with the level of information visibility and the level of cooperation are considered. The impact of these strategies on the distribution process of the local disaster relief agency is discussed.

011-0984: Debris Management Operations

Ozlem Ergun, Georgia Institute of Technology, United States

Pinar Keskinocak, Georgia Institute of Technology, Georgia

Monica Villarreal, Georgia Institute of Technology, United States

Jose Carbajal, Georgia Institute of Technology, United States

Debris is the waste resulting from a disaster. According to FEMA (Federal Emergency Management Agency), debris removal operations account for approximately 27% of the disaster recovery costs; therefore, such operations require to be performed as efficiently as possible. Up to now, most of the literature devoted to disaster debris cleanup is mainly descriptive and of strategic character, and there is a need of developing analytical methods to improve the execution of a debris management plan. We have identified the main activities to perform during each stage of such a plan, developed a mathematical model for the debris collection problem right after a disaster strikes, and tested it on cases generated based on real-world instances.

011-0662: Heuristics for Disaster Response Supply Chains

Erica Gralla, MIT, United States

Jarrod Goentzel, MIT, United States

Charles Fine, MIT, United States

Disaster relief supply chains are particularly challenging to build and manage because it is difficult to gather reliable information on the situation, and it evolves rapidly in an unplanned manner. Nevertheless, these supply chains must be built extremely fast, and must adapt as the situation changes. Traditional operations management methods of modeling and optimization depend on available data and time. This paper suggests, as an alternative, the notion of "heuristics" for rapid supply chain design: useful yet approximate decision rules for guiding emergency response. They allow quick decisions based on little information, and provide a reasonable (if suboptimal) response. Such heuristics are identified and evaluated within current disaster response practice, based on field work with humanitarian aid organizations. More broadly, heuristics are discussed as part of a flexible planning strategy for disaster relief organizations.

011-0980: Modeling Influenza Pandemic, Intervention Strategies, and Food Distribution

Julie Swann, Georgia Institute of Technology, United States

Pinar Keskinocak, Georgia Institute of Technology, United States

Pengyi Shi, Georgia Institute of Technology, United States

Ali Ekici, Georgia Institute of Technology, United States

Experts report that a future pandemic influenza is inevitable and likely imminent. Evidence suggests that an efficient and rapid response will be crucial for mitigating morbidity, mortality, and costs to society. To aid with planning, we model the spread of pandemic influenza, both geographically and over time, using an agent-based simulation approach. We use the spread model to evaluate intervention strategies and the effect of influenza seasonality or mutations on planning and response. We integrate the spread model with optimization of the supply chain response (e.g., locating facilities for a food distribution network). We use the state of Georgia as a test case and present the infections incurred and meals needed for one year along with the design of the supply chain network. In addition, we study the effect of timing and length of the quarantine or school closings on the disease spread and food distribution logistics.

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Sunday, May 3, 11:15-12:45 **Room:** Captain
Session: Networking

Track: SCM, 24

Chair: Donghyun Choi

011-0764: Supply Chain Sourcing Under Asymmetric Information

gal raz, Darden Graduate School of Business, University of Virginia, United States

Ozalp Ozer, Columbia University, United States

We study a supply chain with two suppliers competing over a contract to supply components to a manufacturer. One of the suppliers is a big company for whom the manufacturer's business constitutes a small part of his business. The other supplier is a small company for whom the manufacturer's business constitutes a large portion, if not all, of his business. We analyze the problem from the perspective of the big supplier and address the following questions: What is the optimal contracting strategy that the big supplier should follow to win the manufacturer's business? How does the information about the small supplier's production cost and the manufacturer's processing cost affect the parties' profits and the big supplier's contracting decision? We show that under certain conditions, the total supply chain profits are independent of the information regarding the small supplier's costs, although the division of profits depends on that information.

011-1003: Providing Optimal Management of Disruptions in Complex Supply Chains

Sunday, 11:15-12:45 Sessions

Frneck Waage, *University of Massachusetts Boston, United States*

The literature on supply chain management frequently argues that the principles of “demand – pull” should guide decision makers when they make the operating decisions for supply chains. Satisfying “demand – pull” principles is a necessary condition for creating profitable growth. It is never stated, however, in the literature just how such decisions can in practice be developed. Nor is it stated anywhere just how a supply chain manager may optimally react to disruptions in the supply chain. This paper solves both of these problems. It shows how a supply chain manager can use linear programs to model the supply chain, and how to extract the optimal management decisions from the model in practice. It shows further how to react optimally to disturbances, changes and interruptions in the Supply Chain.

011-0475: The Manufacturer and Supplier Relationship in After Sale Supply Chain: The Influence of Network Structure Change

Hyun-Mok Jeong, *Yonsei University, Republic of South Korea*

Sang Lee, *University of Nebraska, Lincoln, United States*

Donghyun Choi, *University of Nebraska, Lincoln, United States*

Researchers have long studied relationships between suppliers and manufacturers. Many researchers have suggested that reducing the supply base and investing in relation-specific assets would encourage suppliers and buyers to maintain long term relationships. However, these studies dealt with relationships between suppliers and manufacturers for final goods only. Compared to final goods supply chain (FGSC), the after sale supply chain (ASSC) is more complex to deal with than FGSC. Specifically, in ASSC, manufacturers must be aware that suppliers can sell their products directly to retailers such as repair shops. In this case, suppliers can become competitors of manufacturers and make inroads into manufacturers' profit from selling parts. In this study, I aim to explain how structural changes in the supply chain can create "dark side" effects in ASSC.

011-0838: Information in Supply Chains and the Importance of Networks

Simon Veronneau, *Chaîne Research Group, HEC Montreal, Canada*

Yan Cimon, *CIRRELT, Université Laval, Canada*

As supply chains cross continents and lengthen substantially, their network architecture and management become more complex. Communication networks, both formal and informal, play an important part in the management of these chains. The purpose of this paper is to shed light on the social aspects of processes in global supply chains. First, supply chains are presented as technology supported social processes. Second, it shows that supply chain networks are incubators of knowledge creation where leakages, capture, and exchange represent important challenges. Third, an emphasis is placed on how such environments lead to sustained value-creation. As such, this paper reports on some findings of previous studies on networks within supply chains, their place, importance, and management as well as some empirical evidence from the authors' field work.

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Sunday, May 3, 11:15-12:45 **Room:** Yeoman
Session: SC Performance

Track: SCM, 33

Chair: Veronica H. Villena
Martinez

011-0435: Value of Quick Response under Competition

Yenting Lin, *University of North Carolina at Chapel Hill, United States*

Ali Parlakturk, *University of North Carolina at Chapel Hill, United States*

Quick response (QR) reduces order lead times and enables in-season replenishment for retailers. By studying a supply chain with a supplier serving two competing retailers, we investigate the value of QR when the supplier sets the price for this in-season replenishment endogenously. We also study the effect of the retailers' competition, demand uncertainty, and the supplier's availability to market information on the firms' profitability. We show that QR can benefit the retailers by reducing the intensity of competition. Furthermore, the supplier may not always benefit from knowing the market demand information.

011-0649: The Role of the Supply Chain Executive in Supply Chain Integration: A Behavioral Approach

Veronica Villena Martinez, *Instituto de Empresa Business School, Spain*

Luis Gomez-Mejia, *Arizona State University, United States*

Elena Revilla, *Instituto de Empresa Business School, Spain*

Applying the behavioral agency model, this paper analyzes human resource factors that induce supply chain executives (SCEs) to foster or hinder supply chain integration. We examine two internal sources -compensation and employment risk- and one external source -environmental volatility- of risk bearing that can make SCEs more reluctant to promote supply chain integration. We argue and empirically confirm the notion that an employment and compensation system that increases SCE risk bearing reduces risk taking and thus discourages supply chain integration. We also reveal that this negative relationship becomes stronger under conditions of high environmental volatility. In addressing the “so what?” question, we find empirical support for the hypothesis that supply chain integration positively influences operational performance. Using a sample of 133 Spanish firms, the results reported here enhance our knowledge about the antecedents and consequences of SCE risk bearing.

011-0198: Supply Chain Management in Volatile Times

Yossi Sheffi, *MIT, United States*

Most of the work on supply chain volatility had been focus on demand variability. Some studies have looked at supply chain disruptions. Recent economic upheaval suggests that factor prices such as the price of energy and the cost of money have been exhibiting large fluctuations which are changing the way supply chain managers look at strategy. This work explores the related questions and some suggested approaches.

Sunday, 11:15-12:45 Sessions

167	Sunday, May 3, 11:15-12:45 Room: Scribe Session: Product Re-X 2	Track: SUST, 14	Chair: S Viswanathan
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011-0900: Forecasting Product Returns for Production Planning and Control in Remanufacturing

Rajesh Srivastava, Florida Gulf Coast University, United States

Toyin Clotey, The Ohio State University, United States

There is a growing focus on sustainability in corporate objectives. Among the business processes used for sustainability is reuse. A key subset of reuse is remanufacturing. In this study, we consider a manufacturer that also acts as a remanufacturer, and develop a generalized forecasting approach to determine the returns of used products, as well as integrate it with an inventory model to enable production planning and control. An auto-regressive distributed lag model is developed for forecasting product returns given previous sales volumes. Forecasts are used as inputs to a newsvendor type inventory model. Accurate predictions of the proportions of returns are important for procurement decisions, capacity planning, production planning, and disposal management. An insight of the study is that the interpretation of the model's rate parameter indicates how long a sales spike or dip is expected to affect the magnitude and timing of the return volumes.

011-0615: Inventory Planning for Spare Parts with Long Inter-Demand Intervals

S. Viswanathan, Nanyang Business School, Nanyang Technological University, Singapore

Chenxi Zhou, Nanyang Business School, Nanyang Technological University, Singapore

We consider the problem of controlling the inventory of spare parts in reverse logistics networks. Typically, demand for spare parts and components is intermittent in nature; that is, many periods of zero demands followed by a sporadic demand of random size in a particular period. We consider the situation when the time interval between positive demands is larger than the lead time for manufacturing or procurement. We first consider the situation where the size of the positive demand is deterministic. We develop structural properties of the optimal policy for the problem in special cases. We then consider the case where the size of the positive demands is random. This problem involves determining the optimal timing as well as the size of each order. We develop the optimal policy for the problem. A comprehensive computational study is then carried out to develop insights into the structure of the optimal policy.

011-0117: Optimal Ordering Policy for New/Reused Parts in a Closed-Loop Supply Chain

Yasutaka Kainuma, Tokyo Metropolitan University, Japan

Japan has undergone a long period of economic growth based on mass production, mass consumption, and mass disposal. But as a result, the country is facing environmental constraints today, such as shortages of landfill sites for waste, and resource constraints, such as the threat of future depletion of mineral resources. These constraining factors could become a burden on economic growth. A lot of Japanese companies tend to carry out remanufacturing systems due to these issues. As a result, manufacturing with reused-products or reused-parts becomes an important business strategy for many Japanese manufacturers. In this paper, we proposed an optimal ordering policy for new/reused parts in a Closed-Loop Supply Chain. The manufacturer in the supply chain decides the order quantity of new and reused parts minimizing their total cost. In conducting the study, we confirm the efficiency of the proposal.

011-1001: A Single Period Multi-Echelon Reverse Logistics Network Design for Product Recovery

Kannan Govindan, University of Southern Denmark, Denmark

Due to the increasing environmental deterioration, government regulations, social responsibilities, resource reduction and economic factors, many companies are engaged in the product recovery business. This paper proposes an alternative way to recover the value from the used tire. The implementation of such remanufacturing system usually requires an appropriate reverse logistics network for choosing the physical locations, facilities, and transportation links to convey the used products from customers to the remanufacturing facility and from there to secondary markets. The main objective of this work is to develop a single period mixed integer non-linear programming model for maximizing the profit of a multi-echelon reverse logistics network. The proposed model provides the decisions relate to the number of facilities to open, their locations and also the allocation of the corresponding product flows. Genetic algorithm is used as a problem solving approach in this study for optimizing the reverse logistics network.

168	Sunday, May 3, 11:15-12:45 Room: Knave Session: Resource Planning and Modeling in Healthcare	Track: HLTH, 10	Chair: Diwas KC
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011-0657: An Econometric Analysis of Patient Flows in the Cardiac ICU

Diwas KC, Emory University, United States

Christian Terwiesch, University of Pennsylvania, United States

This paper explores the rationing of bed capacity in a cardiac intensive care unit (ICU). We find that a patient is likely to be discharged early when the occupancy in the ICU is high. This in turn leads to an increased likelihood of the patient having to be readmitted to the ICU at a later time. We analyze the capacity implications of revisits, shedding light on the question of whether an ICU should apply an aggressive discharge strategy.

011-0660: The Impact of Size And Occupancy of Hospital on the Extent of Ambulance Diversion: Theory and Evidence

Sarang Deo, Northwestern University, United States

Gad Allon, Northwestern University, United States

Sunday, 11:15-12:45 Sessions

Many emergency departments (EDs) frequently report periods of overcrowding during which they are forced to divert incoming ambulances to neighboring hospitals, a phenomenon known as "ambulance diversion." We first develop a queuing network model to study the impact of key structural characteristics of the hospitals such as the number of ED and inpatient beds and the utilization of inpatient beds on the extent to which hospitals go on diversion. We then test the qualitative findings of our analytical model by estimating a selection model using cross-sectional data on California hospitals and find moderate support for our results. We also find that certain hospitals, owing to their location and ownership structure, are more likely to employ ambulance diversion than others.

011-0663: A Partially Observable Model for the Liver Transplant Waiting List

Burhaneddin Sandikci, University of Chicago, United States

Lisa Maillart, University of Pittsburgh, United States

Andrew Schaefer, University of Pittsburgh, United States

Mark Roberts, University of Pittsburgh, United States

The end-stage liver disease patients in the United States join a waiting list for cadaveric liver transplantation. The liver transplantation system publishes incomplete information about the composition of this waiting list. Patients on the waiting list are faced with the problem of accepting or rejecting an offered liver. We model and analyze this accept/reject decision problem from an individual patient's perspective, where we use a partially observed Markov decision process (POMDP) description to model the incomplete information in the system. In a previous study, we have formulated a Markov decision process (MDP) model for this system and introduced the concept of a patient's price of privacy, namely the value of accessing more precise waiting list information. We compare this POMDP model to the previous MDP model to obtain more precise estimates of the patient's price of privacy. We present the results of clinically driven numerical experiments.

011-0733: Ice-Breaker vs. Stand-Alone Service Provider: How Best to Use Physician Extenders?

Denise White, University of Cincinnati, United States

Craig Froehle, University of Cincinnati, United States

Justifications for the use of physician extenders, such as Physician Assistants and Nurse Practitioners, in outpatient clinics include enabling the physician to serve more patients, increasing access to care, improving clinic financial performance, and providing a low-cost alternative for follow-up visits. A physician extender can be deployed in two ways: (1) as an "ice-breaker" physician's assistant, visiting the patient in advance and passing along critical information or (2) as a stand-alone service provider able to see a certain subset of patients. We examine the influence of several decision criteria, including efficiency gains, revenue and salary differentials, and others on the decision of how best to deploy a physician extender. Results from discrete event simulations across multiple performance measures inform clinical and staffing policy decisions.

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Sunday, May 3, 11:15-12:45 **Room:** EC-D1
Session: Panel on Empirical Research in OM

Track: EMPR, 11

Chair: John Gray

011-0816: Panel on Empirical Research in Operations Management

Aleda Roth, Clemson University, United States

Enno Siemsen, University of Minnesota, United States

John Gray, Ohio State University, United States

This panel will cover a variety of special issues in conducting empirical research, including common methods bias, secondary data applications, and approaches to measurement and scale development. Once critical methodological concern that frequently arises in empirical studies pertains to how common methods variance (CMV) influences the evaluation of parameter estimates. We will show how statistical theory can provide insights pertaining to the conditions under which CMV may influence empirical results in regression models. Another emerging area of interest is the use of secondary data in operations management. We will discuss data sources and issues that must be considered when using data from other sources. Other areas of measurement and scale development will be evaluated.

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Sunday, May 3, 11:15-12:45 **Room:** EC-B
Session: Product, Process, and Organization Issues

Track: PITM, 9

Chair: Sid Rupani

011-0502: Rethinking the Platform Approach in the Automotive Industry

Mike Danilovic, Jönköping International Business School, Sweden

Mats Winroth, Chalmers University of Technology, Sweden

In many industrial areas, such as in the automotive industry, the development of joint technology platforms is seen as an enabler for improving efficiency, facilitating frequent and rapid new product and technology introductions, as well as transfer of production between units. During the present financial recession, especially in the automotive industry, it has become obvious that there might be extensive drawbacks to using integrated platforms for several brands if different companies within large industrial groups are extremely integrated in terms of organization, technology, and know-how. In integrated product structures, major product changes, however, become more difficult and more expensive to carry out. If companies have products based on very different technologies, integration is also not easily achieved and it may be almost impossible to merge several brands into one group and one platform. In this paper we identify implications of widely implemented integrated technology platform thinking in the automotive industry.

011-0648: Commonality in Enterprise Product Development Processes

Sidharth Rupani, Massachusetts Institute of Technology, United States

Warren Seering, Massachusetts Institute of Technology, United States

Sunday, 11:15-12:45 Sessions

This paper deals with the issue of standardization versus diversity in enterprise product development processes. The overarching question is "what is the right level of variation across product development processes in a multi-project organization?" Process standardization offers several benefits in terms of efficiency and learning, but process diversity can allow projects that vary widely in characteristics like scale, complexity, technological novelty, etc. to execute the process that fits their needs and thus more effectively meet project targets of cost, schedule, and quality. This paper builds on a broad survey of the literature as well as interviews with practicing process owners and project managers to lay out a framework to manage this tradeoff. Three specific questions are addressed: a) how do product development processes differ across projects in an organization, b) what factors drive these differences, and c) how do these differences impact performance on both project-level and organization-level outcomes?

011-0525: A Multinational Study of Factors Influencing Crossfunctional Conflict

Hamieda Parker, University of Cape Town, South Africa

Anthony Ross, Michigan State University, United States

Tino Mueller, University of Cape Town, South Africa

The automotive industry faces a challenging pace of change which demands a high level of adaptability. Change within an organization generally involves multiple functions with the potential to cause crossfunctional conflict. Conflict in return can result in frictional losses that directly affect the bottom line as time and money are wasted. Drawing on relevant previous studies, five factors were identified which hold the potential to influence crossfunctional conflict. This study aims to contribute to understanding crossfunctional conflict in situations when teamwork is required to implement a process improvement or a strategic change. A sample from the automotive industry in three countries (Germany, Mexico, and South Africa) was used to statistically test the hypotheses developed in this study. Qualitative as well as quantitative data were used to evaluate the influence of five proposed factors on crossfunctional conflict.

171	Sunday, May 3, 11:15-12:45 Room: EC-C Session: Recovery Operations	Track: DSTR, 1	Chair: Fetter Fetter
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011-0253: Improving Debris Disposal Operations using Prospective Spatial-Temporal Analysis

Gary Fetter, Virginia Tech, United States

Terry Rakes, Virginia Tech, United States

As shown by Hurricane Katrina and other recent disasters, disposing of disaster-generated debris can be quite challenging. Extraordinary amounts of debris far exceeding typical annual amounts of solid waste are almost instantaneously deposited across a widespread area. Although the locations and amounts of debris can be easily summarized looking back after recovery activities have been completed, they are uncertain and difficult to estimate in real-time. Inaccurate estimates can result in inefficient resource allocation, increased costs, prolonged recovery, and increased social, political, and economic unrest. This paper compares the use of two common prospective spatial-temporal analysis methods to prioritize regions for allocating resources by detecting emerging patterns in real-time as debris information becomes available during disposal operations. Kuldorff's Scan Statistic and Cumulative Sum (CUSUM) Statistical Process Control methods—both successfully used in prospective detection of disease outbreaks—are adapted and evaluated using debris disposal data from a 2003 hurricane.

011-0712: Architectures for Disaster Response Platforms

Geoffrey Parker, Tulane University, United States

During times of emergency local, state, and federal authorities may be called upon to react. Effective response requires close collaboration among organizations that is often absent, resulting in failures such as those seen during the 2003 invasion of Grenada, in New York on September 11, 2001, and in August/September 2005 in the Gulf South after Hurricane Katrina. We argue that these failures are unsurprising partly because responding organizations normally operate independently and their systems naturally evolve at different rates. As a result, the rapid systems integration required during a disaster is difficult to achieve. We describe some possible architectural solutions with examples drawn from communications and logistics.

011-0791: Incorporating Recycling into Post-Disaster Debris Disposal

Gary Fetter, Virginia Tech, United States

Terry Rakes, Virginia Tech, United States

Christopher Zobel, Virginia Tech, United States

Although large amounts of disaster-generated debris significantly strain landfill capacities, until recently existing policy provided no financial incentive to consider other disposal alternatives such as recycling. Last year, FEMA released a new pilot program that provides incentives for communities to recycle by allowing them to retain revenue from the sale of disaster debris for recycling. This first-ever policy offers significant financial benefits for communities seeking to clean up in an environmentally responsible way but requires reexamining existing assumptions and decision processes that are based on prior reimbursement programs. This paper presents a decision model with recycling incentives for assigning debris recovery teams and locating temporary disposal and storage reduction (TDSR) facilities in support of disaster debris cleanup operations. Extensions to the hierarchical facility location model are proposed to incorporate the unique assumptions, objectives, and constraints of debris disposal in light of FEMA's new policy.

172	Sunday, May 3, 11:15-12:45 Room: Gallery Session: Human behavior and knowledge management II	Track: BDOM, 6	Chair: Marcelo Gallardo
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011-0042: Competencies to Improve Productivity: A Structural Model

Marcelo Saravia Gallardo, UNIVERSIDAD CATÓLICA BOLIVIANA, Bolivia

Sunday, 11:15-12:45 Sessions

The world of employment has radically changed in the last 10 years, and due to that, a new paradigm recently has been developed to improve human resources inside organizations: "Workplace Competencies for Professional Excellence." To get on board with this major challenge, some relevant employment experts have produced models of application in Europe and United States: Bunk (1994), Mertens (1996; 1999; 2000), Echeverría (2001; 2002), SCANS (1992; 1993). Nevertheless these efforts have severe conceptual and application deficiencies. In the last four years we have developed a model that addresses these limitations. A "Structural Model of Competencies for Productivity" has theoretical and scientific rigor and shows a General Workplace Competence including four main competencies: Scientific, Practical, Personal and Social, all which are clearly applicable throughout eleven dimensions and more than 130 indicators with wide orientations for organizations and managers to really improve institutional quality.

011-0688: Solidary Economy in Brazil: Surplus Distribution in an Autogestionary Cooperative

Juliana Cibebe, Coopercaixa, Brazil

Reinaldo Costa, University of São Paulo, Brazil

Abraão Júnior, University of São Paulo, Brazil

The internationalization of the 1990s economy and its effects has led many Brazilian industries into bankruptcy, causing structural unemployment. This stimulated a social movement called Solidary Economy that creates autogestionary productive associations as an alternative to unemployment, and today, more than 20 thousand units and 1.6 million people are working cooperatively with internal democracy and egalitarian surplus distribution. This work addresses this movement as an alternative to unemployment and social exclusion in Brazil, taking as an example the case of a bankrupted industry transformed into an autogestionary production cooperative - Coopercaixa. The study aims to analyse the new production management mode and the participation of each worker in the economic surplus. The work also discusses the reasons and ways to promote the solidary economy: producers associations, cooperatives, autogestionary companies, production groups, purchases and sales units and communitarian banks.

173	Sunday, May 3, 11:15-12:45 Room: EC-A Session: Pricing and variability	Track: INV, 3	Chair: Qi Feng
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011-0105: Price Alteration of Inventories as an Emergency Action

Kathryn Stecke, The University of Texas at Dallas, United States

Nagihan Comez, Bilkent University, Turkey

We study the dynamic pricing strategy as a hedge to demand-supply mismatch. Dynamic pricing may lead to better supply-demand match by approaching from the demand side in a price dependent demand market. While a regular competitive market price is charged under regular inventory levels, during the long lead time of orders, a retailer may apply a temporary price change to handle any imbalance in inventory levels to optimize his expected profit. Our interest is to gain insight about the benefits of dynamic pricing policy and its effects on regular replenishment policy.

011-0319: Impact of Inventory Allocation Policies on Downstream Supply Variability in a Multi-echelon System

Suman Niranjan, State Univ of NY at Binghamton, United States

Frank Ciarallo, Wright State University, United States

In this paper we study the impact of inventory allocation policy on the downstream supply variance in a two-echelon system with multiple sources of demand in the upper echelon. Allocation policies play a crucial role in deciding the amount of inventory assigned to every source of demand. We find that inventory allocation policy has a direct impact on the downstream supply variance, in turn affecting the optimal safety stock cost and total cost in a supply chain. We introduce a new metric that will aid managers in the selection process of inventory allocation policies in the presence of multiple sources of demand, and further determine the relation between the inventory allocation policy and the new metric. A Simulation based Inventory Optimization (SIO) algorithm is developed to obtain the best base-stock levels for a two-echelon system based on derivative estimates from an Infinitesimal Perturbation Analysis (IPA) framework.

011-0210: Sourcing from Multiple Unreliable Suppliers for Price-Dependent Demands

Ruixia Shi, The University of Texas at Dallas, United States

Qi (Annabelle) Feng, The University of Texas at Austin, United States

We consider a firm that replenishes a product from multiple unreliable suppliers for price-dependent demands over multiple periods. In each period, the firm decides the amount of orders from each supplier, and product's price. The difficulty with this problem is the profit function is not concave in the orders to each supplier. We prove the concavity of the optimal profit function in the inventory level. For deterministic capacities, we derive the optimality of the modified base-stock list-price policy. In general, the presence of capacity uncertainty leads to a nonlinear inventory-dependent pricing and replenishment policy. On the other hand, the price-dependent demand uncertainty results in non-monotone ordering quantities in the inventory level. We characterize the conditions under which both the optimal number of suppliers to be retained and the optimal price are nonincreasing in the inventory level. Under the same conditions, there is a unique re-order point for each supplier.

174	Sunday, May 3, 11:15-12:45 Room: EC-E Session: Demand and Satisfaction in the Public Sector	Track: LAPS, 7	Chair: Juliana Hsuan
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011-0496: Modularity in Care and Service Provision: An Exploratory Case Study

Jos Schols, Tilburg University / Tranzo, Netherlands

Carolien de Blok, Tilburg University / Tranzo, Netherlands

Bert Meijboom, Tilburg University / Tranzo, Netherlands

Sunday, 11:15-12:45 Sessions

Katrien Luijckx, *Tilburg University / Tranzo, Netherlands*

In most Western countries, public service providers are operating in a mass-customization like environment in which they have to align customization and efficiency goals. While the advantages modularity can offer to private mass-customization environments are well-known, its characteristics and implications have hardly been researched in public services. By means of exploratory case research, packages of care and related services of four providers in the Dutch elderly care sector were investigated against product and service modularity features as identified in literature. Among others, results show that, strikingly, the aim of modularity, i.e. customization of content elements, is perceived as less far-reaching as personalization of delivery-related elements. The output of our study are propositions for new theory that capture the characteristics and essentials of modularity in public service provision to the elderly, to be tested and refined in subsequent research.

011-0576: An Empirical Investigation of High-Frequency Electricity Market Data

Eric Bentzen, *Copenhagen Business School, Denmark*

Electricity consumption is very important to predict. Among other things, just think of the investment in transformers and other equipment to meet demands. In this paper, high-frequency data showing consumption and clearing prices are analyzed. Short- and long-term effects in electricity consumption can very often be hard to identify. The reasons behind the missing identification are several, but in order to find the causes, it is very important to find the main effects of the time series under investigation. In this paper the main effects, short and long term, and the random variations will be investigated. And we identify dynamic elasticities during the selected period.

011-0307: Improving Demand Pattern Analysis with Zero-inflated Count Models

Hubert Setzler III, *Francis Marion University, United States*

Cem Saydam, *UNCC, United States*

Demand pattern analysis describes how Emergency Medical Services supervisors determine ambulance resource allocation. These factors include number and location. The purpose of these deployment models is to maximize coverage while minimizing resources. These models are not effective without accurate forecasts. The finer the granularity of time and space in which these predictions are to be made, the greater the chance that the count values are zero. This phenomenon renders traditional forecasting techniques impotent. When the huge majority of observations are zero, a forecast of zero every time will have an extremely low error. However, this eliminates the utility of the forecast because we deploy ambulance based on the possibility of an emergency, not the possibility of not having one. Therefore, zero-inflated count models will be applied in an attempt to increase the accuracy and also the utility of the forecasts.

011-0325: Reducing Uncertainty and Equivocality in the Supply Chain

Dianne Hall, *Auburn University, United States*

Joseph Skipper, *Air Force Institute of Technology, United States*

Joe Hanna, *Auburn University, United States*

Joseph Huscroft, *Auburn University, United States*

Today's business environment is increasingly volatile and unpredictable. As a result, the environment is difficult to predict, making disruption-reduction positioning difficult. Disruptions are not merely an inconvenience to an organization or the organization's clients, but may result in major economic impact. Nearly all businesses that experience a disruption suffer a reduction in profitability and experience two years at a lower level of productivity, irrespective of industry or cause of disruption (Hendricks and Singhal, 2005). Higher levels of risk are evident as interdependency among organizations increases (Christopher, 2002). Inherent in risk are uncertainty and equivocality. In this study, we propose that contingency planning is an effective means of uncertainty reduction, and that organizational flexibility is an effective way for organizations to reduce equivocality. Thus, we examine the relationships between information sharing, collaboration, information technology, and organizational flexibility during the contingency planning process.

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Sunday, May 3, 11:15-12:45 **Room:** EC-F
Session: Performance of LEAN Systems

Track: JIT, 3

Chair: Christian Rossetti

011-0477: Measuring Performance and Lean Production: A Review of Literature and a Proposal for a Performance Measurement System

Vagner Cavenaghi, *São Paulo State University, Brazil*

Kleber Gama, *São Paulo State University, Brazil*

The purpose of this study is to revise literature identifying Lean Production's main characteristics and a Performance Measurement System that has adherence to this management model. It is our aim to provide organizations with conditions to understand that this management model needs appropriate performance indicators where the focus is not only directed towards production volume, but rather on producing only what is needed, eliminating waste throughout the production process. The paper explores literature and reviews studies carried out in the performance measurement area and Lean Production, thus finding critical factors for developing an appropriate PMS for this management philosophy. We conclude that it is necessary to evolve in this knowledge area that involves production management and operations with the support of a PMS and indicators that adhere to the principles of Lean Production, avoiding distortions in the information obtained by performance indicators that are inappropriate for this model.

011-0583: What is the Relationship between Lean Practices, Supply Chain Complexity, and Manufacturing Plant Performance?

Cecil Bozarth, *North Carolina State University, United States*

Christian Rossetti, *North Carolina State University, United States*

Don Warsing, *North Carolina State University, United States*

Barb Flynn, *Indiana University, United States*

Sunday, 11:15-12:45 Sessions

In this research project, we empirically examine alternative proposed relationships between lean practices, supply chain complexity, and manufacturing plant performance, using a sample of data from 209 plants. This research builds on works by Shah and Ward (JOM 25, 2007, pp. 785-805) and Bozarth et al. (JOM 27, pp. 78-93).

011-0909: Lean Production, Market Share, and Value Creation in the Agricultural Machinery Sector in Brazil

Ullisses Shimizu, Mackenzie university, Brazil

Leonardo Basso, Mackenzie University, Brazil

By adopting Lean Manufacturing firms want to see the value created in its results at the bottom line. The agricultural machinery and implements sector in Brazil had experience in Lean and saw its results affected by the program. Using an established analytical model, the paper tests three hypotheses: H1: firms with a high degree of management commitment to the program simultaneously support this commitment with investments in support of the plant infrastructure and problem-solving groups; H2: firms that adopt lean principles have made changes in the direction of these principles; H3: firms that made continuous investments in plant infrastructure to support lean principles have better performances. All hypotheses H1, H2 and H3 were fully accepted and corroborated.

011-0931: Manufacturing Complexity: Common Attributes of Manufacturing System Design and their Effects on System Performance

T. J. Gabriel, N. Georgia College and State University, United States

Manufacturing operations are complex. Some of the complexity arises from decisions regarding the design attributes of a system, e.g. number of products, breadth of product structure, and number of operations in the routing. Because of the differences from one operation to another, it is difficult to make comparisons or account for the relative complexity among manufacturers in research. To study the impact of eight system design attributes that are common among most manufacturing systems, a large scale simulation of a generic batch-type manufacturing system was conducted. The result of the study will identify the effects of these system attributes and discuss how these effects should be given consideration as managers make decisions that alter a system's design.

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Sunday, May 3, 11:15-12:45 Room: EC-G
Session: Marketing Effects on Success

Track: MKTG, 10

Chair: Dilip Chhajed

011-0262: Satisfaction on the Adoption of the Balanced Scorecard - Drivers of Success

Frederico Barbosa, Universidade Potiguar - UnP, Brazil

Kleber Nobrega, Universidade Potiguar - UnP, Brazil

Rodrigo Leone, Universidade Potiguar - UnP, Brazil

Balanced Scorecard (BSC) appears among the recently most used management models for deployment and implementation of strategies. In order to improve managerial communication processes, this model was implemented by a major industry of elevators, operating worldwide. This work is a case study in its Brazilian operation, which aimed to evaluate, after two years of implementation, the satisfaction of employees on how to comprehend and run matrix strategies. The results demonstrate the success of the communication in the form of implementing the model. It was possible to verify the contribution of the model adopted for the dissemination and implementation of organizational strategies.

011-0071: How Marketing Affects SME Firm Profitability, Growth, and Success

Jukka Hemilä, VTT Technical Research Centre of Finland, Finland

Mika Oinas, Chiller Oy, Finland

From the manufacturing industries could be found many well-known small and medium-sized enterprises with established brand status in their home markets. When such a company has plans for growth through exporting, it needs a huge marketing effort. The marketing effort is useless if a company is not believable from the international customers' points of view. For ensuring profitable growth in international markets, a company should be managed well in all operation levels: purchasing, manufacturing, delivering and marketing. It is a challenge for operation management to update all business functions to fulfil the needs coming from international markets. Marketing is the tool for a company to visualise own capabilities, offerings and the brand for the exporting markets. This paper is a story of one company from Finland with great products, willingness for growth, and the effort they have made for operations management to support their growth in international markets.

011-0263: A Negotiation-Based Capacity Planning Model

Kung-Jeng Wang, National Taiwan University of Science and Technology, Taiwan, Republic of China

Shih-Min Wang, National Taiwan University of Science and Technology, Taiwan, Republic of China

In a multiple-factories environment, finite budgets for capacity planning and allocation have become an incentive to improve system performances. We develop a model to negotiate and resolve the budget conflicts among factories. Motivated by potential benefits, factories are modeled as intelligent agents that exchange negotiable budget plans with each other under asymmetric information. All factories are self-interested business units and seek to fully utilize allocated budgets so as to maximize their own profits. A negotiation-decision-function mechanism is designed to mimic the attitude of a factory. Intrinsic and budget utility functions are used as performance indices to examine the behaviors of negotiation trajectories. Once the compromised budget allocation plan is obtained after a negotiation process, each factory develops its resource investment portfolio and capacity plan. Experimental outcomes have empirically justified that the proposed model provides an efficient tool to examine the influences of different negotiation attitudes.

011-0933: Commonality in Product Line Design under Horizontal Preference Structure

Dilip Chhajed, University of Illinois, United States

Kilsu Kim, Sogang University, Korea, Republic of (South Korea)

Sunday, 11:15-12:45 Sessions

We present an analytic model of product line design with two attributes for which consumer segments exhibit opposite preference ordering. Our focus is on studying the implications of making an attribute common. Our results show that commonality strategy, when it saves cost, can intensify or relieve a cannibalization problem within a product line under certain conditions, can make a first best solution implementable even when it is not under non-commonality strategy, and results in smaller amount of differentiation along the attribute that is not common.

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Sunday, May 3, 11:15-12:45 **Room:** EC-H
Session: Operations Management in LA&C

Track: LA&C, 1

Chair: Rebecca Arkader

011-0902: Implementation of a Computer Application for Production Planning and Scheduling for a Colombian Company

Gonzalo Mejia, UNIVERSIDAD DE LOS ANDES, Colombia

Andrea Hernandez, MDO Consultores S.A., Colombia

This paper describes the development and implementation of a computer application for production planning and scheduling in a Colombian auto part company. The paper illustrates the functionality of an application which uses a Closed-loop MRP (Materials Requirement Planning) logic. The Master Production Schedule (MPS) is validated through a detailed shop floor scheduling plan. The application also provides features such as stock verification and real time schedule updates. A comparison of the current practices vs. the application outputs is fully analyzed. A case study illustrates the issues of the implementation and provides insights for future improvements.

011-0776: Impacts of the Adoption of Electronic Reverse Auctions on the Relationship Between Large Buyers and their Service Suppliers

Gustavo Klein, Petroleo Brasileiro S.A. - Petrobras, Brazil

Rebecca Arkader, The Coppead Graduate School of Business, Federal University of Rio de Janeiro, Brazil

Over the last few years the use of e-procurement tools has increased among Brazilian companies, in particular with the adoption of electronic reverse auctions not only for the purchase of goods but also of services. However, there have been concerns about their adverse effects on buyer-supplier relationships. In order to explore such effects in the case of service acquisitions a qualitative study was conducted with three dyads of large Brazilian buyer companies and their service suppliers. Results indicate that the impacts of reverse e-auctions on buyer-supplier relationships tend to be negative or neutral depending basically on the power relationships in the dyad and on the way competitive advantages of suppliers are perceived by buyers. As a consequence, differentiating aspects of purchased services may be lost during the process and may negatively affect performance and compliance.

011-0639: Retail Distribution Strategies in Emerging Markets

Luz Torres, Center for Latin-American Logistics Innovation, Colombia

Edgar Blanco, MIT Center for Transportation & Logistics, United States

In Latin America, as well as many other emerging markets, the retail sector includes a large number of small, independent, owner-operated and usually very low-technology convenience stores. This channel represents a significant share of trade sales and varies across the region. It is estimated to be upwards of 50% in Colombia, 60% in Argentina and close to 70% in Brazil. Thus, distribution operations in urban and rural environments in Latin America are very complex and costly. Through case studies, this presentation will highlight and classify successful distribution strategies implemented in Latin America that have successfully integrated this unique retail channel. We will also discuss recent technological innovations and their implications for the future of Latin-American supply chains.

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Sunday, May 3, 11:15-12:45 **Room:** EC-I
Session: International Networks

Track: INTL, 2

Chair: Afonso Fleury

011-0915: The Reconfiguration of Global Production Networks and Emergence of New Manufacturers

Afonso Fleury, University of Sao Paulo, Brazil

Maria Fleury, Fundacao Getulio Vargas Sao Paulo Business School, Brazil

Developed Country Multinationals are restructuring international operations, focusing on knowledge intensive activities and seeking the command of Global Production Networks. New multinationals from Emerging Economies are becoming Global Players. It is our thesis that both movements are related to changes in corporate competences. Typologies that illustrate the relationship between the core competence of the corporation and strategic positioning identified three categories: Manufacturing as core competence leading to Operational Excellence, R&D as core leading to Product Innovation, and Marketing as core leading to Customer Orientation. Our research based on case studies and surveys leads us to infer that the most important Multinationals from Emerging Countries are engaged in Global Production Networks due to distinctive competences in Manufacturing. Multinationals from Emerging Countries whose core competence is R&D or Marketing play the regional game because they are not able to compete at a global level.

011-0314: Global Facility Network Design in the Presence of Competition

Ping Su, SUNY at New Paltz, United States

Lingxiu Dong, Washington University in St. Louis, United States

Panos Kouvelis, Washington University in St. Louis, United States

Sunday, 11:15-12:45 Sessions

We study the facility network design problem for a global firm who is a monopolist seller in its domestic market but faces local competition in its foreign market. The global firm performs its core production under demand and exchange rate uncertainties, and postpones localization and distribution activities after uncertainties are resolved. The competitor in the foreign market postpones all production activities after uncertainties are resolved. The two firms engage in an ex-post Cournot competition. The global firm's network design question is in which market(s) to locate the core production facilities and the production output level(s). We consider four potential network configurations: natural hedge, complete network, domestic and foreign centralization. We provide the optimality conditions for those four networks and conduct sensitivity analysis with respect to key parameters. We find that the presence of competition significantly increases the attractiveness of domestic centralization but only slightly decreases the attractiveness of foreign centralization.

011-0418: Innovation in a Chinese Food Manufacturer: A Case Study

Hong Woo, Middlesex University, United Kingdom

The food industry is a major industry in China consisting of both local Chinese owned and managed firms, and foreign ventures, often operating in competitive environments. It is, however, slow in innovating its processes and products. This paper examines the case of a family-owned Chinese food manufacturer in Beijing. Innovation was considered by the firm because of the challenges faced externally but internal challenges, especially resistance to innovation and change, have held the firm back. To move forward, the firm had to make drastic changes to its management style and structure; implement a forward looking human resources strategy; and formalize research and development. The findings show that innovation is necessary, and can happen, if there is willingness and support to overcome internal obstacles.

011-0584: The Logistics Performance Indexes 2007 and 2009 and Their Use

Lauri Ojala, Turku School of Economics, Finland

Jean-Francois Arvis, World Bank, United States

Monica Mustra, World Bank, United States

The Logistics Performance Index (LPI) 2007 was based on a survey of over 800 global freight forwarders worldwide, providing feedback on the logistics "friendliness" of the countries in which they operate and those with which they trade. LPI is expected to be released in spring 2009. LPI combines in-depth knowledge of the countries in which they operate with informed perceptions of other countries with which they trade, and experience of global logistics environment. Feedback from operators is supplemented with objective data on the performance of key components of the logistics chain in the home country; data are collected for 100 countries. Singapore ranked 1 in the LPI 2007 with data for 150 countries (See: www.worldbank.org/lpi).

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Sunday, May 3, 11:15-12:45 **Room:** EC-D
Session: Demand Planning

Track: GENL, 16

Chair: Jair Souza

011-0434: Use of Sensitivity Analysis for Measuring Value of Flexibility

Sanjeev Bordoloi, University of St. Thomas, United States

Today's firms are entering the era of flexibility, if they are not already in it. With product life cycles becoming shorter and profit margins becoming narrower, flexibility has become a necessary strategic weapon for firms. Therefore, economic justification of investments in flexibility and subsequently, costing for flexibility, has become of utmost importance to today's firms. This paper develops a simple mixed integer programming formulation for production planning, with the help of a simple numerical example. Then, this paper discusses how some of the parameters of the sensitivity analysis can provide possible measures for flexibility. In particular, this paper suggests a way to take "hiring cost" or "layoff cost" as a surrogate for flexibility and it is shown that there may exist an optimum level of hiring/layoff cost that would minimize the total production cost.

011-0534: Econometric Model to Forecast Demand for Agricultural Machinery Automotive

Jair Manfrinato, Universidade Estadual Paulista - Unesp Bauru, Brazil

Marcelo Dutra, Universidade Estadual Paulista - Unesp Bauru, Brazil

Companies that make their forecasts of demand based solely on GDP or in simple projections of the dependent variable in trying to guess the future can achieve unsatisfactory results such as excess or shortage of production capacity. These deterministic methods are based on average values of a single variable that hardly capture all variations of the historical series. One option with greater success confidence is the definition of econometric models to predict where, based on economic theories or hypotheses, with defined regression models to estimate, with some significance, the demand of the product. Thus, the estimates will contain probabilistic values that may occur possible with the measurement of risk involved. Seeking to estimate the demand for agricultural machinery automotive a multiple regression model using economic and agricultural variables was developed which explains approximately 94% of the behavior of historical demand, allowing projections hold a confidence interval of 95%.

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Sunday, May 3, 11:15-12:45 **Room:** Senate
Session: Technologies in Global Supply Chains II

Track: TECH, 2

Chair: Yi Wu

011-0421: Online Reverse Auction Design and its Effect on the Buyer-Supplier Relationship

Thomas Parker, Southern Illinois University Carbondale, United States

Sunday, 11:15-12:45 Sessions

Online reverse auctions have become a popular tool for the sourcing of goods and services for industrial buyers around the world. The advantages of online reverse auctions include significant price reductions, increased purchasing and selling efficiencies, and access to new supply and purchasing markets. Despite these benefits, there are significant concerns with respect to the impact of online reverse auctions on buyer-supplier relationships. Previous research suggests that the design of an online reverse auction can influence perceptions of the buyer-supplier relationship. This study examines how the choices and decisions buyers make with regard to the design of online reverse auction affect supplier perceptions of commitment and trust in the buying organization. Utilizing auction and relational exchange theory, the study presents and tests hypotheses related to online reverse auction design and its effect on supplier perceptions of the buyer-supplier relationship.

011-0033: Digital Supply Chain Integration

Yi Wu, Warwick Business School, United Kingdom

Jannis Angelis, WBS, United Kingdom

Agility is a vital factor for business success in complex industrial landscapes as it enables firms to successfully compete in a competitive market. Firms are increasingly relying on information systems in achieving such agility throughout the supply chain. However, limited research has been carried out in identifying the mechanisms by which information systems and their implementation enable supply chain agility. The study is based on data gathered in three supply chains in the Chinese automotive industry, covering firms ranging from distributors through to 2nd tier parts suppliers. Factors constraining the achievement of supply chain agility and performance implications have been identified, while the integration of information systems reveals an unexpected implementation.

Sunday, 1:30-3:00 Sessions

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Sunday, May 3, 1:30-3:00 **Room:** Cloister North
Session: Service Failure, Recovery, and Retention

Track: SRVC, 10

Chair: Ryan Buell

011-0790: Service Quality Cascades: Designing High-Quality Service Supply Chains

Paulo Goncalves, University of Lugano, Switzerland

Willem van Oppen, LPM, Netherlands

Henk Akkermans, Tilburg University, Netherlands

High quality and customer satisfaction are essential for the profitability of service companies from telecommunication firms to electric utilities. However, the unique nature of services, characterized by their intangibility, inseparability, heterogeneity and perishability, poses a significant challenge to meet desired quality and customer satisfaction levels. Our research suggests four additional dimensions that make services even more challenging: (a) the size of the quality impact on primary processes, (b) the unpredictability of quality impact on secondary processes, (c) the cascading impact of quality in the service supply chain, and (d) the multiplicative impact of quality on installed base. Through a model-based field study of a leading European provider of IT services and telecommunications, we develop a formal dynamic model describing the poor performance of service operations. Our work highlights the importance of designing service operations properly, to prevent them from generating the detrimental behaviours observed in practice.

011-0573: The Impact of Locus Attribution and Recovery Gap on Recovery Satisfaction

DongKyoong Kim, Graduate Student, School of Business, Yonsei University, Korea, Republic of (South Korea)

Sunmee Choi, Associate Professor, School of Business, Yonsei University, Korea, Republic of (South Korea)

Due to high involvement of human factors in production and delivery, service processes are subject to failures. Understanding factors influential in successful recovery from such failures can help service practitioners better manage such recovery processes. This research investigates the role of locus attribution and the impact of recovery gap (gap between expected level of recovery and delivered level of recovery) on recovery satisfaction. Results of ANOVA and regression analyses of data collected using quasi-experimental scenario-based survey show the following. Locus attribution affects customer recovery expectation. Recovery gap influences recovery satisfaction. The effect of recovery gap on recovery satisfaction depends on locus attribution. Findings of this study emphasize the importance of managing service failures relative to the level of expected recovery and locus attribution.

011-0202: Are Self-Service Customers Satisfied or Stuck?

Ryan Buell, Harvard Business School, United States

Dennis Campbell, Harvard Business School, United States

Frances Frei, Harvard Business School, United States

This paper investigates the impact of self-service technology on customer satisfaction and retention. Specifically, we disentangle the distinct effects of satisfaction and switching costs as drivers of retention among self-service customers. Our empirical analysis examines 26,924 multi-channel customers of a nationwide retail bank. For each customer, we track channel usage, overall satisfaction and actual retention over a one-year period. We find that relative to face-to-face service, customers who use self-service channels for a greater proportion of their transactions are no more or less satisfied with the service they receive. However, we also find that these same customers are predictably less likely to defect to a competitor if they are heavily reliant on self-service channels characterized by high switching costs. Through a mediation model, we demonstrate that when self-service promotes retention, it does so in a way that is consistent with switching costs rather than via increased satisfaction.

011-0679: An Empirical Investigation of Successful Service Recovery Practices: A Cross-cultural Comparison between the US and Taiwan

Hua-Hung (Robin) Weng, Clemson University, United States

Janis Miller, Clemson University, United States

Alveda Roth, Clemson University, United States

When growing globally, service companies must consider how departures from their home country norms may affect customers in different regions. This study addresses the question: To what extent do customers from Taiwan, versus their U.S. counterparts, differ in their perceptions of service recovery and loyalty behaviors? We draw upon and extend Miller, Craighead, and Karwan's (2000) service recovery framework and Hofstede's (2005) cultural dimensions in order to subject to rigorous empirical scrutiny how service recovery influences loyalty behaviors, using samples of 131 and 161 students in the U.S. and Taiwan, respectively. After controlling for demographic and other factors, we find that customers in the two countries differ in their perceptions of what constitutes good recovery. In the U.S. loyalty is influenced by the service recovery process and in Taiwan by the service recovery outcome. Managerial insights and future research directions are given.

011-0964: A New Look at Service Quality Failure: Some Case Study Evidence

Ebrahim Soltani, University of Kent, United Kingdom

Ying-Ying Liao, University of Kent, United Kingdom

This paper aims to examine the linkage between management's approach and attitude and (in)effectiveness of quality of service operations. In doing so, three primary issues of service operations management, namely, the control of service quality, service recovery, and service processes were chosen to be probed as part of a case study research in a sample of three UK-based service-oriented organisations. Drawing upon 71 semi-structured interviews with managers at top, middle and first levels, the findings suggest that the type of approach and attitude adopted by senior management in managing service quality operations has a strong prescriptive overtone. The findings highlight that the impact of quality management (QM) practices on service quality is indirect through the senior management's approach and attitude toward QM. Specifically, the findings offer an alternative and complementary path to more nuanced account of service quality failure - as opposed to identifying the frequently cited service quality gaps.

Sunday, 1:30-3:00 Sessions

182	Sunday, May 3, 1:30-3:00 Room: Cloister South Session: Product Variety and Assortment Models	Track: SCM, 11	Chair: Aydin Alptekinoglu
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011-0830: Product Line Design with Vertically Differentiated Products

Dorothee Honhon, University of Texas at Austin, United States

We consider the problem of a retailer choosing the optimal assortment of vertically differentiated products from a set of potential products offered by a group of manufacturers (e.g., MP3 players of different brands). The quality levels (e.g., memory size for an MP3 player) are determined exogenously by the manufacturers. We assume that customers differ in their willingness to pay for quality. First, we assume that the prices of the products are determined by the manufacturers as well, and that the retailer's decision is to find the subset of products that maximizes her expected profit. We show that the optimal subset can be obtained efficiently using dynamic programming. Second, we extend the result to the case where the retailer can also choose the price of the products in her assortment.

011-0834: Competing Manufacturers in a Retail Supply Chain: On Contractual Form and Coordination

Gurhan Kok, Duker University, United States

Gerard Cachon, University of Pennsylvania, United States

Retailers commonly sell products from competing manufacturers. How then should firms manage their contract negotiations? The supply chain coordination literature focuses either on a single manufacturer selling to a single retailer or one manufacturer selling to many (possibly competing) retailers. We find that some key conclusions from those market structures do not apply in our setting - manufacturers may prefer wholesale-price contracts over sophisticated coordinating contracts.

011-0871: Don't Ask Don't Tell: An Analysis of Revenue Sharing Contracts when Retailers Cheat

H. Sebastian Heese, Indiana University, United States

Eda Kemahlioglu-Ziya, UNC Chapel Hill, United States

Revenue sharing contracts are widely used to align the incentives of different channel members. Under a typical revenue sharing contract, if it is impossible or prohibitively expensive for the manufacturer to verify the retailer's sales reports, the retailer has incentive to underreport sales and cheat the manufacturer out of part of its profit. We develop a simple analytical model to investigate the impact of cheating on the different supply chain constituents, and we show that cheating can increase manufacturer profit.

011-0831: Retailing Customized Products: Pricing, Inventory and Refund Policies

Alex Grasas, University Pompeu Fabra, Spain

Elif Akcali, University of Florida, United States

Aydin Alptekinoglu, SMU, United States

Advances in information and manufacturing technologies are changing the retailing industry, allowing firms to offer highly customized products through online retail channels. Such extreme product variety also brings changes in consumer return policies. Leaving generous 100%-money-back guarantees behind, many online retailers of customized products restrict their product return policies, and do not even allow returns in some cases. In this paper, we study optimal pricing, inventory, and refund policies of a customizing firm. We find that partial refunds are generally optimal. In a single-period setting, partial refunds allow the firm to charge a higher price (compared to the case with no returns allowed). In a multiple-period setting, where a salvage-down-to inventory policy is optimal, the firm passes some of the expected savings from being able to carry inventory from one period to another onto the customers, surprisingly, not in the form of higher refunds but of lower prices.

011-0837: Air-Cargo Capacity Contracts

Kannapha Amaruchkul, National Institute of Development Administration, Thailand

William Cooper, University of Minnesota, United States

Diwakar Gupta, University of Minnesota, United States

Carriers (airlines) use medium-term contracts to allot bulk cargo capacity to forwarders who deliver consolidated loads for each flight in the contractual period (season). Carriers also sell capacity to direct-ship customers on each flight. We study capacity contracts between a carrier and a forwarder when certain parameters such as the forwarder's demand, freight charges, and operating costs are its private information. We propose contracts in which the forwarder pays a lump sum in exchange for a guaranteed capacity allotment and receives a refund for each unit of unused capacity according to a pre-announced refund rate. We obtain an upper bound on the informational rent paid by the carrier for a menu of arbitrary allotments and identify conditions under which it can eliminate the informational rent and induce the forwarder to choose the overall optimal capacity allotment (i.e. one that maximizes the combined profits of the carrier and the forwarder).

183	Sunday, May 3, 1:30-3:00 Room: Captain Session: Supplier Management	Track: SCM, 25	Chair: Gal Raz
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011-0832: International Supply Chain Practices in Developing Countries: A Study in Tanzania

Kabossa Msimangira, The Open Polytechnic of New Zealand, New Zealand

Clemence Tesha, National Board for Materials Management, Tanzania

Sunday, 1:30-3:00 Sessions

This paper reports the results of a study on international supply chain practices in developing countries, with particular reference to the public transport sector in Tanzania. It discusses factors/problems affecting international sourcing processes. The case study methodology and semi-structured interview questionnaire were used to collect data. The study reveals that the international supply chain in developing countries like Tanzania faces many problems compared to that of developed countries, for example, the use of outdated technology in the domestic market, lack of trust, documentation problems, lack of integrated computerised system to link with overseas suppliers, and so on. The insights on problems provide valuable information on global challenges and opportunities in international sourcing processes. Recommendations to solve some of the problems are discussed.

011-0194: An Exploratory Study of the Item Importance Construct

Jillian Davis, Clemson University / Department of Management, United States

Scott Ellis, Clemson University / Department of Management, United States

Drawing from marketing, supply chain, and operations management literature, we develop and empirically assess a causal model of purchased item importance. We define item importance as the overall value that a buyer places on a particular direct material and examine how the purchased item's functional contribution to end-product performance, customer involvement in the purchasing decision, end-product importance, financial impact of the purchased item, and item customization affect buyer's perception of purchased item importance. To assess our causal model, we collected primary survey data from 34 ISM purchasing professionals from the Northeast U.S. Using bivariate correlation analysis, we find that purchased item's functional contribution to end-product performance and financial impact positively influence perceptions of item importance. However, customer involvement, end-product importance, and item customization have no effect on item importance. These findings lend new insights into supplier segmentation practices and inform supplier portfolio management approaches.

011-0574: Manufacturer Incentives for Supplier Investments in Process and Product Innovations

Cheryl Druehl, George Mason University School of Management, United States

Gal Raz, Darden Graduate School of Business, University of Virginia, United States

Raul Chao, Darden Graduate School of Business, University of Virginia, United States

We examine a supply chain that sells a product to end consumers in a newsvendor setting. The supply chain consists of a manufacturer and a supplier, where the supplier must determine whether to implement a process improvement (in the form of a unit cost reduction) or a product improvement (in the form of increased value to consumers) or both. We consider the centralized case as a benchmark and then analyze the decentralized supply chain. We address the following questions: What is the supply chain loss due to the decentralization? How can the manufacturer incentivize the supplier to optimally invest in either or both types of innovation? Our results show how process and product innovation affect the supply chain outcomes.

011-0508: Toward Theories of Managing Indirect Suppliers: A Trilateral Perspective of Buyer Indirect-Supplier Relationships

Ping Wang, School of Economics and Management, Southwest Jiaotong University, China

One thing in common in the literature of buyer-supplier relationship management is that the unit of study is a dyadic relationship with a direct supplier. However, in complex societies, buyer-supplier relationships should not be limited to the dyadic and direct ones. From a triadic or trilateral standpoint, this research sheds light on the characteristics of relationships between a buying company and its indirect suppliers (i.e., second-tier or tertiary suppliers). In this research, seven cases that actively manage indirect suppliers are presented, and the dynamics of buyer-indirect-supplier relationship are described. Relationships among a buyer, direct-suppliers, and indirect-suppliers are explored from two dimensions: relationalism and power-dependence. Using theory building through case studies, this research identifies six archetypes of buyer indirect-supplier relationships. Each type of relationship is a unique configuration of the trilateral relationship characteristics. Propositions are presented, and finally, the findings and the directions of future research are discussed.

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Sunday, May 3, 1:30-3:00 **Room:** Scribe
Session: Product Re-X 3

Track: SUST, 15

Chair: Michael Galbreth

011-0229: Modeling External Transport Costs in Distribution Networks

Chiara Ortolani, University of Padova, Italy

Fabio Sgarbossa, University of Padova, Italy

Alessandro Persona, University of Padova, Italy

This work investigates the "Green Impact" concern in the transport sector. Generally, companies which work to reduce their environmental impact act on three subsequent levels: optimising the existent networks and flows; optimising modes of transport; and increasing efficiency of routes and journeys. Similarly, some of the most widespread actions meant to decrease transport pollution costs consist in minimizing empty running of the trucks, encouraging co-operative retailer distribution, and running more efficient vehicles: all measures that, before abating pollution and congestion costs, have the substantial benefit of pulling down the transport operative costs directly paid by companies. This article will review many of the main contributions on the theme in literature, showing how dispersed data regarding full transport costs appears to be. An analytical aggregation of the different results is offered in order to obtain a homogeneous transport cost function, and a numerical example is proposed to show its application.

011-0428: True Green: Aligning Economic and Environmental Concerns in Equipment Replacement Decisions under Technological Change

Thomas Sloan, University of Massachusetts Lowell, United States

Sunday, 1:30-3:00 Sessions

This paper presents a Markov decision process model of a single-machine production system with deteriorating process condition. As the state degrades, the system produces more waste, pollution, and other environmental burdens. The firm can choose to keep the current equipment or to reset the system state by replacing the equipment with the same technology. In addition, there is a newer, cleaner technology that is expected to be introduced; however, the exact timing of its debut is uncertain. The model is solved using two separate minimization criteria: economic costs and environmental burden. Three sets of questions are explored. First, how do the replacement policies derived from the two criteria differ and why? Second, how does the expectation of a new technology affect the optimal policies? Finally, how can penalties and/or incentives be used to bring the two policies into alignment?

011-0225: Multi-Generation Product Design with Remanufacturing

Michael Galbreth, University of South Carolina, United States

Raul Chao, University of Virginia, United States

When consumers replace a product with an updated version, the old product is often returned to the original manufacturer. This is particularly true if the product was leased or if trade-in rebates are used. The manufacturer has several options regarding the processing of these returned items, including disposal, recycling, or remanufacturing. In this paper, we consider the possibility that components from returned items can be reused in subsequent generations of the product. Component reuse can lower production costs, but it may also reduce pricing power if the updated product is perceived to be a minor innovation relative to previous generations. We examine the fundamental tradeoff between component reuse and innovation in new product design with used product returns.

011-0100: Component Commonality in Closed-Loop Supply Chain

Jack C. P. Su, National Tsing Hua University, Taiwan, Republic of China

Victor Lee, National Tsing Hua University, Taiwan, Republic of China

Many literatures in forward supply chain management point out the importance of product design. In this research, we follow the same concept and apply it to closed-loop supply chain. We consider two closed-loop supply chain structures, Parallel and Mix. In the Parallel structure, the assembly and disassembly lines are separated while in Mix structure they are performed by the same production line. We study how component commonality, operational variables, and their interactions impact the cycle time of forward supply chain under these two structures.

011-0098: The Impact of Product Proliferation in Closed-Loop Supply Chain

Jack C. P. Su, National Tsing Hua University, Taiwan, Republic of China

Vincent Huang, National Tsing Hua University, Taiwan, Republic of China

In a highly competitive market, product variety is one of the most important competitive advantages. However, excessive product proliferation will hurt firm's profit. Hence, how to manage for maximal profit becomes an important question. In a closed-loop supply chain, product proliferation not only impacts the forward supply chain, but also the reverse one. Although increasing number of product types will satisfy customers' diverse needs better, complexity of product recycle, remanufacturing, and resale process may erode firm's profit as well. In this research, we develop a mathematic model to analyze a capacitated reverse supply chain, consisting of single manufacturer and multiple retailers, in order to understand how product proliferation impacts reverse supply chain.

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Sunday, May 3, 1:30-3:00 **Room:** Knave
Session: Outpatient Appointment Scheduling

Track: HLTH, 11

Chair: Kenneth J Klassen

011-0673: Urgent and Emergency Care Service Location and Capacity Planning

Elif Akcali, University of Florida, United States

Ching-I Lin, University of Florida, United States

Ensuring patient access to medically appropriate health care services is an important concern in the health care industry. In the absence of easily accessible urgent care clinics, urgent care patients go to emergency rooms. As a result, expensive emergency care resources are utilized to deliver urgent care services. Moreover, urgent care patients typically experience long service times in emergency rooms, since they are pre-empted by emergency care patients. Therefore, hospitals that operate a number of emergency care locations in a given geographical region are interested in establishing a network of urgent care clinics to improve patient access to medically appropriate health care services. In this paper, we develop an optimization model to determine the optimal number of urgent care clinics as well as their respective locations and capacity levels to minimize the total cost of operating the network of urgent care clinics and emergency rooms while maximizing patient access.

011-0413: Comparing Walk-In, Open Access, and Traditional Appointment Scheduling in Outpatient Health Care Clinics

Linda LaGanga, Mental Health Center of Denver, United States

Stephen Lawrence, University of Colorado at Boulder, United States

Outpatient health care clinics have been experimenting with innovative means to provide better service for patients. Among these are open access and walk-in access for patients where patients either make same-day appointments or simply walk in without an appointment. In this paper we compare and contrast open access and walk-in scheduling with traditional scheduling policies. We allow different proportions of open access or walk-in traffic to mix with traditionally scheduled appointments, and show how clinic utility varies with different policies and different mixes. We study a variety of problems using a heuristic scheduling procedure that provides near-optimal schedules for our problem set. The results of our study inform clinic administrators regarding the trade-offs among these three scheduling policies and assists them in selecting that scheduling policy which best meets both clinic constraints, practitioner preferences, and the needs of patients.

011-0416: Outpatient Scheduling in the Presence of Interruptions and Server/Client Unpunctuality

Reena Yoogalingam, Brock University, Canada

Kenneth Klassen, Brock University, Canada

Sunday, 1:30-3:00 Sessions

There has been limited research on the combined effect of interruptions and server/client unpunctuality on appointment system design. The presence of these factors has been shown to reduce clinic efficiency and increase costs of the health care system. Furthermore, appointment system design is complicated by patients who compensate by arriving earlier or later than their scheduled appointments in an effort to reduce their expected waiting times. This study uses a simulation optimization approach based on empirical data and interviews from a number of outpatient clinics. The goal is to determine optimal appointment schedules given interruptions and server/client unpunctuality and develop practical insights for appointment system design.

011-0739: Flexible Shift Scheduling of Physicians at Hospitals

Jens Brunner, Technische Universitaet Muenchen, Germany
Rainer Kolisch, Technische Universitaet Muenchen, Germany
Jonathan Bard, The University of Texas, United States

We address a flexible shift scheduling problem in which physicians are scheduled to meet varying demand. We propose a new modeling approach where shifts are generated implicitly rather than starting with a predefined set of shifts like three 8-hour shifts or two 12-hour shifts. The objective is to minimize the paid out hours under the restrictions given by the labor agreement. Our problem is formulated as a mixed-integer program and solved with a customized Branch-and-Price algorithm. The new approach is tested with data from the anesthesia department of a German university hospital. Computational results indicate that high quality schedules up to several weeks can be obtained quickly. In comparison to rosters obtained by the current procedure considerable cost savings are possible.

187	Sunday, May 3, 1:30-3:00 Room: EC-D1 Session: Empirical Methods	Track: EMPR, 12	Chair: Christer Karlsson
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011-0672: The Impact of Institutions on Operations of Multinational Logistics Service Providers - The Case of Russia

Inga-Lena Darkow, European Business School, Germany
Markus Weidmann, European Business School, Germany
Roger Moser, European Business School, Germany

Emerging markets are challenging established business theories in many aspects. In this paper, we expand existing approaches using institutional theory and resource-based view in order to analyze how formal and informal institutions impact management decisions of multinational companies in an emerging market context. The conceptual framework is applied to foreign third party logistics service providers in the Russian transition economy. In 24 case interviews with local executives of four multinational third party logistics service providers, we explore how formal and informal institutions in Russia affect operations and competitiveness. The study results suggest that institutions are an important element for management research and practice when analyzing emerging markets.

011-0451: Combining Archival Data and Experimental Choice Analysis: New Opportunities for Enhancing Empirical Research in Operations Management

Rohit Verma, Cornell University, United States

During the recent years, archival, survey-based and experimental approaches have become prominent empirical research techniques in operations management. During this presentation, the author will present the benefits of, and examples of, service operations-focused research studies based on the combination of empirical techniques.

011-0489: Toolism: Generation of Mode 2 Knowledge in Research

Choy Yee, Universiti Putra Malaysia, Malaysia

Business research is always criticised for lack of industrial relevance. Many researchers are inclined to use more established methods such as survey, econometric, or modelling. A survey maximizes generalizability but lacks precision and realism. Companies have real needs to improve their performance, but the survey method would hardly contribute greatly in these areas. This paper proposes a new research methodology, toolism, which can be used for generating Mode 2 knowledge. It aims to bridge the gap between academic and practicing communities by improving the industrial relevance of business research. This paper illustrates the research protocols of toolism, its epistemological position as well as how it could be used for theory development. An industrial case is presented to demonstrate how toolism is used to generate Mode 2 knowledge. I have no intention to substitute, but rather complement other research methods and to encourage other researchers to adopt similar approaches in future.

188	Sunday, May 3, 1:30-3:00 Room: EC-B Session: NPD Competencies and Capabilities	Track: PITM, 10	Chair: Janice Carrillo
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011-0872: Management of Product Platforms – A Portfolio Approach

Juliana Hsuan, Copenhagen Business School, Denmark

The objective of this paper is to present a method to assess the complexity of product platform modularity with respect to its alignment with the supply chain and production platforms. A theoretical framework called Product Platform Matrix (PPM) is introduced to assess such complexity. The theoretical foundation for PPM is drawn from the following theoretical backgrounds: product architecture modularity, supply chain management, operations management, and portfolio management. Hypothetical systems are simulated in order to illustrate how PPM can be applied. More specifically, the degree of product platform modularity is measured by a mathematical model called the Modularization Function. The degree of platform alignment is measured with qualitative methods. The simulation graphically illustrates the weaknesses and strengths of the product platform modularity and how a firm can plan its resources for long-term survival.

Sunday, 1:30-3:00 Sessions

011-0328: Managing New Product Development Knowledge Between Competing Firms

Gulru Ozkan, Clemson University, United States

Cheryl Gaimon, Georgia Institute of Technology, United States

We introduce a two period stochastic Stackelberg game on knowledge management (KM) strategies that drive NPD activities of two competing firms. In period one, the leader determines the price to charge for knowledge transfer (KT) (patents, employee transfers) to the follower. The follower determines the amount of knowledge to acquire. In period two, each firm invests in knowledge development (KD) (problem solving, experimentation, training). Each firm maximizes net revenue from the product it releases at the end of second period whose value is driven by the relative levels of knowledge of both firms; minus the cost of KD and the revenue or cost for KT. Two sources of uncertainty are considered: customer's valuation of the knowledge embedded in the new product and the follower's ability to integrate the KT from the leader. Optimal solutions are obtained from which we analyze the impact of firm and market characteristics on KM decisions.

011-0710: Multi-Generation NPD with Dynamic Pricing

Janice Carrillo, University of Florida, United States

Michelle Seref, University of Florida, United States

When planning for the introduction of a stream of new products into the marketplace, managers must consider both the timing and dynamic pricing decisions to determine an appropriate entry strategy into the marketplace. Literature in the new product development (NPD) area has addressed optimal timing of multiple generations of products and the dynamic pricing decisions independently. However, no analytic results have been developed when these decisions are considered simultaneously. We present an analytic model of coordinated product introduction and pricing decisions when there are two generations of a new product under consideration. In addition, we identify an optimal threshold value for the length of the planning horizon which dictates the new product introduction strategy. Further insights are obtained for a special case of the model where the two generations of products have similar sales and pricing characteristics.

011-0857: Value Chain Dynamics: From Scope to Profit Evolution Given Modular and Architectural Innovation

Claudio Wolter, Carnegie Mellon University, United States

Michael Jacobides, London Business School, United Kingdom

Francisco Veloso, Carnegie Mellon University, United States

Recent research shows that to understand vertical scope we need to combine transaction cost and capabilities to look at all firm's choices in terms of expanding vertically or continuing focused. The main implication is that industry competition dynamics, evolution, and vertical scope should be jointly considered. Yet existing research has not adequately studied the interplay between a sector's evolution and firm vertical scope, and how these shape profitability. Previous models of endogenous scope have considered how profitability drives firms' particular integration choices; yet little is said about profitability evolution as industry changes. This paper aspires to cover this gap, focusing on the profitability implications of scope changes, and how these relate to changes in firm's underlying capability distributions. In particular, it sheds light into a sector's evolution dynamics, by looking at how modular and architectural innovations affect specialists and integrated firms and shape both the sector's scope and profit distribution.

011-0716: Sustainability: Use of Sugarcane Bagasse and Bamboo Leaves to Produce Sealing Boards

Rosane Battistelle, UNESP - campus Bauru, Brazil

Camila Catosse, UNESP - campus Bauru, Brazil

The environmental impact caused by the uncontrolled production of solid waste has led the government and society to promote studies for alternatives that aim at minimizing the degradation of nature and increasing society's well-being as a whole, thus becoming a part of Sustainable Architecture. The purpose of this study is tied to the production of a new material, on a laboratory scale, that can be used as an option for sealing boards (ceilings and walls) in homes. Particle boards were produced using waste: sugarcane bagasse and bamboo stalk leaves at proportions of 100%, 75%, 50%, 40%, 25% and 0%, and then evaluated as to physical and mechanical characteristics. Since Brazil is the world's largest producer of sugarcane and consequently its residue (bagasse), this study links concepts of plausible and sustainable disposal and proposes solutions to mitigate the housing deficit.

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Sunday, May 3, 1:30-3:00 Room: EC-C

Track: DSTR, 2

Chair: Cristobal

Session: Supply Chain Issues in Disaster Relief Operations

Sanchez-Rodriguez

011-0974: Tracking of Disaster Warning Signals

Martin Starr, Rollins College, United States

Sushil Gupta, Florida International University, United States

Advances in technology while guaranteeing more security also generate more sophisticated threats. Security challenges will continue to become more critical and dynamic with these advances. Detection of anomalies (such as quality deviations from the normal order and odd events) becomes an important part of the security efforts. Appropriate warning signals pointing to impending catastrophes have to be tracked and monitored. POM techniques can be used to design warning systems for diverse applications including seaport/airport security, violent acts of nature, and industrial catastrophes.

011-0589: Risk of Supply Chain Disruptions in Businesses in the Greater Toronto Area: An Empirical Study

Cristobal Sanchez-Rodriguez, York University/ School of Administrative Studies, Canada

Ali Asgary, York University/ School of Administrative Studies, Canada

Sunday, 1:30-3:00 Sessions

Supply chain disruptions pose a serious threat to most of today's organizations. It is for this reason that creating a resilient supply chain is becoming an important issue for supply managers. This study presents the results of a survey analyzing the importance of supply chain disruptions, risk exposure to disasters in first-tier suppliers and related disaster management measures in a sample of 346 Canadian businesses in the Greater Toronto Area.

011-0659: Disaster Relief Supply Chains -- Insights into Supply Chain Design

Steven Melnyk, Michigan State University, United States

Debbie Persell, Arkansas State University, United States

Omar Helferich, Central Michigan University, United States

This presentation focuses on the disaster relief supply chains (DRSC). By drawing on two detailed case studies, we show that this type of supply chain must deal with a set of challenges not frequently encountered in the demand driven supply chain. Consequently, many of the practices and approaches found in the demand-driven supply chain may not be applicable to the DRSC. In differentiating these two systems, we introduce several critical dimensions of supply chain design that should be considered when assessing supply chains. More importantly, we view the DRSC as a subset of a broader category – the responsive supply chain. The responsive supply chain is very attractive in new product introduction, rapid response to demand, and military organizations engaged in large scale deployments. The properties and unresolved questions surrounding such supply chains are discussed.

011-0752: Fostering Community Resilience: Disaster Relief as a Complex Adaptive Supply Network

Jamison Day, University of Houston, United States

Adequate response and recovery performance following large-scale and catastrophic disasters has remained elusive despite considerable efforts to coordinate the many government agencies, non-profit organizations, for-profit businesses, and individuals that participate. When these diverse entities interact with each other, they form a large supply chain network and the resultant collective performance emerges, often with unanticipated results. We integrate knowledge from supply chain management and complexity science to discuss how the behaviors of entities, their interactions, and their environmental context determine the level of resilience that communities have following disasters. Based on this framing, we set forth propositions regarding several properties, both of entities and of their interactions, that could give rise to improved community resilience. Finally, we suggest some future work on fostering inter-entity coordination that could give rise to previously unseen levels of community resilience.

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Sunday, May 3, 1:30-3:00 **Room:** Gallery

Track: BDOM, 7

Chair: Anand Nair

Session: Human behavior and behavioral dynamics in supply chain management I

011-0751: Co-opetitive Buyer-Supplier Relationship

Anand Nair, Moore School of Business, University of South Carolina, United States

Ram Narasimhan, Eli Broad School of Business, Michigan State University, United States

Elliot Bendoly, Goizueta Business School, Emory University, United States

This study proposes an analytical approach combined with behavioral experiments for a joint examination of competitive and cooperative (i.e., co-opetitive) relationship between a buyer and a supplier. A dynamic game model is considered to examine the evolution of investment strategies in critical resources and to investigate the issues of channel power in a buyer-supplier dyad. Specifically, we consider the scenario in which the buyer and the supplier invest in strategic capabilities to increase their relative channel power. The Nash equilibrium expressions for the investment strategies of the buyer and supplier firms are presented and the underlying implications for the buyer-supplier relationship are examined. We complement the analytical study with a behavioral experiment that examines the level of correspondence between "optimal" behavior as suggested by the analytical model and the bounded rational behavior of decision makers in an experimental context.

011-0745: Managing Operational Autonomy in Joint Ventures

Paul Myers, Simmons College, United States

One criticism of studies of joint ventures is the narrow focus on links between initial conditions and venture performance, rather than on post-formation behaviors and processes within the ventures themselves. In response, this paper examines how joint venture managers adjust the scope and magnitude of their operational autonomy. Interviews with venture managers and partners provide data for a comparative case study analysis of the evolution of two successful multiparty ventures whose autonomy developed on opposing trajectories – one ascending, the other descending. Analysis suggests that effective venture managers actively shape the degree of operational autonomy they attain in order to increase the venture's survival chances; that they do so by exploiting the two distinguishing features of joint ventures, their multilateral structure and the varied status set of the partners; and that adjusting their degree of autonomy helps venture managers mediate partner goal incongruity and mitigate the effects of partner dependence.

011-0717: The Buyer-Supplier Social Contract: Information Sharing as a Deterrent to Unethical Behaviors

James Hill, The Ohio State University, United States

Stephanie Eckerd, The Ohio State University, United States

In this research, we focus on information sharing as a fundamental building block to effective social contracts between buyers and suppliers. A social contract defines the acceptable norms governing a relationship; one manner in which the social contract between parties may be perceived as violated is when one partner acts unethically towards the other. A greater degree of information sharing, an activity intended to build and nurture the social contract, is hypothesized to decrease the potential for violation of the social contract. We test our hypothesis using survey data collected from supplier firms from a wide range of industries and that have been involved long-term in the provision of goods and/or services with a particular buyer. We demonstrate the critical nature of frequent and valuable information sharing, both as an obstruction to unethical behaviors, as well as a vital factor increasing buyer commitment and supplier satisfaction in the relationship.

Sunday, 1:30-3:00 Sessions

011-0031: Implementation of Material Handling Systems: Improving Distribution Operations

Satya Chakravorty, Kennesaw State University, United States

Richard Franza, Kennesaw State University, United States

Academic research has primarily focused on the technical factors of material handling systems, with little or no discussion of human factors. In order to improve the performance of distribution operations, we found that the implementation of material handling systems involves both human and technical factors. These human and technical factors interact over time and go through three somewhat overlapping transitional stages. In the first stage, both human and technical problems exist; however, human problems dominate, and require conflict management skills to resolve. In the second stage, human problems improve, but technical problems persist, requiring formal problem-solving methods to resolve. In the third stage, both human and technical problems improve. These transitional stages must be effectively managed in order for the material handling system to perform at the optimal level. Implications of this research, including directions for future research, are also provided.

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Sunday, May 3, 1:30-3:00 **Room:** EC-A
Session: Procurement, profit targets and performance

Track: INV, 4

Chair: Selcuk Karabati

011-0238: Reliability, Procurement Cost, and Lead Time

Burcu Tan, University of Texas at Austin, United States

Qi (Annabelle) Feng, University of Texas at Austin, United States

We consider an inventory manager who can source from two unreliable suppliers that have different lead times. The capacity of each supplier is uncertain upon ordering, which leads to a nonconvex cost evaluation of the ordering strategy. We use dynamic programming to explore the optimal procurement strategy for different levels of net inventory, cost parameters, and supplier reliability. We analyze the tradeoffs between lead time, reliability and procurement cost in determining the optimal supplier base. We evaluate the value of flexibility under different scenarios and discuss the role of flexibility as a means to mitigate the supply risk.

011-0556: Performance Evaluation and Optimization of a Multi-Item Inventory System with Stock-Out-Based Substitution

Selcuk Karabati, Koc University, Turkey

Baris Tan, Koc University, Turkey

We consider an inventory management problem in a retail setting with multiple items, Poisson arrival processes, stock-out based substitutions, and lost sales. The retailer uses a fixed-review period, order-up-to level system to control the inventory levels of items in a product category. We present a Continuous Time Markov Chain model to compute the expected sales, average inventory levels, and number of substitutions between all product pairs for given demand and substitution rates, and order-up-to levels. We then develop a more tractable approach to approximately compute the same performance measures. The approximate approach is then used in a profit maximization setting-with profit margins, inventory holding and substitution costs, and service level constraints-to find the optimal order-up-to-levels. In a computational study, we analyze the performance of the approximation and optimization approaches.

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Sunday, May 3, 1:30-3:00 **Room:** EC-E
Session: Implications of Public/Private Policies

Track: LAPS, 8

Chair: Joseph Huscroft

011-0162: Justifying Location Incentives: Seeking Win-Win

Willard Price, Eberhardt School of Business, University of the Pacific, United States

Facility location decisions are a critical choice for supply chain/logistics design. Most interestingly, both public agencies and private companies seek to benefit, yet too often Win-Win does not occur. This research defines the nature of location inducements/incentives offered by the regional community, suggests the components of agreements/partnerships and examines past and future behavior through interviews with public and private actors in the author's home county. The model is tested using local data, but surely can be applied to other regions across the globe. It is important to separate economic cycles, location agreement design and strategies/operations which may place either party at higher risk. Uncertainty is often under-evaluated in location choices and, setting current economies aside, the design of an agreement may not protect the community or company. Win-Lose is more likely, who loses? Agreement changes are coming, can or will Win-Win follow?

011-0661: A Simulation-Based Genetic Algorithm for the HSR Timetabling Problem

Vincent Yu, Industrial Management, National Taiwan University of Science and Technology, Taiwan, Republic of China

Good high speed rail (HSR) timetables yield more profit and increase customer satisfaction for the HSR company. In this study, we developed a simulation-based genetic algorithm for the HSR timetabling problem and compared our algorithm with those in prior studies using data from the Taiwan High Speed Rail Company. Computational results indicate that our algorithm yields better HSR timetables. On average, northbound trains generate 66.1% more profit than those in prior studies, while southbound trains yield 37.2% more profit.

011-0919: Public Policies as a Factor for Innovations in Customs Procedures: A Case Study by Itri - Rodoferrovia e Serviços Ltda

Rafael Barreto, Universidade Católica de Santos, Brazil

Washington Soares, UNISANTOS - Universidade Católica de Santos, Brazil

Camila Lopes, Universidade Católica de Santos, Brazil

Getulio Akabane, Universidade Católica de Santos, Brazil

Sunday, 1:30-3:00 Sessions

The present study identifies the public policies that allowed the extension of bonded warehouses which, associated with organizational innovations applied to a company in the transportation logistics sector, have brought benefits and improvements to rail modal performance by the utilization of the Customs Transit Declaration (CTD) called DTA - CARGA PÁTIO. This kind of customs procedure has been developed as an essential third-party logistics service. Customs procedures are analyzed under the aspect of intermodality in the case study of a road-rail freight carrier operating between the City of Suzano-SP and Greater ABC-SP region. This study's findings show that rail modal performance is influenced by public administration, which can limit competitiveness of modal and freight transporting systems by the Port of Santos.

011-0089: Managing For Transformation: A Case Study

Kedarnath Panigrahi, ABIT GROUP OF INSTITUTES, India

A plant engaged in extraction of minerals from beach sand and located in the eastern coast of India commercially began production in the year 1986. The plant had manpower of 1300 and a fair-weather port to facilitate export of minerals. Since then the plant was plagued with various industrial relations issues as well as technical problems; as a result the plant could never achieve rated capacity. The trade unions supported by vested political interests made it impossible for management to enforce discipline. The management often succumbed to pressure tactics of trade unions. The plant accumulated huge losses. Then there came a change of management for transformation with new vision. With the introduction of innovative techniques of management, reforms, and rehabilitation measures, production could be achieved more than the rated capacity, thus wiping out the losses and bringing a new lease on life to the plant. This paper discusses the various measures/managerial techniques adopted for the turnaround.

193	Sunday, May 3, 1:30-3:00 Room: EC-F Session: LEAN Transformation and Improvement	Track: JIT, 4	Chair: Brad C Meyer
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011-0755: Musings on a Theory of Continuous Improvement

Brad Meyer, Drake University, United States

In a search for a theoretical underpinning of lean, common practices such as 5S, TPM, and Kaizen events are compared to regimens prescribed by doctors for sick or overweight persons. Trying to determine whether or not lean works is found to be similar to trying to determine the efficacy of a given diet plan. This analogy also points out the difference between a theory of a diet plan and the science of the human body that allows practitioners to create diet plans. It is concluded that we need a science of process performance that will allow us to develop continuous improvement programs and to evaluate lean, Six Sigma, and TOC. Some suggestions are given for the necessary elements of a theory of process performance that will support the study of continuous improvement.

011-0976: Improving Bone Screw Manufacturing Process: A Case Study

Bimal Nepal, Texas A & M University, United States

Krishna Balla, Indiana University Purdue University Fort Wayne, United States

While lean manufacturing literature is very rich in terms of its application in high volume and commoditized products in traditional manufacturing industries, there are not as many examples representing innovative and custom designed parts such as biomedical products. These products pose unique challenges to the process optimization efforts because of their stringent government and industry requirements. This paper presents a real-world case study on implementation of LM in bone screw manufacturing process at a multinational orthopedic company. Through value stream mapping (VSM) and quality study, it has been found that existing electro-polishing (EP) operation did not add any value to the customer. Therefore, the paper suggests a new lean process for bone screw manufacturing without EP. In addition to improvements in manufacturing process, we present the several test results that are used to demonstrate the safety of the final products as required by the industry standards.

194	Sunday, May 3, 1:30-3:00 Room: EC-G Session: Performance Measurement	Track: MKTG, 11	Chair: Robert Sellani
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011-0427: Models, Features, and Options Product Definition: An ERP Supported Marketing Approach

Robert Sellani, Nova Southeastern University, United States

This paper examines the thought process and systems support necessary to use models, features and options as an integral part of Marketing. How a company defines its products can have sales and marketing implications and also can define how customers order the product. Feature-rich products cannot be defined by specific part numbers, due to the multitude of possible combinations. In a marketing context, the term "model" can mean a type or design of a product such as a computer, car or chair. The term "feature" can be used to describe physical attributes associated with a "model," and an "option" can describe the various alternatives available for a given "feature". Using Bill of Material logic, a hypothetical product will be developed using models, features, and options, to illustrate the process and ease of use from both the customer and marketing perspectives.

011-0510: Beyond the Functional Silos: A Performance Analysis Based on the Cumulative Capabilities Perspective

Ely Paiva, UNISINOS, Brazil

Iuri Gavronski, Federal University of Rio Grande do Sul, Brazil

Cross-functional integration and its influence on business strategy is a relevant topic in operations management since the classic articles of Skinner and Wheelwright decades ago. At the same time competitive priorities identification is a relevant issue in order to link operations decisions to business strategy. We consider competitive priorities from a cumulative capabilities perspective. Thus, this study aims to evaluate the relationship between cross-functional integration, competitive priorities and business performance. We used a survey methodology to collect the data. The sample includes ninety and nine (99) companies from food and machinery industries. We used structural equation modeling to analyze the proposed model. The results suggest that cross-functional integration and competitive priorities influence positively business performance.

Sunday, 1:30-3:00 Sessions

011-0515: Impact of Performance Measurement on Goal Interdependence and Relationship Effectiveness at the Operations-Distribution Interface

Carl Marcus Wallenburg, WHU - Otto Beisheim School of Management, Germany

Martin Springinklee, WHU - Otto Beisheim School of Management, Germany

In order to best serve customers, marketing and sales rely on integrating both operations and distribution. In this context, goal incongruity across different departments of a firm is a serious impediment for effective cooperation. Current research in operations management suggests that performance measurement and evaluation systems should be aligned between departments (Ellinger, Keller, Hansen, 2006; Pagell, 2004) and that there should be further research on the structural determinants of cross-functional cooperation (van Hoek, Ellinger, Johnson, 2008). Based on Deutsch's (1949) Theory of Co-operation and Competition, we analyze how performance measurement and evaluation of distribution and manufacturing departments impact goal alignment and, consequently, relationship effectiveness. Survey-data from manufacturing companies serves as the empirical basis for this study.

011-0602: Developing Operations Services for B-to-B Marketing Business

Jukka Kallio, Helsinki School of Economics, Finland

Claudio Nava, Helsinki School of Economics, Finland

Mika Raulas, Helsinki School of Economics, Finland

Ari Vepsäläinen, Helsinki School of Economics, Finland

The marketing function in b-to-b business usually means persuading two or more parties to engage in mutual projects, such as developing information systems. We investigate the business models of companies offering marketing event services, such as professional meetings, congresses, training seminars and summits. Comparing examples from traditional exhibitions and trade fairs, focused workshops and personal meetings we demonstrate the special operational and organizing skills and processes behind successful persuasion leading to new business relationships. The examples illustrate the pivotal role of specialized operations services in running productive persuasion activities for technology providers and potential clients. The facilitator can introduce novel marketing practices such as role reversals, intensive workshops and selective face-to-face meetings, all with industrial efficiency, by managing a dynamic portfolio of specialized roles, learning routines, and the entire knowledge base on the community of delegates and partners.

011-0481: Air Passenger Demand Forecasting and Passenger Terminal Capacity Expansion: A System Dynamics Framework

Shuo-Yan Chou, National Taiwan University of Science and Technology, Taiwan, Republic of China

Erma Suryani, National Taiwan University of Science and Technology, Taiwan, Republic of China

This paper deals with how to develop a model to forecast air passenger demand and to evaluate some policy scenarios related to runway and passenger terminal capacity expansion to meet future demand. System dynamics frameworks can be used to model, to analyze and to generate scenarios to increase system performance because of its capability of representing physical and information flows, based on information feedback control that is continuously converted into decisions and actions. We found that airfare impact, level of service impact, GDP, population, number of flights per day and dwell time play important roles in determining the air passenger volume, runway utilization and total additional area needed for passenger terminal capacity expansion.

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Sunday, May 3, 1:30-3:00 Room: EC-H

Track: LA&C, 2

Chair: Susana Pereira

Session: Manufacturing strategy and internationalization of LA&C enterprises

011-0032: A Study of Manufacturing Strategy in the Southern Caribbean

Harvey Millar, Saint Mary's University, Canada

Suzana Russell, University of Trinidad and Tobago, Trinidad and Tobago

This work presents the first of a number of studies aimed at understanding the manufacturing sector in the Caribbean and its ability to compete in a global environment. Noting that a critical success factor for competitiveness is the effective alignment between manufacturing operations and competitive strategy, firms must 1) ensure effective alignment of operational capabilities, and 2) recognize manufacturing capability as a source of competitive advantage. Our study of 60 companies in Saint Lucia, Barbados, Trinidad and Tobago, and Guyana show that there is a need for a regional strategic agenda for manufacturing if the Caribbean is to have a fighting chance in a highly competitive and globalized world.

011-0891: Outsourcing Level and Performance: An Empirical Analysis of Brazilian Manufacturing Companies

André Duarte, Ibmec São Paulo, Brazil

Luiz Carlos DiSerio, Fundação Getúlio Vargas, Brazil

Lei and Hitt (1995) define outsourcing as reliance on a certain outside source of value-added activities. Gilley and Rasheed (2000) define it as the purchase of a good or service that was originally produced internally, or might have been produced internally, but was in fact produced by a supplier. This paper worked with 1,200 manufacturing companies, located in São Paulo state, active in 14 different industries, to test the relationship between outsourcing level and organizations' performance. The study used a multiple regression technique and performance was measured in terms of Profitability and Revenue Growth Rate. The research found that outsourcing level has a negative relationship with both profitability and growth. This finding leads to a reflection on the fad of outsourcing, which may not be producing the expected results and endure constant criticism.

011-0946: Can We Innovate?

Shellyanne Wilson, The University of Trinidad and Tobago, Trinidad and Tobago

Sunday, 1:30-3:00 Sessions

The ability to innovate has been linked to the success or failure of small and medium sized manufacturing enterprises (SMMEs). For many Caribbean countries, the vast majority of their manufacturing sector falls within this SMME classification. Therefore, innovation should, theoretically, play a vital role in the formulation and implementation of the manufacturing strategies of these SMMEs. But what qualifies as "innovation," especially in manufacturing sectors predominately composed of low to medium technology firms? This research paper explores the literature to determine the meaning of innovation and its implication for Caribbean manufacturers. Further, the literature is reviewed for an understanding of the stimulus for innovation and the factors which enable innovation. The findings of the literature review are captured in a framework that can be used in future research to investigate the role that innovation can play in the future of Caribbean SMMEs.

011-0721: International NPD – A Preliminary Analysis of Cooperation between the Headquarters and a Subsidiary of an Automotive Company in Brazil

Paulo Cauchick-Miguel, Universidade de São Paulo - USP, Brazil

Andre Segismundo, Universidade de São paulo - USP, Brazil

The current literature in new product development (NPD) has identified cases that indicate a strong trend of product development internationalization. In this sense, this paper aims at performing a preliminary analysis of NPD between the headquarters and its Brazilian subsidiary of a commercial vehicle automotive company. The paper highlights some aspects of the work organization and management, the decision-making process, and the criteria used to evaluate the results and possible co-work success factors. In addition, preliminary results show that the headquarter decisions are mostly based on financial criteria for project approval and evaluation, present a light managerial structure and have a method of project portfolio management in place.

011-0536: Internationalization Strategies of the Brazilian Beef Industry

Luis Henrique Pereira, FGV-EAESP, Brazil

Daniela Pozzobon, USP-FEA, Brazil

Susana Pereira, FGV-EAESP, Brazil

The world market for beef is increasingly competitive. To advance towards new markets, Brazilian companies in the industry need to invest in the improvement of their internationalization strategies. This study examines the approaches pursued by the Brazilian Beef Industry, with the following objectives: (i) review the modes of entry abroad, the economic motives for internationalization; the degree of diversification or specialization adopted, how the coordination of the firm is organized abroad (ii) monitor the adherence of the processes of internationalization of Brazilian Beef Industry with the economic theories of internationalization. The preliminary analysis indicates that the process of internationalization of the Brazilian Beef Industry supports the economic theory of Dunning (1993), which suggests the search for markets, assets, resources and efficiency, and the eclectic paradigm (Dunning, 1980), which refers to the search for three types of advantages: ownership, location and internalization.

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Sunday, May 3, 1:30-3:00 **Room:** EC-I
Session: International Strategy

Track: INTL, 3

Chair: Flavia Scherer

011-0725: Quality and Productivity in a Transition Economy: The Case of Romania

Daniel Glaser-Segura, Texas A&M University at Kingsville- San Antonio, United States

In the early 1990s, Romania began the transition away from central planning to a market economy requiring the newly privatized firms to develop strategies and managerial skills to compete with global peers in the emerging globalized industrial market. Primary among the new strategies was an emphasis on quality and productivity improvement. This study is based on structured interviews of top managers of twenty-two Romanian firms representing a cross-section of former state-owned enterprises in the steel and metal, transportation equipment suppliers, chemical, food, and wood furniture industries, regarding past and future plans to improve quality and productivity performance. Findings of this study show that Romanian managers considered new equipment as the primary approach to improve performance and did not consider employees as a competitive advantage. Employee attitudes and work habits were considered weaknesses. There was little evidence to show that lean manufacturing or similar strategies were used to improve performance.

011-0312: Relations Between Company Profile, Strategy and Performance in International Markets

Flavia Scherer, Universidade Federal de Santa Maria, Brazil

Clandia Gomes, Universidade Federal de Santa Maria, Brazil

Isak Kruglianskas, Universidade de São Paulo, Brazil

Studies have evaluated if different performance is associated with different strategic behavior (Mata and Portugal, 2002, 2004; Yip et al., 2000; Li, 1995; Venkatraman and Ramenujam, 1986). This article aims to describe and to analyze the relations between company profile, strategy and performance in international markets, in Brazilian companies. The analysis of the company profiles identified the prevalence of medium and large companies, which are mature in the industry, perform planning to guide their actions, and are concerned about monitoring environmental changes. On the relationship between company profile, strategy and performance, correspondence analysis showed that the main variables that discriminate the group are the strategic profile, planning and environmental monitoring. It was found that companies with higher gross operating revenue are smaller, perform planning activities only where appropriate, don't perform environmental monitoring and take a defensive strategic posture.

011-0783: Strategic Agility, Operational Responsiveness and Firm Performance

Hojung Shin, Korea University, Korea, Republic of (South Korea)

Jae-Nam Lee, Korea University, Korea, Republic of (South Korea)

DaeSoo Kim, Korea University Business School, Korea, Republic of (South Korea)

Hosun Rhim, Korea University, Korea, Republic of (South Korea)

Sunday, 1:30-3:00 Sessions

Using the grounded theory with the literature review in various disciplines, we develop theoretical linkages between strategic agility and its underlying dimensions (technology capability, process orientation, knowledge management, and strategic alignment). Then, based on the conventional theory of industrial organization paradigm and the process model, we propose a conceptual model of investigating the nomological network of influences among strategic agility, operational performance (responsiveness), and firm performance (customer retention and financial performance). Using structural equation modeling, we conduct the confirmatory analysis of the hypothesized relations in the alternative structural models.

011-0844: Strategy, Innovation, and Social Networks: A New Perspective on Operations Strategy

Yan Cimon, CIRRELT, Université Laval, Canada

Simon Veronneau, Chaîne Research Group, Canada

In an increasingly globalized world where the costs of inputs suffer increased variance, operations strategy formulation and its implementation have never been so critical. The purpose of this paper is to outline some trends that are affecting operations strategy and practice. First, it shows various processes of firm internationalization. Second, it examines the consequences on the innovation dynamics that are involved in creating and implementing world class strategic processes. Third, it points to implications in product design and reengineering as well as for value creation through boundary spanning routines. An integrative model is developed that serves as a roadmap for managers and as an ongoing research agenda for academics. Finally, it concludes by showing possible advances and outlining opportunities for future research.

011-0993: Examining the Influence of Culture and Team Type on the Global New Product Development Team Interaction

Zheng Ma, University of Southern Denmark, Denmark

Chih-Cheng Lin, University of Nottingham, United Kingdom

Kul Pawar, University of Nottingham, United Kingdom

Johann Riedel, University of Nottingham, United Kingdom

When managing a physically dispersed team or multi-cultural team, the most important issue is interaction across the cultural differences. A hypothesis of a successful physically dispersed or multi-cultural team is understanding the communication issues according to cultural differences, but to date, there have been relatively few previous studies that seek to unveil and theorise the underlying processes of NPD team interaction with cultural diversity. Therefore, it is necessary to explore how the culture and team type influences the process of NPD team interaction. This paper compares the processes of NPD team interaction within two cultural contexts – China and the UK – and two team types – collocated and virtual – in order to present the NPD team interaction process. A framework for conceptualising and analysing the team interaction process for different team types and in different cultural contexts was developed.

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Sunday, May 3, 1:30-3:00 **Room:** EC-D
Session: Risk Management

Track: GENL, 17

Chair: Jair Souza

011-0016: Financial Crisis and Forty Year Mortgage: A Critical Examination

Chun-Hao Chang, Florida International University, USA

Krishnan Dandapani, Florida International University, USA

One of the proposals aimed currently under consideration to address the enveloping global financial crisis is the introduction and adoption of the forty year mortgages by financial institutions. But, is the forty year mortgage a cure or a curse for the homeowner? In this study we examine the role of the forty year mortgage from the perspectives of the homeowner and institutions and compare and contrast it with other conventional mortgages. We develop a theoretical model and test it using institutional factors. We conclude, and detail how the forty year mortgage should be structured to ensure its successful adoption by financial institutions.

011-0219: Analysis of the Gauss Method as a Substitute for Anatocism as Types of Amortization Systems

Matheus Goncalves, UNESP, Brazil

Manoel Salgado, UNESP, Brazil

Jair Manfrinato, UNESP, Brazil

In view of the critical situation the global financial market is currently facing, now is the time to rethink those topics related to the business models being practiced and the analysis methods involved. The case of the American subprime is an example. In Brazil, we see a growing number of legal questions regarding the illegal practice of charging compound interest, called Anatocism. Therefore, we need to know the mathematical models applied to real estate loans and analyze the advantages and disadvantages. The proposal of this paper is to discuss the occurrence of Anatocism in the main amortization systems and to assess the weighted linear method, known as the Gauss Method, as an alternative to existing systems. Examples based on real market practices are used. The results expose arguments regarding the practice of Anatocism and show the technical difficulties that exist to define an appropriate model of collection of interest.

011-0709: And If the Operations Fairy Doesn't Show Up? Operations Management in New Ventures

Suzanne de Treville, University of Lausanne, Switzerland

Jeffrey Petty, University of Lausanne, Switzerland

Do entrepreneurs give sufficient consideration to operations management in designing their company and supply chain, or do they assume that operations will take care of themselves? Do venture capital firms weigh operations expertise appropriately? There is an almost complete neglect of operations in the entrepreneurship literature. From a longitudinal data set of investment decisions over an 11-year period collected from the archival records of a European venture capital firm we examined 1,365 CVs from 340 companies submitting projects. There did not appear to be a relationship between operations experience on the team and the project being accepted into the portfolio. We then present four case studies that illustrate how a lack of consideration of operations issues led to problems that could have been easily avoided, and lower startup performance. This preliminary research suggests a systematic underinvestment in operations planning in the new venture environment.

Sunday, 1:30-3:00 Sessions

198	Sunday, May 3, 1:30-3:00 Room: Senate Session: Responsive Learning Technologies	Track: GENL, 8	Chair: Samuel Wood
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011-0004: Play an Award-Winning Online Game Used to Teach Operations Management

Samuel Wood, *Responsive Learning Technologies, USA*

In 2004 POMS awarded the Wickham Skinner Award for Teaching Innovation for the development of a competitive online simulation-based assignment named Littlefield Technologies. Last year the game was used in introductory operations courses at the undergraduate, graduate, and executive level in hundreds institutions around the world. In this highly interactive session, participants will play an actual game compressed to 45 minutes. The session will also include discussion of how online games can be used effectively. Although not required, attendees are encouraged to bring a laptop to the session.

Sunday, 3:30-5:00 Sessions

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Sunday, May 3, 3:30-5:00 **Room:** Cloister North
Session: Non-U.S. Service Management

Track: SRVC, 11

Chair: Richard Clayton

011-0101: A Feasibility Study for Joint Services of Vehicle Routing and Patrol

Chikong Huang, Dept. of Ind. Management, National Yunlin University of Science & Technology, Taiwan, Republic of China

Poshun Wang, National Yunlin University of Science & Technology, Taiwan, Republic of China

The patrol and security companies in Taiwan have developed a new way of operation using their patrol capability. A preliminary study in this paper is to combine the traditional service of vehicle routing delivery with regular patrol and security routings. A mathematical model is first developed for these joint routing services. The objective of this model is to minimize the number of vehicles as well as the traveling cost. A heuristic algorithm using the simulated annealing algorithm is also developed for solving the problem. The effectiveness of this proposed model and the profitability of the proposed solutions are tested through several numerical examples.

011-0676: Entry Strategies in Business Process Offshoring Service Operations: Timing, Location and Diversification

Vaidy Jayaraman, University of Miami, United States

Yadong Luo, University of Miami, United States

Business process offshoring (BPO) service operations has recently emerged as an important strategy and a prevalent landscape in global service operations. As one of the first attempts to analyze this issue in an emerging market, this study examines how firms develop a set of global expansion strategies, including where (location), when (timing), and what (diversification), that are unique to BPO services. Our analysis of 424 BPO service providers in India demonstrates that providers with greater knowledge specialization tend to operate in more developed cities, and that information connectivity, government support and human resources competitiveness are critical locational determinants. While BPO investment is less path dependent than traditional FDI, behavioral variables including assertiveness and pre-BPO experience in the host locations are important factors behind the timing decision. Finally, BPO units involving lower knowledge specialization or higher process measurability are more diversified in terms of the number of business processes outsourced.

011-0437: Administrative Process Improvement in the Brazilian Public Sector

Monica Biazzi, University of São Paulo / Production Engineering Department, Brazil

Antonio Muscat, University of São Paulo / Production Engineering Department, Brazil

During the past two decades, the public sector has been under pressure for improving its performance and showing more transparency and assessment of results. Historically, the Brazilian public sector has developed a departmental and bureaucratic structure, which makes difficult activity coordination and service efficiency and efficacy. Process approach provides an alternative to this static and fragmented structure through a systemic vision, focused on the customer or citizen. In this context, the objective of this work is to present a multiple case study of administrative process improvement, with scope on Brazilian Public Institutions of Undergraduate Education, and propose a Process Improvement Model. The research methodology used was multiple case study. Data were collected through direct observation, documental analysis and semi-structured interviews. The results obtained contribute to theory, since they enclose specific aspects of the public sector and their influence in improvement programs, and present practical application, providing a base for future work.

011-0563: Generating Value from Whole-Life Solutions – A New Opportunity for the UK Rail Industry

Richard Clayton, Loughborough University, United Kingdom

Chris Backhouse, Loughborough University, United Kingdom

Samir Dani, Loughborough University, United Kingdom

Jeremy Lovell, Bombardier Transportation, United Kingdom

The UK government has started to demand a “whole-life, whole-system” view of new contracts within the UK rail industry, requiring the industry to transform the way it does business in order to deliver this new paradigm. This paper describes the work of a collaborative academic-industry research project based in one railway vehicle manufacturing company. The aim of the project is to maximise benefit across the value chain throughout the whole-life of a fleet of railway vehicles. This paper presents preliminary results and a review of the relevant literature to discuss how the traditional approach to value generation must change in order to deliver whole-life solutions. The discussion describes how an organisation's structure, approach to contracting and spares provisioning, supplier and customer relationships and people issues (behaviours and cultures) significantly impact upon the ability to deliver value to the manufacturer, their customers and suppliers in whole-life service contracts.

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Sunday, May 3, 3:30-5:00 **Room:** Cloister South
Session: Risk Management

Track: SCM, 12

Chair: Ricardo Reolon Jorge

011-0892: Quantity Flexibility Contract under Advance Purchase Discount and Partial Refund Policy

Mahdi Zanddizari, The University of Maryland (UMD), United States

Sanjay Jain, The George Washington University, United States

In a decentralized supply chain when speculative production of manufacturer is coupled with demand uncertainty of retailer, the result could be supply chain inefficiency. Yet efficient risk sharing cannot be achieved unless it accomplishes both channel coordination and win-win outcome. A generally proposed remedy is to get the retailer committed to a fraction of inventory risk prior to the selling season seen in Quantity Flexibility (QF) contract; however, by itself QF contract can not assure efficient risk sharing. Thus, we study dual production while combining QF and Advance Purchase Discount (APD) models to coordinate the channel and increase retailer's commitment. To address the win-win outcome, both updated demand and Partial Refund Policy (PRP) models are studied. Our findings show that the combined model has a superior performance to APD and QF alone while addition of PRP into QF contract can ensure win-win outcomes for both parties.

Sunday, 3:30-5:00 Sessions

011-0290: A Comparison of Supply Chain Risk Perceptions in Original Equipment Manufacturers and Tier One Suppliers: An Aerospace Industry Case Study

Naomi Brookes, Aston Business School, United Kingdom

Amrik Singh, Aston Business School, United Kingdom

Whilst supply chain risk has become a topic of great interest to supply chain researchers, few studies have used the supply chain as a "unit-of-analysis" to track how perceptions of risk of the same component streams vary at different tiers along that chain. Understanding differences in risk perceptions is crucial in devising effective approaches to mitigate against risk. This paper presents an exploration of these issues using a multi-component case study undertaken in the aerospace sector. The results of the case study indicated that perceptions of risk were very different between tiers. Disparities in perceptions could be partly attributed to complex supply chain interactions both within and across sectors and partly attributed to informational inequalities at different tiers. The paper concludes by delineating the potential implications of the case study investigation for practitioners and researchers interested in supply chain risk and outlines further empirical work that could be undertaken.

011-0342: Risk, Incentive and Optimum Delivery in Supply Chains

Jiamin Wang, Long Island University - C. W. Post Campus, United States

We consider a supply chain with a buyer and a single make-to-order supplier. The supplier may incur a high inventory holding cost if production is started too early. However, the supplier's conservatism in commencing the production process undermines the effectiveness of the supply chain due to long and uncertain material flow times. In response, the buyer sets a delivery date and an incentive in the contract for on-time delivery. In this study, a mathematical model is developed to analyze the role of incentives and to structure incentives in supply chain contracts.

201	Sunday, May 3, 3:30-5:00 Room: Captain Session: Demand Management	Track: SCM, 26	Chair: Paulo Cesar Chagas Rodrigues
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011-0043: Analysis of the Influence of Strategic Management of ETO Demand on Management of Stock in a Printing Industry

Paulo Rodrigues, Universidade do Sagrado Coração, Brazil

Otávio Oliveira, São Paulo State University, Brazil

Organizations are adopting industrial production models with priority given to reducing costs and increasing the quality of their processes and products. Optimizing and rationalizing inventory management is a great opportunity for these companies to achieve these goals. The case study method was employed in this research. Data were collected through the intersection of the following tools: semi-structure, document analysis and observation in loco. Revisions are made in theoretical work on the following topics: management of materials and management system demand. These themes guided the search, allowing for greatest insight about the collected data and information generated. The case study was presented with a characterization of some aspects of the influence of demand management strategy on the management of inventories.

011-0684: Real Time Order Management with Penalty Costs in an Integrated Supply Chain

Rajesh Srivastava, Florida Gulf Coast University, United States

Elias Kirche, Florida Gulf Coast University, United States

Order management in a build-to-order environment requires synchronization of customer specifications with corresponding production processes upstream the supply chain. Consequently, the firm should understand its system constraints, and those of its suppliers, in terms of the stated criteria to accurately quote prices and delivery dates. We develop a decision support system in an integrated supply chain with suppliers facing cost, capacity, quality, and lead time constraints. We consider the case where the firm is able to renegotiate due dates if the customer-supplied due date cannot be met, however, with a customer-imposed penalty for the inability of the firm to meet the original due date. The characteristics of the penalty cost function are examined in this study to determine whether the firm should renegotiate, given the size of the penalty. The problem is solved through a multi-criteria mixed-integer program module from a major ERP vendor.

011-0670: Service Level Differentiation in Make-to-Order Supply Chain Design for Segmented Markets

Navneet Vidyarthi, Concordia University, Canada

Make-to-order (MTO) systems are emerging business strategies in managing responsive supply chains, characterized by high product variety, highly variable customer demand, short product life cycle, and multiple customer classes. Motivated by the strategic importance of response time, we study the problem of demand allocation and capacity selection in the design of MTO supply chains for segmented markets with service-level differentiated customers. We examine the impact of different parameters on the design of supply chains for segmented markets and provide some managerial insights.

202	Sunday, May 3, 3:30-5:00 Room: Yeoman Session: Material Management	Track: SCM, 29	Chair: Günther Schuh
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011-0075: Optimal Design of Supply Chain for Production and Distribution of Synthesized Natural Gas (Syngas)

P Raman, The Energy and Resources Institute, India

Nambirajan Thangasamy, Pondicherry University, India

Increasing cost and scarcity of conventional fuel (petrol as an example) has led to the search for an alternative fuel. Synthesized Natural Gas (Syngas) is an alternative fuel that can substitute for diesel, petrol, furnace oil, LPG, etc. at lower cost and also on a sustainable basis. Syngas is produced from biomass wastes like wheat straw, groundnut shell, coconut shell, cotton stalk and mustard stalk. Biomass wastes are converted into Syngas using a device known as Advanced Biomass Gasifier System. Since Syngas is a new and innovative product to the market, it does not have a suitable supply chain design. Authors are addressing the complete activities involved in the process of manufacturing, distribution and an optimal supply chain design for Syngas so that the right quantity of Syngas is delivered to customers at the right time with the right quality.

Sunday, 3:30-5:00 Sessions

011-0268: Applying Hybrid System Theory to Supply Chain Design

*Günther Schuh, ,
Volker Stich, RWTH Aachen University, Germany
Jan Meyer, RWTH Aachen University, Germany*

Supply Chain Management delivers a considerable number of ideas and methods to design the value stream. Each of these concepts may lead to significant cost reduction and higher service levels. But the same concept does not work for different customers and their diverse needs. Thus, a "one size fits it all" supply chain cannot lead to success. The key to overcome this obstacle is the hybrid supply chain. This paper outlines the application of hybrid system theory to supply chains. After a comprehensive overview of existing methods for the design of supply chains is given, a methodology for a customer-to-customer oriented supply chain design is presented. This approach adopts the hybrid system theory to supply chains which is in a nutshell that hybrid systems use the advantages of their subsystems to reach a superior result to one system alone. A case study illustrates the application of the methodology.

011-0535: Flexible Configuration Logic for a Complexity Oriented Design of Production Systems

*Günther Schuh, Research Institute for Operations Management (FIR) at RWTH Aachen University, Germany
Henrik Wienholdt, Research Institute for Operations Management (FIR) at RWTH Aachen University, Germany*

To keep work and production sites in high-wage countries like Germany, companies have to focus on the production of complex and customer individualised products. This results in the necessity of flexible and efficient production systems. In a subproject of the cluster of excellence "Integrative Production Technology for high-wage countries" at RWTH Aachen University a configuration logic is developed that enables companies to configure their production systems in a way that customer-specific products can be produced at the costs of mass production. In the project a holistic description model for production systems has been defined. With numerous attributes in the sub models (e.g., Supply Chain) a detailed characterization of the production system is possible. Case studies helped to identify the interdependencies among all attributes. Finally, external and internal complexity drivers have been identified to allow a configuration of a production system that is able to deal with dynamic influences.

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Sunday, May 3, 3:30-5:00 **Room:** Scribe
Session: LCA and Environmental Impact Assessments

Track: SUST, 16

Chair: Wassila Mtalaa

011-0735: Life Cycle Assessment as a Tool for Analyzing "Sustainable" Construction Materials

*Maria Fernanda dos Santos, Universidade Estadual Paulista - Unesp Bauru, Brazil
Rosane Battistelle, Universidade Estadual Paulista - Unesp Bauru, Brazil*

Much has been discussed lately about reusing waste in new construction materials and countless studies have been carried out based on this objective. However, before these products can be called "sustainable" and a recycling system can be implemented, it is fundamental to understand all aspects involved in this action, and most especially, what would be the true gains for the environment. Within this context, Life Cycle Assessment (LCA) seems to be an important Environmental Management tool in the search for products that can lead to increasingly smaller impacts, without leaving aside the economic aspects. In the face of the above, this study objective to evaluate the application of LCA in construction materials compounds of residues, conducting bibliographic surveys and raising the true environmental impacts associated with these products, and also to contribute towards the disclosure of using this tool in relation to specific products of the civil construction sector.

011-0473: Use of Life Cycle Assessment in Sustainable Manufacturing: Review of Literature, Analysis and Trends

*Carla Machado, São Paulo State University, Brazil
Vagner Cavenaghi, São Paulo State University, Brazil*

The implementation of the management model with a Sustainable Manufacturing (SM) approach means thinking of processes that use natural resources in a responsible manner, promote the health and safety of all those involved and the integration of production cycle processes (production - distribution - consumption - recovery). One of the possible methods to map this process is to produce the Inventories in the Life Cycle Analysis (LCA), which makes an environmental balance of the processes and creates indicators for monitoring and decision making. Through a review of literature, this paper proposes underscoring the importance of LCA in implementing SM, seeking to be an incentive for more in-depth research and for the creation of proposals that can make LCA accessible to the entire production sector in the country as soon as possible. The paper shows it is not possible to establish truly sustainable production processes without carrying out an LCA.

011-0066: Environmental Labeling: The Importance of the Life Cycle Approach to Define the Criteria for the Leather Category

*Bruna Barra, UNIVERSIDADE ESTADUAL PAULISTA JULIO DE MESQUITA FILHO - UNESP, Brazil
Adilson Renofio, UNESP, Brazil
Rosane Battistelle, UNESP, Brazil*

A product's life cycle begins the moment the natural resources needed for its manufacturing are extracted, followed by the manufacturing, transport, user and appropriate management of waste phases. From an assessment of the life cycle, environmental labeling programs define criteria to be complied with by manufacturers aimed at obtaining the green seal for their products. The purpose of this seal is to inform consumers of its good production practices. However, environmental labeling programs that consider leather have faults since they do not consider its entire life cycle. In this context, the objective of this study, by means of exploratory research, is to present how imprecision in defining these criteria, a consequence of a partial life cycle assessment, results in distorted information to consumers about the real environmental impacts related to cow leather production. It encourages indiscriminate and wasteful actions in the Brazilian Amazon.

011-0863: Economic and Carbon Impacts of Utility Smart Grid Systems

*Rebecca Johnson, University of Colorado, United States
Subhamoy Ganguly, University of Colorado, United States*

Sunday, 3:30-5:00 Sessions

Paul Komor, University of Colorado, United States

Stephen Lawrence, University of Colorado, United States

Convergence of high fuel prices, environmental consciousness, and increasing energy demand are creating pressure for electric utilities to enact holistic reform to their systems. Smart Grids, a mechanism to provide bi-directional communication and control between electricity providers and consumers, are a leading option being considered for the evolution to a more efficient and renewably powered electric-grid infrastructure. In this paper we develop an MILP emissions and decision support model which will assist electric utilities, regulators, and interested parties in the evaluation of the economic and carbon trade-offs inherent in Smart Grid programs.

011-0590: CO2 Emissions Calculation Models for Green Supply Chain Management

Riad Aggoune, Public Research Centre Henri Tudor, Luxembourg

Jos Schaefer, Public Research Centre Henri Tudor, Luxembourg

Wassila Mtaala, Public Research Centre Henri Tudor, Luxembourg

Green logistics is a new concept launched by several logistics companies. It means reducing carbon emissions caused by transport. Particular attention is to be paid to trucks, which play an important role in transport logistics. The quantification of CO2 emissions linked to transport is a complex exercise due to the high number of parameters that influence these emissions. Still, at the moment, existing measurement and calculation methods do not take account of all these parameters.

The aim of this paper is to give an overview of the current measurement and calculation models that compute CO2 emissions due to truck transportation. In this respect, journal articles and reports mainly published the last decade are reviewed and analyzed. This work aims at being able to calculate for a given route and a given heavy duty vehicle the overall amount of CO2 of a given shipment.

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Sunday, May 3, 3:30-5:00 Room: Knave

Track: HLTH, 12

Chair: Geneviève Desbiens

Session: Successful Applications of Lean in Healthcare

011-0459: Panacea or Trend? The Role of Rapid Improvement Events in the Deployment of Lean Thinking in Healthcare using a Case of the UK NHS

Thanos Papadopoulos, School of Management, University of Southampton, United Kingdom

Spyros Angelopoulos, Technical University of Crete, Greece

This paper focuses on the role of Rapid Improvement Events (RIE) during the deployment of Lean Thinking (Lean) in healthcare. It explores the diverse and evolving actor associations (dynamics) in shaping RIEs during Lean implementation in the Day-case and Pre-operative assessment Units of a UK NHS hospital. Echoing dynamic translation, this research describes how actors associated and constructed Lean through RIEs. It demonstrates that the use of RIE as the focal tool may be futile, since Lean is constantly translated by actor dynamics during and after the RIE. These translations influence the RIE and the subsequent implementation of Lean. Ultimately, the paper suggests that RIEs during the implementation of Lean in healthcare do not constitute a panacea, and are used more as a trend. However, the use of RIEs as tools is not enough; it is their use as part of the Lean philosophy that render Lean implementation successful.

011-0519: Lean in a Core Clinical Area – Lessons Learned

Norman Faull, University of Cape Town, South Africa

Cephas Chikanda, University of Cape Town, South Africa

Our programme of action research began in 2003 and has tested lean in healthcare. The programme is background to a new trial in a core clinical area experiencing a perplexing and distressing problem: a neonatal ward with a rising incidence of Hypoxic Ischemic Encephalopathy (HIE) babies. The ward is part of a large, tertiary hospital. The field researcher, a young MD, himself identified the problem. Prior to the field work he met with representatives of the clinical directorate, the neonatal unit nursing staff and the head of neonatology. Initial approval led to direct observation in the labour and neonatal wards, and a review of 51 HIE patient folders. Preliminary findings were presented to a meeting comprising the heads of neonatology and obstetrics, the maternity unit manager, and a representative of the clinical directorate. Controversy erupted and the research was discontinued. The paper reports the lessons learned.

011-0762: Lean and BPR in Healthcare: A Surgeon's Look at Potential Pitfalls and Key Success Factors

Geneviève Desbiens, HEC Montréal, Canada

Sylvain Landry, HEC Montréal, Canada

Successful implementations of lean and BPR in the manufacturing industry have convinced many healthcare managers to pursue a similar path. However, in a highly political and complex context, the challenges faced are numerous. The BPR experience at Leicester Hospital analysed by David Buchanan (1997, 1998, 2003) suggested that politics between actors may impede process transformation. This presentation will survey POM approaches that have been implemented in the healthcare sector, identify KSF and pitfalls taking into account a surgeon's point of view on politics, to ensure their continued implementation and prevent any unjustified adverse reactions. Based on published data and our experience in the field, we will suggest future areas of research of significant value for POM researchers.

011-0214: Value Creation through Lean Healthcare

Mohammad Salam, Mt. Allison University, Canada

This paper reports a study that applied the concept "lean" to the analysis of a health care system. This study used lean methodology to identify the problem areas as well as identify value for the patient. The existing process was analyzed based on the layout of the check-up area in the Health Promotion Center of Bangkok Hospital. The process and layout were then redesigned to optimize the lead time of the system. There are 3 main stages in the analysis: data collection, data analysis and data comparison.

Sunday, 3:30-5:00 Sessions

205	Sunday, May 3, 3:30-5:00 Room: EC-D1 Session: Service Management	Track: EMPR, 13	Chair: Dong Yan
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011-0439: Survival Analysis of e-Business Start-ups: Implications of Product-Process Alignment for Electronic Food Retailers

Gregory Heim, Texas A&M University, United States

Kingshuk Sinha, University of Minnesota, United States

In this paper, we investigate the relationship between product-process alignment and the survival of e-business start-ups. Specifically, we empirically analyze product-process alignment of a large sample of electronic food retailers, a class of e-businesses that has witnessed both successes and failures, and continues to be a vibrant sector even after the dot.com fallout. The contribution of the paper is in conceptualizing and empirically illustrating that product-process alignment is associated with the survival of e-business start-ups over time, an indicator of the sustainability of competitive advantage.

011-0760: An Empirical Estimation of the Impact of Airline Flight Schedules on Flight Delays

Vinayak Deshpande, Purdue University, United States

Mazhar Arikan, Purdue University, United States

Airline flight delays have come under increased scrutiny lately in the popular press, with FAA data revealing that airline on-time performance was at its worst level in 13 years in 2007. The goal of this paper is to examine the impact of the scheduled time block allocated for a flight on on-time arrival performance. We combine empirical flight data published by the Bureau of Transportation Statistics (BTS), with the Newsvendor framework from the Operations literature to conduct this analysis. Our results show that airlines systematically under-schedule flights. Our results also indicate that airlines do not maintain consistent service levels by adjusting their schedules based on the time of the day, origin airport congestion, and destination airport congestion.

011-0714: Service Failures, Competition, and the Sources to Blame: An Empirical Study of Airline On-Time Performance

Yan Dong, University of Maryland, United States

Kefeng Xu, University of Texas at San Antonio, United States

Sources to blame for failures in service operations have been found to affect the degree of customer satisfaction at the consumer level. Taking into account the behavior of its customers, a service provider may design its operations strategies to compete more effectively. Using data collected in the airline industry, we investigate how characteristics of airline customers and variance in the sources of service failures (e.g., whether they are internal or external sources) affect airline schedule time and related service on-time performance. We also examine these effects with airline competition to highlight the interactions between them. Our study contributes to the service failure and recovery literature in both service management and marketing literature, and provides managerial insights regarding service operations strategies.

011-0220: Price Volatility in the Airline Markets: Wait or Buy?

Benny Mantin, University of Waterloo, Canada

David Gillen, University of British Columbia, Canada

In this work we illustrate how consumers could reach inferences about future price movements of airfare tickets by carefully observing previous price swings. We quantify the price volatility on 1000 US domestic routes and its progression as time to departure approaches. Price volatility could represent the implied demand volatility or reflect the sensitivity level of the dynamic pricing and revenue management systems employed by the different airlines. Price volatility could also be intentionally adopted by airlines to induce demand. We empirically investigate the impact of price volatility on the behavior of future prices. We find that price-pertinent variables, such as price volatility, bear predictive power about the probability of a price drop/increase in the immediate future and the relative magnitude of this price movement. Strategic consumers could be aware of these dynamic pricing mechanisms and react accordingly.

206	Sunday, May 3, 3:30-5:00 Room: EC-B Session: Collaborative Innovation	Track: PITM, 11	Chair: Debasish Mallick
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011-0240: Collaborative Product Development (CPD): Exploring Contingencies in Supplier and Customer Involvement

Debasish Mallick, University of St. Thomas, United States

Changyue Luo, Governors State University, United States

Roger Schroeder, University of Minnesota, United States

Inter-firm collaboration in new product development is becoming one of the major sources of competitive advantage for companies in almost every industrial sector. Using a cross-industry survey of 266 new product development projects, we explore the factors affecting the relationship between customer and supplier involvement and new product development performance.

011-0612: Drivers of Collaboration in Innovation-driven Horizontal Networks

Adegoke Oke, W.P. Carey School of Business, Arizona State University, United States

Moronke Idiagbon-Oke, Ken Blanchard College of Business, Grand Canyon University, United States

It is generally assumed and perhaps accepted in the literature that innovation-driven inter-organizational collaborations exist due to the common need to share risks and resources, obtain access to external resources and technologies, and the like. Based on an in-depth longitudinal case study of a network of firms, we find a significant discord between organizational expectations and organizational realizations with a subsequent negative impact on network performance outcome.

011-0600: Globally Distributed Design: The Role of Product Architecture and Coordination

Sunday, 3:30-5:00 Sessions

Bilal Gokpinar, *University College London, United Kingdom*

Wallace Hopp, *University of Michigan, United States*

Seyed Irvani, *Northwestern University, United States*

Changes in the global economy and technological advances are enabling and motivating an increasing geographic distribution of new product design and development efforts. This brings new operational challenges to product development organizations. For a large organization which designs and develops a complex product, the geographic distribution of product architecture (e.g., parts designed for a new vehicle) and the geographic distribution of workers (e.g., design engineers working in different sites globally) adds a new layer of complexity to product development efforts. In this empirical study, using an extensive dataset of global engineering design efforts from a large auto manufacturer, we have developed a framework for examining the impact of geographic distribution of product architecture and design teams on NPD performance. Our results also provide insights on which architectural interfaces can be managed across large geographic distances and which cannot.

011-0272: Matching Needs and Providers: An Empirical Study of Innovation Outsourcing

Zhijian Cui, *INSEAD, Technology and Operations Management Department, France*

Christoph Loch, *INSEAD, Technology and Operations Management Department, France*

Based on detailed case studies of 31 innovation outsourcing projects at Siemens, we examine the link between the reasons for innovation outsourcing and the providers of the outsourced work. Six outsourcing motivations (including cost driver, market driver, technology driver, strategic driver, production driver, organizational driver) discussed in the literature are confirmed in our sample. In most cases, the outsourcing decision is driven by several motivations simultaneously (cost savings are usually not the main rationale). We then compare five types of outside knowledge providers. We find that certain provider types tend to be chosen for specific outsourcing motivations. The success of the outsourced project is explained by the project management of the collaboration, but also by the match between the outsourcing motivation and the provider's competence on this dimension.

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Sunday, May 3, 3:30-5:00 **Room:** EC-C
Session: Modeling for Disaster Management

Track: DSTR, 3

Chair: Douglas J Morrice

011-0682: A Simulation Model to Measure the Effectiveness of Evacuation Warning Message Dissemination

Magesh Nagarajan, *Aston University, United Kingdom*

Pavel Albores, *Aston University, United Kingdom*

Duncan Shaw, *Aston University, United Kingdom*

Effective communication during the large-scale emergency is essential for saving lives. This study proposes an agent-based simulation model to simulate the warning message dissemination among the public, through unofficial channels (people-to-people communication among friends and neighbours), and also official channels (e.g., TV, radio and sirens). The proposed model was developed in NetLogo for a hypothetical area, and requires input parameters such as effectiveness of each official source (%), estimated time to begin informing others (min), estimated time to inform others and estimated percentage of defaulters (who do not relay the message). This model would help the decision makers to estimate the maximum possible coverage under given conditions. The time series results of the model would help in estimating the time required to inform the desired proportion of the public. The sensitiveness of the input parameters on the time required to inform the desired proportion of the public was also studied.

011-0866: Applying Service Theory to Disaster Management

Richard Chase, *Marshall School of Business, University of Southern California, United States*

Thomas House, *Naval Post Graduate School, United States*

Yaara Bergin, *Naval Post Graduate School, United States*

Laurie Van Leuven, *Seattle Public Utilities, USA*

We propose that viewing disaster response through the lens of private sector service management provides a new and more effective way of responding to them. We show how the service delivery paradigm (Chase and Haynes, 2001) can be recast as a disaster response framework and discuss how service companies can use their service capacity during disaster situations to benefit both citizens and the companies themselves.

011-0955: An Empirical Analysis of Hurricane Sales and Weather Data

Douglas Morrice, *The University of Texas at Austin, United States*

John Butler, *The University of Texas at Austin, United States*

Eva Regnier, *Naval Postgraduate School, United States*

In this study, we conduct an exploratory data analysis on hurricane sales data from a retailer and weather forecast data. The intent is to develop a sales forecasting model that the retailer can use to better manage and distribute inventories prior to a hurricane.

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Sunday, May 3, 3:30-5:00 **Room:** Gallery
Session: Human behavior and behavioral dynamics in supply chain management II

Track: BDOM, 8

Chair: Candido Perez

011-0494: How Cognitive Biases and Managerial Experience Impact Supply Chain Management Performance: An Empirical Approach with the Bullwhip Effect

Candido Perez, *IESA, Venezuela*

Sunday, 3:30-5:00 Sessions

This paper looks to see how cognitive biases explain the bullwhip effect and the results show statistical support for such biases in decision-making, as a form of conservatism (managerial experience) when testing managers against undergraduate students. Before using the traditional Beer Game with 360 individuals, subjects complete a questionnaire to measure their degree of representativeness (via memory recency) and overconfidence; my results show that no player--independent of gender-- performs better than the copycat strategy (pass-orders). A time-series analysis suggests overconfidence from subjects because the inventory availability becomes an order deterrent, more intense than customer's demand, and the diminishing impact along time of previous orders indicates a small representativeness effect.

011-0580: The Effects of the Size and the Change Direction of Initial Wealth in Inventory Ordering

Tae Hyun Kim, Yonsei University, Korea, Republic of (South Korea)

Seong Am Moon, Korea National Defense University, Korea, Republic of (South Korea)

Wonso Kim, Yonsei University, Korea, Republic of (South Korea)

The main theories of Behavioral Operations Management(BOM) are grounded in the Prospect Theory developed by Kahneman and Tversky(1979). According to the theory, benefit is evaluated not by the absolute amount of wealth, but by the change of wealth. That is called "reference dependence" and is considered as a highly important argument of the Prospect Theory. However, it is interesting that there is little BOM research which covers the reference dependence. In this research, we study the effects of 1)the size of initial wealth (reference) and 2)the changing direction of the wealth during inventory ordering decision-making. We develop hypotheses about the effects of those two factors on risk attitude and the time passed before order stabilization. To validate our hypotheses, we design 2x2 factorial design and carry out the experiment. The subjects are undergraduate students attending OM classes.

011-0091: Shadow Price in Supply Chain Relationships

Darko Tipuric, University of Zagreb, Faculty of Business and Economics, Croatia

Jasna Prester, University of Zagreb, Faculty of Business and Economics, Croatia

Supply chain interactions can partly be described by Agency Theory. Yet according to Salanié (2003), Agency Theory has still not received enough empirical validation. We propose a validation in supply chain context. Although we do not enter into psychological or social reasons for partnering, we included subjective probability introduced by Kahneman and Tversky in their seminal paper in *Econometrica* (1979), which led to the evolution of Prospect Theory. Using Prospect theory's Value functions in classical derivation of the optimal contract, we derive the analytical form of the Lagrange multiplier (shadow price) which we then test and empirically derive the value of this multiplier in a large scale supply chain survey.

011-0169: Newsvendor Order Distribution under Contracts with Threshold

Diana Wu, University of Kansas, United States

Kay-Yut Chen, HP Research Lab, United States

We use a series of experiments to study the behavior of a newsvendor retailer under supply chain contracts that involve threshold, for example, quantity discounts and sales target rebates. Previous studies show that decision makers tend to anchor orders on the mean customer demand, which can lead to suboptimal performance of the channel. All earlier newsvendor experiments focus on the analysis of the average of ordering decisions. In this study, we look at the overall order distributions under different contracts and find that by constructing the threshold effectively, the anchoring behaviors can be largely reduced. We propose a behavioral model based on quantal response to describe the observed behavioral changes in order distributions.

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Sunday, May 3, 3:30-5:00 Room: EC-A

Track: INV, 5

Chair: Atipol

Session: Supply Policies and Government Sectors

Kanchanapiboon

011-0012: Joint Pricing and Inventory Decision in an Inventory System with General Demand Function

Hong Chen, University of British Columbia, V6T OA7

Zhan Zhang, University of British Columbia, V6T OA7

We consider a joint optimal pricing and inventory control problem that has been studied by Federgruen and Heching (1999) among others. In the earlier work, the optimal policy is shown to be a base-stock list-price policy under the assumption that the demand is concave in price. However, substantial empirical evidence does not support the concavity assumption. In this paper, we explore to what extent the base-stock list-price policy is still optimal without assuming the demand function to be concave.

011-0608: The Newsvendor Problem: Review and Directions for Future Research

Yan Qin, University of Florida, United States

Ruaxuan Wang, University of Florida, United States

Asoo Vakharia, University of Florida, United States

Yuwen Chen, University of Rhode Island, United States

Michelle Seref, University of Florida, United States

In this paper, we review the contributions to date for analyzing the newsvendor problem. Our focus is on examining the specific extensions for analyzing this problem in the context of modeling customer demand, supplier costs, the buyer risk profile, and the selective newsvendor setting. Over and above summarizing the current literature, we also provide directions for future research in each area.

011-0380: Synchronizing the Supply Chain: A Practical Application of Multi-Echelon Stock Theory

Erlend Alfnes, SINTEF Industrial management, Logistics dept., Norway

Erik Gran, SINTEF Industrial management, Logistics dept., Norway

Sunday, 3:30-5:00 Sessions

This paper describes a practical application of theory for multi-echelon stock management in a manufacturing supply chain. The case company, O. Mustad AS, is the largest manufacturer of fishhooks in the world and has plants in China, Dominican Republic, and Norway in order to serve the global market. The proposed control model for this distribution system is based on periodic review, order-up-to inventory control (R S s). The paper describes the various considerations that led to this proposal as well as some special adaptations we have proposed. The main point is that the use of deterministic intervals between replenishment orders implicit in order-up-to inventory control, may be used to synchronize orders for end products that are made from the same raw material or intermediate product. Utilizing this coordinated flow makes it in our view possible to almost eliminate cycle stock at the earlier (echelon) stages.

011-0323: Robustness of a Joint Supply Policy between Two Manufacturers under Shifting Demand

Atipol Kanchanapiboon, New Jersey Institute of Technology, United States

Sanchoy Das, New Jersey Institute of Technology, United States

We consider a pair of manufacturers, in which the first produces and supplies a single item to the second, where it is assembled into the final product. The supply item is stocked at both locations. The joint supply policy is defined by order batch sizes, reorder levels, and production rates. Here we study the robustness of a stationary supply policy when demand is shifting. Theoretically, in order to minimize the total cost, the delivery batch size needs to be continuously updated whenever there is a shift in the demand level. This is not feasible in practice because of limitations in production and logistic planning. In this research, two supply policies are proposed: (i) fixed delivery batch and (ii) fixed production period. Given a stochastic demand shift pattern, each selects the batch size that minimizes the expected total cost of both manufacturers. A combined strategy that integrates both policies is developed.

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Sunday, May 3, 3:30-5:00 **Room:** EC-E
Session: Drivers of Innovation Performance and Policy

Track: PITM, 12

Chair: Tyson Browning

011-0195: Community Integration in a State Program of Innovation

Carlos Jung, Federal University of Rio Grande do Sul - UFRGS, Brazil

Carla ten Caten, Federal University of Rio Grande do Sul - UFRGS, Brazil

This paper describes the results of exploratory research into the Research and Development (R&D) model employed in the Program for the Creation of Technological Innovation Nuclei in the State of Rio Grande do Sul, Brazil. Implemented in 1989 by the Secretariat of Science and Technology of Rio Grande do Sul (RS), to promote sustainable regional development, this program has stimulated the formation of public and private sector partnerships to generate new technology, products and processes adapted to the specific conditions found in the different regions in the State. The results described herein were obtained by a process of exploratory research designed to investigate the conceptual principles and practical operation of the R&D activities of the RS Program for the Creation of Nuclei of Technological Innovation, and the lateral development of this program so as to identify the principal actions effectively contributing to regional development.

011-0408: The Company Size Effect in Innovative Performance

Isak Kruglianskas, São Paulo University, Brazil

Clandia Gomes, Santa Maria Federal University, Brazil

The study aims to evaluate the influence of the size of the company in the process of management of external sources of technological information. The survey was carried out in Brazilian industrial companies. These innovators having aimed to contribute to the inferences in the form of technology management and innovative performance. The analysis of the relationship between the management of external sources of technological information and performance, according the size of the companies disclosed that significant differences exist in the relative aspects to the management structure. This is especially evident with chances of access to the technology, the external sources of technological information, and to the indicators of innovative performance. The effected analyses highlight the contribution of the partnership and the external relationship in the choice of the modality of access to the technology and in the source of technological independent information of the size of the companies.

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Sunday, May 3, 3:30-5:00 **Room:** EC-F
Session: Organizational Issues in LEAN Adoption

Track: JIT, 5

Chair: Jos A.C. Bokhorst

011-0696: The Impact of the Amount of Work in Process on the Use of Cross-Training

Jos Bokhorst, University of Groningen, Netherlands

Cross-training is becoming increasingly important to firms in order to cope with the more stringent performance requirements they are faced with in today's market. However, many firms put considerable effort into cross-training their workers only to find out that their workers favor the familiar tasks and hardly use and maintain the newly acquired skills. In this paper we explore the hypothesis that reducing the fixed level of work in process (WIP) forces workers to make a more balanced use of all their skills. We test this hypothesis by means of a simulation study with cross-training configuration and worker assignment policy as moderating variables. Simulation has been performed for different settings of manufacturing parameters. Based on this study, it can be concluded that the control and limitation of the amount of WIP is a simple but effective instrument to enforce using and maintaining worker skills.

011-0718: Human and Organizational Factors in Lead Time Reduction

Francesco Gallmann, University of Lausanne, Switzerland

Suzanne de Treville, University of Lausanne, Switzerland

Michael Borno, University of Lausanne, Switzerland

Gerald Reiner, University of Neuchatel, Switzerland

Sunday, 3:30-5:00 Sessions

How does competitive need for short lead times translate into lead-time-reduction behavior? The system dynamics of lead time reduction have been well understood for decades, and it is clear that short lead times can result in competitive gains. Why, then, is so little lead-time-reduction behavior observed? We present a theoretical model that emerges from case-based research to address this paradox, arguing that the relationship between competitive need for short lead times and lead-time-reduction behavior is moderated by both organizational and human factors. Organizational factors include use of accounting or performance measurement systems based on utilization and investment to improve flow on the factory floor. Human factors include understanding of the system dynamics of lead time and a time-based mindset. The model, if shown to be generalizable in the next round of testing, permits better integration of the mathematical relationships that drive lead time with operations management theory.

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Sunday, May 3, 3:30-5:00 Room: EC-G
Session: Demand Forecasting

Track: MKTG, 12

Chair: Usha Ramanathan

011-0276: Forecasting Strategies, Causes of Inaccuracy, and Future Challenges

Patrik Jonsson, Chalmers University of Technology, Sweden

A forecasting process and its possibility of efficiently developing accurate forecasts depends on several issues. One is to simplify the conditions for carrying out forecasting, another is to shape the forecasting process, a third to design an organisation with trust and commitment, and a fourth to use accurate software support. Based on survey data, this paper identifies three distinct and equally sized forecast strategy clusters of companies working with forecasting simplification, processes, organisation and software support in distinct ways. The analysis compares the forecasting status, reasons for forecast inaccuracies, and perceived important forecast improvement areas in the three forecast strategy clusters.

011-0995: Grocery Sales Forecasting with SVR Feature Selection

Ozden Gur Ali, Koc University, Turkey

Our objective is to develop an accurate method to forecast stock keeping unit sales in the presence of promotions. From a managerial point of view, transparency of the method, as well as consistency in handling similar situations, is desirable. To this end, we leverage the marketing literature to develop variables that reflect the hypotheses about the effect of price and promotions on sales. The potentially useful variables include the stimuli variables such as prices and promotions for the products in the choice set, and seasonality; as well as variables that describe the SKUs, stores, and categories in terms of their past sales and promotion behavior, and their interactions. We use support vector regression with L1 norm to select the relevant features among the hundreds, and to estimate parameters that depend on the type of product and store. We use data from a grocery store chain in Turkey.

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Sunday, May 3, 3:30-5:00 Room: EC-H
Session: New approaches for POM decisions in LA&C enterprises

Track: LA&C, 3

Chair: Luiz Brito

011-0666: Culture, Knowledge and Competitiveness: A KBV Approach to Manufacturing Firms in Brazil

Flavio Macau, EAESP - FGV, Brazil

Luiz Brito, EAESP - FGV, Brazil

Competitive advantage is more than ever an important topic during crisis. Thus better understanding about how to achieve superior financial results, growth and performance becomes central to the strategic management process. Drawing on the knowledge-based view (KBV) of the firm and theory on manufacturing performance, and following studies such as Hult et al (2007), this research explores the influence of a culture of competitiveness and knowledge development on firm competitiveness. We reexamine previous links between a culture of competitiveness, knowledge development and cycle time in three ways: adding manufacturing capabilities (cost, dependability, quality, flexibility) as a proxy to superior manufacturing performance; adding components and immersing knowledge development into a comprehensive KBV context; and adding growth and financial performance as possible dependent variables of the former. Thus we extend the existing scale, applying a survey to HR and Manufacturing & Industrial directors of Brazilian firms to empirically test our propositions.

011-0720: CABASnet EPCIS: A Collaboration Platform for Multistakeholder RFID Deployments

Edgar Blanco, MIT Center for Transportation & Logistics, United States

Juan Ochoa, Center for Latin-American Logistics Innovation, Colombia

RFID has been widely studied as an enabling technology to decision making, operational efficiency and real-time based operation control among others. Besides the traditional barriers for deploying RFID technology, emerging markets bring some additional complexity: lower access to capital, less operational efficiency and cultural barriers. Therefore, there is little incentive for a single corporation to drive innovation and invest in RFID regardless of its value proposition. LOGyCA, through a common EPCIS platform in Colombia was able to increase RFID adoption and realize operational benefits. In this presentation we will describe how by bringing together multiple stakeholders it is possible to catalyze RFID deployments through collaboration and common technological platforms. Examples of cost savings initiatives and enhanced efficiency in logistics and supply chain will be discussed.

011-0697: Prospective Methodology for the Comprehensive Analysis of Manufacturing Site Location Decisions

Michael Johnson, Texas A&M University, United States

William Sawaya, Texas A&M University, United States

Sunday, 3:30-5:00 Sessions

In the globalized economy, manufacturing is frequently situated in countries with low labor costs. In some cases these countries are geographically and culturally remote from the locations where the products were designed or used. Often the decision to locate in these countries is based on the putative cost benefits, mostly attributed to decreased labor costs (and occasionally increased distribution costs are also considered). It is likely that other variables could be included to properly capture the implications of manufacturing in low cost countries. These variables may include: transportation time and cost; inventory costs; oversight and quality assurance costs; currency and political risk; and labor supply and wage dynamics. This presentation will discuss ways of examining and monetizing some of these variables. It is proposed that the inclusion of these additional variables will allow for informed manufacturing site location decisions. Manufacturing in northern Mexico is the primary setting for this presentation.

011-0620: The Contribution of Infrastructural Technologies (IfT) to Technological Capability (TC)

Renato Gallina, Centro Universitário da FEI, Brazil

Afonso Fleury, University of São Paulo, Brazil

The survival of firms is related to the possibility of offering products and/or services in conformity to international standards. Mastery of Infrastructural Technologies - IFT (metrology, standardization and conformity assessment) is fundamental for accumulation of Technological Capabilities (TC) needed for innovation and improvement. This study develops a model to assess the interplay between three of IfT's basic functions and distinct TC levels. The model is most suitable for emergent economies. It was applied to 103 Brazilian firms. Insightful results showed associations between: (i) firms certified ISO 9001/TS 16949 with reversal engineering activities; (ii) firms certified ISO 17025 with incremental innovations; (iii) firms certified by social and environmental standards with radical innovations in products/processes; and (iv) firms that participate with International Standardization Committees with P&D practices and relationships with C&T Institutions.

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Sunday, May 3, 3:30-5:00 Room: EC-I

Track: PROJ, 1

Chair: Roy Stratton

Session: Project Management Methods and Applications

011-0010: Implications for Concurrent Engineering in a Stochastic Environment

Nagesh Murthy, University of Oregon, USA

Product development speed and timeliness of product development are key determinants of success in managing timing and frequency of new product introductions. Overlapping stochastic activities in a project wherein succeeding tasks are initiated prior to even the expected completion times of the immediately preceding tasks can lead to significant degradation in task times for the succeeding tasks, thus eroding the benefits of overlapping activities. We develop a model to understand the implications of degree of concurrency for development speed and timeliness and derive results that are independent of the distribution of tasks.

011-0059: Projects and Processes in Strategic and Operational Management for Sustainable Growth of an Enterprise

Timothy Kloppenborg, Xavier University, United States

Ravi Chinta, Xavier University, United States

Projects and processes are mutually-reinforcing parts of value creation. The authors present an integrative knowledge management framework that links projects and processes, thereby bridging the gulf between strategy and operations. They suggest strategy and operations should be treated as two distinct but connected realms with projects emphasized in strategy and processes emphasized in operations. When 3M introduced Six Sigma with a strong focus on process improvements, several innovation projects were adversely impacted. In contrast, during the early years of Amazon, an emphasis on projects led to neglecting processes, resulting in significant losses. The authors argue that value creation is a knowledge management process in which projects and processes work in concert to produce knowledge that is transformed into value for the organization. They discuss how companies in crisis (e.g., GM, Ford and Chrysler) would benefit from the proposed integrated knowledge management framework.

011-0754: Critical Chain Project Management Theory and Practice

Roy Stratton, Nottingham Trent University, United Kingdom

It is now over 10 years since the first publications on Critical Chain Project Management (CCPM) and this paper aims to view its impact from a practical and a conceptual perspective. Firstly, the paper reviews prior publications in establishing the conceptual claims together with reporting the extent of its practical adoption by industry, with particular reference to government funded construction projects in Japan. Secondly, the paper identifies and critically evaluates the latest best practice developments associated with CCPM and how they relate to conventional and more recent PM developments as in the case of earned value project management. Thirdly, the work reviews the practical implementation process, issues and results with specific reference to case research in the UK construction industry. Finally, the paper seeks to evaluate claims that the approach is consistent with a unified view of operations management exhibiting the flow management principles associated with lean production.

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Sunday, May 3, 3:30-5:00 Room: EC-D

Track: GENL, 12

Chair: Monica Johar

Session: OM/IS

011-0691: Coordinating Supply Chain with a Manufacturer-Owned Online Channel: Dual Channel Model under Price Competition

Jennifer Ryan, Rensselaer Polytechnic Institute, United States

Daewon Sun, University of Notre Dame, United States

Xuying Zhao, University of Notre Dame, United States

Sunday, 3:30-5:00 Sessions

We consider a dual channel supply chain in which a manufacturer sells a single product to end-users through both a traditional retail channel and a manufacturer-owned direct online channel. We analyze the optimal pricing and inventory decisions for each channel and prove the existence of a unique equilibrium for the system. We compare this equilibrium solution to the solution for an integrated system. To enable supply chain coordination, we then propose two contract schemes: a modified revenue sharing contract and gain/loss sharing contract. We show that such contracts enable the manufacturer to maintain price discrimination, selling the products in different channels at different prices.

011-0954: Optimal Local and Global Software Reuse Policies: A Control Theoretic Approach

Vijay Mookerjee, University of Texas at Dallas, United States

Monica Johar, University of North Carolina at Charlotte, United States

Suresh Sethi, University of Texas at Dallas, United States

We study optimal policies for local and global reuse in a software project using a control theoretic approach. A project needs to be developed in minimum time where the control $r(t)$ is the proportion of effort allocated to reuse activities and $\delta(t)$ is the proportion allocated to direct development activities. We first consider a local reuse policy where the benefits of reuse activities are restricted within the project. Here the optimal policy follows a bang-bang structure: full reuse followed by full development. Next we consider two sequentially linked projects where local reuse in the first project has global effects: some or all of the reuse capital accumulated in the first project benefits the downstream project. While the bang-bang nature of the policy is still optimal for the two project case, the reuse investment in the upstream project first increases and then decreases with the ability to utilize reuse capital accumulated in the first project for the second project.

011-0957: Role of IT Systems in Auction Design for Optimal Supplier Behavior in Reverse Auctions

Pankaj Setia, University of Arkansas, United States

Cheri Speier, Michigan State University, United States

Online reverse auctions are an important mechanism for dynamic price determination in organizational procurement processes. While buyer related issues have gained considerable attention in previous research studying reverse auctions, this research addresses the issues that impact supplier bidding behavior in these auctions. With the growing use of reverse auctions in B2B markets, behavior of participating suppliers has become an important factor for sustainable success of these auctions. We examine how the type of IT system used for conducting a reverse auction influences the bidding behavior for suppliers under varied conditions. Results contribute to an understanding of optimal auction design, and also offer insights for IT business value researchers. Complementarities are explored between the type of IT system and participating suppliers' conditions. Three ratios are developed to do a more in-depth examination of these interactive effects that have important implications for academics and practitioners alike.

011-0973: A Two-Sided Market Analysis of the Role of Online PHR systems in Digitizing Healthcare Records

Zafer Ozdemir, Miami University, United States

Subhajyoti Bandyopadhyay, University of Florida, United States

John Barron, Purdue University, United States

We discuss the implications of the introduction of online PHR systems by companies like Google and Microsoft in the debate of digitizing health care records by looking at the incentives of the various players involved in the debate in a two-sided market framework. Our analysis finds evidence that health care providers do not have an incentive to implement interoperable EHR systems, and further, though their introduction will definitely increase consumer surplus, the health care providers will be worse off. We also find that by inserting themselves into the debate, the PHR providers can fundamentally alter the incentives of the other players, leading to increased EHR adoption in some scenarios. In a pluralistic health care system like that which exists in the US, where health care providers do not have an incentive to implement interoperable health information systems, the online PHR platform can become a proxy 'national health information network'.

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Sunday, May 3, 3:30-5:00 Room: Senate
Session: Knowledge Management

Track: GENL, 9

Chair: Timo Fleschutz

011-0593: Evaluation and Planning of Assembly Equipment Applying Knowledge Based Systems

Timo Fleschutz, TU Berlin, Chair of Assembly Technology and Factory Management, Germany

Robert Harms, TU Berlin, Chair of Assembly Technology and Factory Management, Germany

Günther Seliger, TU Berlin, Chair of Assembly Technology and Factory Management, Germany

The planning and application of assembly equipment for a broader range of products and product generations is essential for meeting the changeability requirements resulting from shortening product life cycles and higher product variances in dynamic global markets. Effective decisions are based on information resulting from a collaborative engineering environment involving various actors, e.g. component producers, system integrators and system operators. In such a complex environment, information and knowledge exchange plays a crucial role, requiring information exchange throughout all life cycle phases. In order to meet these challenges, a framework consisting of methods, tools and business process reference models for assembly equipment closed loop management is proposed. The core element is a computer aided reuse planning application that allows planners to generate reuse options and provides decision support during the planning process. The knowledge based approach, including its structure and core inference processes, is explained.

011-0480: Impacts of Information Visibility with the Adoption of RFID for Public Transportation

Shuo-Yan Chou, National Taiwan University of Science and Technology, Taiwan, Republic of China

Yulia Ekawati, National Taiwan University of Science and Technology, Taiwan, Republic of China

Sunday, 3:30-5:00 Sessions

Radio Frequency Identification (RFID) has been heralded as one of the technologies that will fundamentally transform industries. After years of hype, the adoption of RFID remains weak. This is due in part to the technology itself but also to the economy and the overall implementation strategy. In this research, the conditions in which RFID adoption is applicable are first synthesized. The merit of RFID is then further exploited for public transportation applications. By employing RFID along with other communication technologies, public transportation vehicles can be identified and tracked during their service. With the ability to "calibrate" where exactly such vehicles are along their routes, the arrival time for the vehicles to the stops can be estimated more accurately. Customers can then keep shorter lead time to meet the vehicle schedule, service providers may on the other hand provide the same level of customer service with less frequent vehicle services.

011-0623: Applications of the Technology Acceptance Model to Industry by Industry Adoption of the Metric System (SI)

A. Sherman, Loyola College in Maryland, United States

The metric system (SI for Systeme International d'Unites) is moving at greater or lesser speeds into industrial usage in the United States. This paper cites industries where the rate of adoption of the metric system in the United States can best be predicted and/or encouraged according to the Technology Acceptance Model (TAM) developed in Information Technology literature by Fred Davis and Richard Bagozzi. Factors tested include perceived usefulness and ease of use as well as social influence and cognitive instrumental processes. The home improvement and home furnishing industries are studied for their similarity with regard to industrial sector and their difference with regard to legacy interference. The study is part of a greater inquiry into the global competitive effect of U.S. adoption of SI and the ability of the metric system to create leaner operations everywhere from supply chains to K-12 education.

Monday, 8:00-9:30 Sessions

217	Monday, May 4, 8:00-9:30 Room: Cloister North Session: Service Management Challenges	Track: SRVC, 12	Chair: Susan Goldstein
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011-0843: Entrepreneurship and Process Renewal in Service Firms: Effect of the Internet

Sidhartha Das, George Mason University, United States

Ravi Kathuria, Chapman University, United States

Maheshkumar Joshi, George Mason University, United States

In a context of widespread diffusion of the Internet, this study examines the relationship between a service firm's entrepreneurial orientation (EO) and renewal of its internal processes. External and internal factors such as the supply chain environment and human talent management systems (HTMS) are also considered. The results of our empirical investigation suggest that changes in the supply chain environment and HTMS due to the growth of the Internet, leads to an increase in a firm's entrepreneurial orientation. Further, an increase in the firm's EO is associated with changes in its internal processes. In addition, there are differences among high and low technology service firms. In high-technology firms, the relationship between changes in the supply chain environment and EO, and that between EO and process renewal, is considerably stronger than for low-technology firms. In contrast, the relationship between HTMS and EO is stronger in low-technology than in high-technology firms.

011-0738: Operations Strategy for COMO: The Role of Service-Focused Business Models

Martin Spring, Lancaster University Management School, United Kingdom

Luis Araujo, Lancaster University Management School, United Kingdom

Hayes (2008) proposes that P/OM could be re-energised by studying the Coordination of Operations across Multiple Organizations (COMO). This paper uses the framework of Business Models to integrate a variety of insights from OM, marketing, and other fields, and suggests that the Business Model concept could provide a way to re-think operations strategy for the world of COMO. It proposes a break from contingency-based, firm-centric view of operations strategy and proposes one that is inherently inter-organizational. Drawing on several empirical illustrations, four elements of the framework are identified and discussed: the structure of inter-organizational networks; the technologies and institutional mechanisms used to make transactions between firms; the form and role of revenue models and incentives between firms; and the way in which firms go about accessing, developing and complementing one another's capabilities.

011-0261: Studying the Service Profit Chain in the Technical Assistance Environment

Frederico Barbosa, Universidade Potiguar - Unp, Brazil

Kleber Nobrega, Universidade Potiguar - UnP, Brazil

Rodrigo Leone, Universidade Potiguar - UnP, Brazil

Tereza Souza, Universidade Potiguar - UnP, Brazil

One of the strongest relationships between the elements of Heskett, Sasser and Schlessinger's service profit chain is verified between employee satisfaction and client satisfaction. This paper reports the results of an exploratory study on the Brazilian operation of a world-wide leader of elevator technical assistance, in which the relationship between these two elements and their influence on the client retention rate was evaluated. The research data were treated with statistical discriminant and cluster analysis. The findings identified the relationship between employee and client satisfaction in 25 of the 27 business units studied. On the other hand, the factor that largely influences the client retention rate in this business environment is client satisfaction, while employee satisfaction is almost null. The results have important academic and managerial implications, given the limited amount of studies in this area, and draw conclusions for business success.

011-0205: Blurring the Boundaries: The Convergence of Industrialization and the Service Economy

Joel Goldhar, Illinois Institute of Technology/Stuart School of Business, United States

Current OM thinking differentiates between "factory" and "service" operations, but in reality these are the end-points of a single continuum. Analysis of the history and the literature of both factory and service operations shows that traditional manufacturing has moved to JIT and mass customization in order to become more customer responsive; while services have continually sought to standardize and become more predictable in order to realize economy of scale, all made possible by advances in digital electronics technology. This presentation will review that history and offer a set of models for operating systems design that allows for choosing a combination of factory and service variables that best creates sustainable competitive advantage.

218	Monday, May 4, 8:00-9:30 Room: Cloister South Session: Production and Inventory Models	Track: SCM, 13	Chair: Joe Guenes
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011-0301: A Decision Rule for Coordination of Inventory and Transportation in a Two-Stage Supply Chain with Alternative Supply Sources

Burak Eksioğlu, Mississippi State University, United States

Ismail Capar, Texas A&M University, United States

Joe Guenes, University of Florida, United States

We study a two-stage supply chain that consists of two distribution centers (DCs) and two retailers. Each member of the supply chain uses a (Q, R) inventory policy, and incurs standard inventory holding, backlog, ordering, and transportation costs. The DCs replenish their inventory from an outside supplier. The retailers replenish inventory from one of the two DCs. When a retailer is ready to replenish its inventory, that retailer must decide whether it should replenish from the first or second DC. We develop a decision rule that minimizes the total expected cost associated with all outstanding orders at the time of order placement; the retailers then repeatedly use this decision rule as a heuristic. A simulation study, which compares the proposed policy to three traditional ordering policies, illustrates how the proposed policy performs under different conditions. The numerical analysis shows that the proposed policy outperforms the other three policies on average.

Monday, 8:00-9:30 Sessions

011-0403: A Class of Generalized Assignment Problems with Flexible Demand and Shared Resource Consumption

Chase Rainwater, University of Florida, United States

Joseph Geunes, University of Florida, United States

Edwin Romeijn, University of Michigan, United States

We study a class of resource constrained assignment problems that is broadly applicable to various production planning scenarios. As in the generalized assignment problem, each job must be assigned to a single resource. However, we classify each job as belonging to one of several job types, each of which corresponds to certain common production characteristics. In particular, a specified amount of capacity is consumed if any one of the jobs from a particular set is assigned to a given resource. That is, a fixed capacity consumption is shared among jobs of the same type. In addition, the demand requirements associated with each job contain a form of flexibility. That is, customers will accept jobs produced within a specified range. We consider alternative formulations of this model and propose an exact solution methodology. We conclude with a computational study of our approach.

011-0405: Optimal Allocation of Stock Levels and Stochastic Customer Demands to a Capacitated Resource

Shuang Chen, University of Florida, United States

Joseph Geunes, University of Florida, United States

We study a class of stochastic resource allocation problems that requires simultaneously determining the stock levels of multiple items in a single capacitated resource and allocating customer demands for the items to the resource. Our model considers a cost for carrying items, a shortage cost for each unit of unsatisfied customer demand, and a salvage value for each unused item in a single-period context. We seek to minimize the expected cost resulting from the assignment of customers and items to the resource while obeying the capacity constraint. We provide an exact solution method for this mixed integer nonlinear optimization problem using a Generalized Bender's Decomposition approach, and compare our method with GAMS/BARON to benchmark its efficiency and quality.

011-0406: Production Planning and Product Portfolio Design with Product Substitutions in an Assemble-to-Order System

Semra Agrali, University of Florida, United States

Joseph Geunes, University of Florida, United States

We consider a component production-planning and product-line design problem with product substitutions and multiple customer segments. Each customer segment has a preferred product and a set of alternative products. If a customer's preferred product is not made available, demand can be satisfied using an alternative product at a substitution cost. Each product has a profit margin that is customer-segment dependent. Moreover, each product is assembled-to-order from a set of components, and inventory is held at the component level. Component procurement costs contain a fixed plus variable cost structure. Our aim is to determine a product portfolio, substitution plan, and procurement plan in order to maximize profit. We develop a large-scale mixed-integer linear programming formulation, and propose an exact decomposition algorithm.

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Monday, May 4, 8:00-9:30 **Room:** Captain
Session: Product mix

Track: SCM, 27

Chair: Fernando Bernstein

011-0904: A Methodology for Optimal Selection of Product/Customer Mix in Manufacturing Industries

João Figueiredo, Saint Joseph's University, United States

Felipe Donato, Axia Consulting, Brazil

Sérgio Mayerle, Universidade Federal de Santa Catarina, Brazil

A two-stage multi-period methodology for aggregate production planning encompassing component supply management and final assembly is developed. A linear programming model uses cost and profit contribution data to select the optimal product and customer mix. An illustrative application improving the medium-term operations strategy of a Brazilian mechanical manufacturer is presented.

011-0605: A New Approach to Cope with Product Variety in the Steel Industry

Matthias Wichmann, Technische Universität Braunschweig, Germany

Thomas Volling, Technische Universität Braunschweig, Germany

Thomas Spengler, Technische Universität Braunschweig, Germany

Due to the huge variety of final products, production as well as supply chain planning in the steel industry is order driven. To handle the complexity, which results from the high number of alternative modes of production, orders are encoded in the preface of planning. Accordingly, production orders are specified that determine intermediate goods for each stage of production. The downside of this approach is that degrees of freedom in planning are systematically ignored. To this end, we propose the method of implicit order encoding. Here, the whole range of intermediate products and transformation processes is incorporated into planning. In our contribution implicit order encoding is applied to the melt design problem, which regards the combination of customer orders to melts. Based on the case study of a large German steel company, advantages in terms of productivity and machine setups are shown.

011-0167: The Role of Component Commonality in Product Assortment Decisions

Fernando Bernstein, Duke University, United States

Gurhan Kok, Duke University, United States

Lei Xie, Duke University, United States

Monday, 8:00-9:30 Sessions

We consider a manufacturing setting in which a firm decides the number of variants to offer in the market. Each variant is produced according to a bill-of-materials that dictates the components used in its fabrication. There are product-specific (or dedicated) components and components that are common to a subset (or all) of the variants. Each product variant may represent, for example, a color/size/design combination of a garment or a specific configuration of a personal computer. Customers choose a product variant according to a choice model. We characterize the structure of the optimal assortment and derive the optimal inventory levels for the common and dedicated components. We investigate the effect of component commonality on product assortment decisions and compare its benefits under different demand characteristics. We show that, depending on the structure of the production system, commonality may not lead to increased assortment offerings (relative to a system without commonality).

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Monday, May 4, 8:00-9:30 **Room:** Yeoman
Session: SC Strategy

Track: SCM, 30

Chair: Charles Lee Munson

011-0182: How Transfer Prices Can Affect a Supply Chain Strategic Decision

Ralph Drtina, Rollins College Crummer GSB, United States

Henrique Correa, Rollins College Crummer GSB, United States

One important decision in global supply chain management is whether to outsource production. Various theories and concepts such as transaction cost economics and the resource based view of strategy formation have recently been used to support this decision. Once this decision is made and the decision is to keep an activity performed in house, a subsequent decision has to be made by multi-national companies (MNCs): in what subsidiary to perform the activity? Again, various concepts have been used to inform that decision such as the comparative advantages of countries and the location theory. One aspect of this decision, however, has frequently been overlooked by the literature: possible tax advantages/disadvantages that can result from alternative ways MNCs deal with their internal transfer prices. This paper is an attempt to contribute with the MNC managers when they make the decision whether (and where to) to send offshore production to their subsidiaries abroad.

011-0436: Scenario-based Planning for Supply Chain Design

Shardul Phadnis, MIT, United States

Yossi Sheffi, MIT, United States

Mahender Singh, MIT, United States

In this paper, we demonstrate the use of scenario-based planning for designing supply chains. A supply chain design defines its architecture to accomplish the company's supply chain strategy in a given business environment. The typical supply chain design decisions are strategic and hence have long planning horizons. Over long periods, the business environment may undergo structural, discontinuous step changes which cannot be forecasted using statistical methods based on past data. A supply chain designed for one business environment may not perform satisfactorily in another. Hence, the design exercise needs to envision various future environments in which the supply chain may operate, and develop a flexible design that can be modified as needed in the future. Scenario-based planning has been used by companies like Shell to envision such step changes and their effects on their strategic decisions. In this paper, we discuss the application of scenario-based planning for designing supply chains.

011-0763: Selecting the Appropriate Quantity Discount for the Right Reason

Charles Munson, Washington State University, United States

Susan He, Washington State University, United States

Sellers offer quantity discounts for a variety of reasons, including both cost and marketing purposes. We develop a set of models to help sellers determine the best types of discounts to offer to obtain the optimal buyer order sizes and associated seller lot sizes under a variety of circumstances. In particular, we examine the use of quantity discounts to increase order sizes when the seller (1) faces various versions of economies of scale, (2) expects price increases in its own inputs, or (3) has specific short-term or long-term marketing goals.

011-0256: Pool-Point Distribution of Zero-Inventory Products

Neil Geismar, Texas A&M University, United States

Milind Dawande, University of Texas at Dallas, United States

Chelliah Sriskandarajah, University of Texas at Dallas, United States

A production facility with a finite production rate distributes its single product, which (because of its short shelf life) cannot be inventoried, to several pool points. The advantages of pool-point (or hub-and-spoke) distribution include the efficient use of transportation resources and effective day-to-day management of operations. Each pool point may require multiple truckloads to satisfy its customers' demand. A third-party logistics provider transports the product to individual customers surrounding each pool point. The production rate can be increased up to a certain limit by incurring additional cost. The delivery of the product is done by identical trucks, each having limited capacity and non-negligible traveling time between the plant and the pool points. Our objective is to coordinate the production and transportation operations so that the total cost of production and distribution is minimized, while respecting the product lifetime and the delivery capacity constraints.

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Monday, May 4, 8:00-9:30 **Room:** Scribe
Session: Auction/Distribution Networks

Track: GENL, 10

Chair: Berit Helgheim

011-0441: An Exploratory Investigation of 3PL Ownership Influence on Productivity in Emerging Markets: A Case Study of Chinese 3PL Companies

Berit Helgheim, Molde University College, Norway

Svein Braathen, Molde University College, Norway

Monday, 8:00-9:30 Sessions

Xin Shen, Molde University College, Norway

3PL companies is a growing industry. Research has mainly focused on 3PL services, B2B relationships and the development of this industry in general. Firstly, we discuss how 3PLs may attract foreign direct investments to emerging market economies. A simple model derived from modern economic growth theory indicates that 3PLs may contribute to self-sustaining regional economic growth. The second part is an exploratory case study of how ownership affects logistics operations in China. There are four ownership structures: state-owned enterprises, Chinese private-owned companies, joint venture companies, and wholly-foreign owned companies. Findings indicate that wholly-foreign companies are more competitive as compared to Chinese providers. Chinese private companies appear to have a cost minimizing strategy, and they gain benefits from sharing large investments in logistics infrastructure. The shortage of capital is a major problem for Chinese private companies. The foreign companies tend to apply horizontal alliances to penetrate new geographical markets in China.

011-0962: Multiplant Production Planning

Bharatendu Srivastava, Marquette University, United States

In today's global supply chains, it is essential that firms fully exploit their production capabilities. We address production planning in a multiplant environment where schedules are subject to disruptions due to unexpected events. We discuss factors contributing to this problem, a mathematical model and an effective heuristic to solve it.

011-0848: Ascending Price Auctions with Deadlines

Farooq Sheikh, SUNY Geneseo, United States

This article examines ascending price auctions when the auctioneer also imposes a deadline as in Internet auctions like Ebay. We study equilibrium bidding strategies and seller revenue outcome.

011-0853: Sequential Auction of Identical Objects with Random Selection of Winners

Farooq Sheikh, SUNY Geneseo, United States

We study a novel auction where n identical objects are auctioned in two sequential auctions. The auctions are analogous to Vickrey's auction except for the novelty that the number of winners selected in the first round of the auction is more than the number of objects assigned to that auction. Actual recipients are randomly selected from the winners' set and pay a price equal to the highest losing bid. We show that this leads to higher expected revenue for the seller with increasing expected prices for sufficiently low discount rates.

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Monday, May 4, 8:00-9:30 Room: Knave

Track: HLTH, 13

Chair: Emily Kohnke

Session: Healthcare Supply Chains II

011-0400: Impact of Imperfect Demand Recording Compliance on Service Levels: The Case of Hospital Supplies

David Opolon, Massachusetts Institute of Technology, Engineering Systems Division, United States

Kathryn Schumacher, Massachusetts Institute of Technology, United States

Yossi Sheffi, Massachusetts Institute of Technology, Engineering Systems Division, USA, 02139

Inventory record inaccuracy occurs whenever there is a mismatch between the recorded inventory and the physical inventory. For medical and surgical supplies in hospitals, an important source of inventory inaccuracy is the imperfect recording of demand transactions by clinicians. This paper investigates the impact of imperfect recording compliance on service levels under different inventory counting policies using a discrete-event simulation model. Consistent with the literature on inventory record inaccuracy, a statistically and practically significant negative effect of imperfect recording compliance on customer service levels is identified. However, its magnitude is higher than previously reported, suggesting that managerial attention to this problem is warranted. Furthermore, under many realistic scenarios, imperfect recording compliance leads to severely overstated observed service level metrics, giving managers a false sense of security.

011-0231: Healthcare Supply Chain Modeling: A Conceptual Framework

Daria Battini, University of Padova, Italy

Alessandro Persona, University of Padova, Italy

Fabio Sgarbossa, University of Padova, Italy

This work describes and illustrates aspects of healthcare operations management and provides advances in theory about patient and materials flow modeling according to System Dynamics paradigm, investigating internal feedback loops and decision-making delays that affect the behavior of the entire system. The conceptual discussion is empirically-derived by the authors and investigates relevant methods and technologies for the design and development of effective and efficient drug distribution in healthcare supply chains with the help of IT/IS (such as RFID).

First, the study presents an extensive literature review on RFID technology innovation and diffusion in healthcare, representing it as an important tools for decision making. Then it develops a Drugs Administration Process dynamic model and analysis.

One aspect addressed is that RFID technology implementation and a right coupling of different IT/IS technologies should be considered in healthcare practices to permit a correct decision making process and decrease drastically adverse drugs events.

011-0562: Pediatric Cardiac Care Delivery in China: A Case Study on Health Care Supply Chain Design for Emerging Economies

Emily Kohnke, University of Minnesota, United States

Kingshuk Sinha, University of Minnesota, United States

Monday, 8:00-9:30 Sessions

The case study is an inductive inquiry into main constructs involved in the medical device supply chain in emerging economies. It examines the coordination elements of the health care supply chain through the functioning of a hospital in Lanzhou, China. The hospital was chosen because of an existing relationship with an NGO called Children's Heartlink. This relationship allows us to examine, in-depth, care delivery in China over a 10-year period and document significant changes in supply chain constructs. A framework is proposed that outlines the appropriate supply chain design requirements for the development of care in emerging markets that will lead to the effective delivery of care. In particular, we find that the development of care must be characterized by innovations in financial services systems, logistics management systems and knowledge sharing systems.

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Monday, May 4, 8:00-9:30 **Room:** EC-D1
Session: Practical Implications of OM Decisions

Track: EMPR, 14

Chair: Valeriana Cunha,

011-0330: Integrating Production-Inventory-Distribution Decisions: An Information-Processing View

Martin Springinklee, WHU - Otto Beisheim School of Management, Germany

Francois Charvet, Northeastern University, United States

Carl Wallenburg, WHU - Otto Beisheim School of Management, Germany

A holistic view on production, inventory and distribution decisions has been identified as a prerequisite for minimizing total cost while satisfying customer demand. The impact of integrated decisions has been frequently examined using analytical and mathematical approaches (Arshinder, Kanda, Deshmukh, 2008). Yet, empirical research on the management of cross-functional dependencies in operations remains relatively scarce. The current research, therefore, investigates how different coordination mechanisms may be used for the effective integration of production, inventory and distribution activities between separate operations departments (here production and logistics). Based on information-processing theory, a model is developed to examine the effect of different coordination mechanisms on operational performance (main performance effects). Contingency effects of the internal and external dimensions of the contextual setting will also be analyzed, thereby building on existing theories and current research (e.g. Germain, Claycomb, Dröge, 2008). The model is tested using survey-based data collected from a sample of German manufacturing firms.

011-0595: The Antecedents and Consequences of Plant Closing Announcements

Amit Raturi, University of Cincinnati, United States

Yann Ferrand, University of Cincinnati, United States

Rati Apana, University of Cincinnati, United States

Bogdan Bichescu, University of Tennessee,

Import competition, restructuring, manufacturing phase-out, technological obsolescence, declining orders (loss of contracts), cost cuts, bankruptcy, or selling of a firm often trigger unhappy and demoralizing stories of plant closings. This paper attempts to classify, benchmark and assess the key antecedent conditions that lead to plant closing announcements and the consequential financial impact of these announcements. We use Dow Jones, Reuters or a similar news wire to collect announcements of plant closings over a 5-year period. We use cluster analysis to develop a typology of plant closing announcements. Then we use Compustat to test hypotheses related to key financial antecedent conditions and consequences of these announcements.

011-0885: Executive Remuneration and Financial Performance in Brazilian Companies

Elizabeth Krauter, University of Sao Paulo, Brazil

Almir Sousa, University of Sao Paulo, Brazil

The objective of this study is to investigate the existence of a relationship between executive remuneration and financial performance in 28 Brazilian companies from the industrial sector. These companies have been selected from among those companies elected as The Best Companies to Work For in Brazil. In order to operationalize the remuneration variable, we use the monthly salary, the variable salary and three indexes - of benefits, career and professional development - which have been created especially for this survey. To measure financial performance, we use three accounting measures: sales growth, return on equity (ROE) and return on sales (ROS). The results point to the existence of a relationship between executive remuneration and financial performance.

011-0910: Correlation Between the Use of Information Technology Systems and Performance

Valeriana Cunha, Federal University of Uberlandia-MG-Brazil, Brazil

The purpose of this study was to identify latent correlations between the level of use of information technology (IT) systems and company performance. The IT systems evaluated here were divided into transactional systems, decision support systems and collaborative systems. Performance was evaluated from the standpoint of rapid and timely deliveries, payment prices and terms practiced by the companies, quality of the main products, and complete fulfillment of orders. One hundred and three companies participated in this study. The technique of canonical correlation analysis was applied and the results indicated that, in this group of companies, there was no significant correlation between the use of any of the IT systems analyzed and the performance of the companies.

011-0869: To What Extent Does e-Government System Acceptance Improve Financial Report Quality?

Soud Almahamid, Al Hussein Bin Talal University, Jordan

Khaled Abu Resheh, Al Balqa Applied Science University, Jordan

Mo'taz Alsa'eed, Petra University, Jordan

Monday, 8:00-9:30 Sessions

The purpose of this study is to empirically explore to what extent e-government system acceptance improves the quality of financial reports. The motivation for conducting this study is the fact that this work has never been done in the audit bureau of Jordan; in addition, it is an empirical research where important findings will emerge and as a result, relevant recommendations will be considered. It is expected that this study will contribute to the knowledge of both academics and practitioners. A questionnaire is developed based on the e-government system acceptance and financial reports quality literature. The results revealed that the e-government systems acceptance improves financial report quality. By focusing on e-government system acceptance, it gives policy makers and decision makers an idea how e-government system acceptance can improve financial reports' quality. This paper represents the first attempt to link e-government system acceptance with financial report quality.

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Monday, May 4, 8:00-9:30 **Room:** EC-B
Session: Value of Innovation

Track: PITM, 13

Chair: Sanjiv Erat

011-0455: Value Creation & Appropriation: The Role of Competition and Technology Characteristics

Sanjiv Erat, University of California San Diego, Rady School of Management, U.S. Minor Outlying Islands

Does an innovator always appropriate value when her innovation creates value for multiple competing users, and if so how much? The answer to this question is a key demand-side consideration when a firm undertakes development of a new technology. In this article, we examine the technology firm's development decision given the constraints posed by the value appropriation potential of her innovation. We offer a partition-function based framework of a firm which develops and offers an innovation to a downstream market of customer firms. The main result indicates that the value appropriated for an innovation depends on the performance enhancement AND the type of benefit it offers. Specifically, value created by innovations that are sustaining in nature (i.e., enhance the status-quo performance dimensions), may be easier to appropriate compared to value created by innovations that are disruptive in nature (i.e., enhance secondary performance dimensions not valued by the primary market).

011-0267: Technological Innovation and Operating Performance: A Comparison of Two Industries

Ying Xin, The Hong Kong Polytechnic University, Hong Kong

Andy Yeung, The Hong Kong Polytechnic University, Hong Kong

Edwin Cheng, The Hong Kong Polytechnic University, Hong Kong

Does technological innovation lead to higher operating performance? Based on an event study of announcements of radical technological innovation in products in the United States in the past ten years and objective financial data collected from COMPUSTAT, we analyzed the impact of technological innovation on firm performance. To our surprise, our preliminary results show that technological innovations as a whole have negative and insignificant impact on firm performance. Our further analysis suggested that technological innovations lead to higher operating performance in Medical and Pharmaceutical related industries (mainly SIC 28 and SIC 38), but negative or insignificant effects in general Electronics, Electrical and Machinery industries (mainly SICs 35-36). We argue that industrial context is an important factor. In particular, technological innovations lead to higher operating performance only in a demand-driven market like medical and pharmaceutical industries, but not in technology-push sectors like general electronics consumer products.

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Monday, May 4, 8:00-9:30 **Room:** EC-C
Session: Disaster Management - Case Study

Track: DSTR, 4

Chair: Peter Tatham

011-0029: Cyclones in Bangladesh - A Case Study of a Whole Country Response to Rapid Onset Disasters

Peter Tatham, Cranfield University, United Kingdom

Karen Spens, Hanken School of Economics, Finland

Bangladesh is a small but densely populated country that is frequently beset by natural disasters. In particular, three cyclones of magnitude 3 or 4 have struck in the past 38 years – but the resultant loss of life has diminished 100-fold (from some 300,000 in 1970 to around 4,000 in 2007). From this bald statistic alone, it is clear that the Government of Bangladesh together with a broad range of UN agencies and other NGOs has developed a highly effective strategy that encompasses activity both prior to, and in the immediate aftermath of, such a disaster. This paper will use the UK military "Lines of Development" model to analyse this strategy, and extract the key lessons that can be learned and applied in reducing the effect of similar disasters such as the 2008 cyclone in nearby Burma that is estimated to have killed up to 1,000,000 people.

011-0524: Disaster Management in the Context of Xenophobia

Norman Faull, University of Cape Town, South Africa

Anél Du Toit, University of Cape Town, South Africa

May 2008 saw a wave of systematic violence against foreign nationals in South Africa. The violence started on 11 May close to Johannesburg, and spread across the country over the following two weeks. Thousands of people fled their homes and places of work to seek safety at police stations, churches, community centres and private residences whilst others crowded train and bus stations in an attempt to flee a particular area or indeed the country. This paper is based on a case study describing how disaster management officials at one major city responded between May and July 2008. The case has "Hank Kolb"-like features: problems of a long-term policy and systemic nature tangle with situational and immediate issues. The paper identifies these problems and shows how lean tools could be used to bring about improvements.

011-0555: Disaster Management for Attractions

Joni Newkirk, United States

Scott Sander, Integrated Insight, In, USA

Monday, 8:00-9:30 Sessions

Attractions such as theme parks, zoos, museums, and parks have a vested interest in planning for and minimizing the impact of human and natural disasters. Though a structured crisis management program, organizations can prepare in advance to reduce potential impacts, ready the team in the face of crisis, respond quickly and recovery rapidly. Scott Sanders, EVP and Partner at Integrated Insight, Inc, a management consulting and training firm, and former VP of Business Insight and Improvement for Walt Disney Parks & Resort worldwide, will speak to the need for disaster management in organizations of any size and share examples of how great planning has led to efficient and effective crisis management.

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Monday, May 4, 8:00-9:30 Room: Gallery

Track: BDOM, 9

Chair: Carrie Queenan

Session: Socio-technical systems and ergonomics I

011-0257: Social Technical Systems Theory: A Review and Application

Tom Kull, Arizona State University, United States

Carrie Queenan, University of Notre Dame, United States

Behavioral factors, such as resistance to change or biases in decision making, often cause problems in operations. OM researchers have recognized the need to better understand such behavioral issues, but research has been limited. One theory that can tie together technical and behavioral aspects of operations is Social Technical Systems (STS) theory. The use of STS concepts has been demonstrated in OM-related literatures, but mostly with respect to STS design principles. Application of the theoretical basis for the design principles is less common, likely because a comprehensive presentation for the OM community is not readily accessible. Because STS theory provides explanations for behavioral dynamics and is a useful basis for behavior-based hypothesis development in OM research, this paper gives a needed STS theory presentation. Moreover, we demonstrate STS theory can be applied to the OM field through example propositions relating to supplier integration.

011-0226: STS is Dead – Live STS! Emphasising the Need for a Modern Sociotechnical System Approach on High-Tech Production Systems

Torbjorn Netland, SINTEF Industrial management, Norway

Gaute Knutstad, SINTEF Industrial management, Norway

Lars Skjelstad, Norwegian University of Science and Technology, Norway

Marte Buvik, SINTEF Industrial management, Norway

Johan Ravn, SINTEF Industrial management, Norway

Sociotechnical systems (STS) research has not received much attention in the latest decade, at least not in terms of its original foundation in a production system context. The main challenge in modern sociotechnical thinking is that STS has left the origin in technology, and nowadays focuses more at a general social perspective on work. The "S"-view overshadows the "T"-view, and the fruitful link between the technical system and the social system is thereby lost. In this sense, STS is dead. Now, due to recent and future developments in technology, strong awareness is called for in regard to a common interplay between the social- and technical system. A combined social- and technological perspective is needed if implementation of further technology shall pay off. This conceptual paper argues that sociotechnical systems research, if reborn, could be a promising path when preparing for the future in high-tech manufacturing industries.

011-0387: Including Sociotechnical Aspects in Value Stream Mapping - Launching the STS VSM

Lars Skjelstad, SINTEF, Norway

Torbjorn Netland, SINTEF, Norway

Gaute Knutstad, SINTEF, Norway

Marte Buvik, Sintef, Norway

This paper explores the possibilities of extending Value Stream Mapping (Womack and Jones, 1996) into the dimension of work satisfaction. Value Stream Mapping (VSM) is a well-proven improvement technique for achieving the goals of lean production. Amongst the advantages of VSM is the visualisation and common understanding of the value creation process, the participation of workers in the development of both the current and future states, and the quick mapping. However VSM is clearly biased towards technical facts/figures of the value stream such as inventory levels, tact times, up-times etc. Extending Value Stream Mapping with socio-technical aspects is needed if the tool is to remain useful for the high-tech industry of the future. Human factors such as job satisfaction, team work, management, and people dependencies need to be examined. This research applies work design criteria from socio-technical system research to extend the value stream map of two case studies.

011-0701: Play it Again, Sam: Contextual Communication in Virtual Teams

Leslie Tworoger, Nova Southeastern University, United States

Baiyun Gong, Nova Southeastern University, United States

Cynthia Ruppel, Nova Southeastern University, United States

Mike Bendixen, Nova Southeastern University, United States

Findings of in-depth interviews with managers of a very large multinational organization and a focus group of their virtually managed, non-colocated subordinates are presented. Despite a rich selection of communication media available to both parties, primarily a very narrow selection is used. It is striking that while managers tend to prefer leaner and asynchronous media, those being virtually managed strongly prefer richer and synchronous media. This difference in preferred modes of communication results in a misinterpretation of actual leadership style. Further analysis reveals that this is caused by a lack of context when leaner, asynchronous communication is used. This can apparently be remedied by face-to-face meetings prior to the management relationship. These findings do not conform to extant theory or the rationale underlying current practice. Possible explanations of these phenomena may lie in cultural differences, lifestyle choices, and the complexity of working across time zones.

Monday, 8:00-9:30 Sessions

227	Monday, May 4, 8:00-9:30 Room: EC-A Session: Inventory Solution Methodologies	Track: INV, 6	Chair: Kung-Jeng Wang
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011-0273: Optimizing Retailer Replenishment Policy with Price Manipulation in a Demand-Declining Market for Deteriorating Items

Kung-Jeng Wang, National Taiwan University of Science and Technology (Taiwan Tech), Taiwan, Republic of China

Jonas C.P. Yu, Takming University of Science and Technology, Taiwan, Republic of China

Yu-Siang Lin, National Taiwan University of Science and Technology (Taiwan Tech), Taiwan, Republic of China

Due to rapid technological innovation and global competitiveness, the demand of many fashion-typed products usually decline significantly with time. A retailer facing such a market can employ appropriate pricing and replenishment strategies to increase its profit. This study examines such a situation from the perspective of the retailer in a two echelon supply chain and develops the optimal replenishment strategy for products experiencing continuous decrease in market demand. In order to solve highly complex rationality constraints, a genetic algorithm is developed to compute the optimal product lifecycle and replenishment lot size. Numerical examples from industry are conducted to verify the performance of the proposed model.

011-0507: A Flexible Decision Region of Dynamic Lot Size: A Phenomenon Resembling EOQ Zone

Dong-Shang Chang, National Central University, Taiwan, Republic of China

Fu-Chiang Yang, National Central University, Taiwan, Republic of China

Fu-Chiao Chyr, Chang Jung Christian University, Taiwan, Republic of China

The well-known Economic Order Quantity (EOQ) zone is beneficial for giving some latitude in picking the lot sizes in a continuous time inventory problem, but it is not suitable in a discrete time inventory problem, i.e. the material requirement planning (MRP) problem. Within this study, numerical experiments are conducted for exploring whether a flexible decision region (such as the EOQ zone) also exists in the dynamic lot size (DLS) problem with a single- or multi-stage version. The experimental results indicate that a region around the optimal solution comprises several alternative solutions with a small penalty cost from the optimal solution. This region is named as "DLS zone", which is useful to enhance the flexibility in decision making in the discrete time inventory problem and to respond to the situation of quality discount and capacity constraints.

011-0744: Monte Carlo Simulation Applied to Order Economic Analysis

Abraão Júnior, University of São Paulo, Brazil

Cristiane Tabosa, Federal University of Ceará, Brazil

Reinaldo Costa, University of São Paulo, Brazil

The use of mathematical and statistical methods can help managers to deal with decision-making difficulties in the business environment. Some of these decisions are related to productive capacity optimization in order to obtain greater economic gains for the company. Within this perspective, this study aims to present the use of the Monte Carlo simulation method to define metrics to support economic decisions related to process or not a new order in a company whose products have great variability in direct costs per unit. To achieve this objective a five-step model is proposed, built from the integration of Management Accounting and Operations Research techniques. The model is empirically tested in a plastic products industry. Finally, it is concluded that the Monte Carlo simulation method is effective in treatment of direct costs per unit variability and that the proposed model is useful to support decision-making related to order acceptance.

011-0985: Semi-Finished Steel Products Inventory Management Using a Mixed Optimization-Simulation Approach

Egualdo Souza, Federal University of Minas Gerais, Brazil

Samuel Conceição, UFMG - Federal University of Minas Gerais, Brazil

The purpose of this paper is to develop a model to manage the strategic semi-finished inventories. The research is based on a multi-item approach for three different groups of costumers. Due to the strong differentiation between the three groups (demand pattern, delivery lead time, etc.) a mixed simulation-optimization model was used. The model is composed by three modules: An order generation, a lot size and scheduling calculator and a shop floor analyzer. Three points of inventory were defined: raw material stage, for this product the strategy is purely make-to-order. The second point is located between the annealing and picking line and the cold strip mill. The third point is located before the finishing line. Each point can be denoted as the Order Penetration Point for the specific product. The results shows consistent costs reductions and loyalty improvement.

229	Monday, May 4, 8:00-9:30 Room: EC-F Session: LEAN Production Control	Track: JIT, 6	Chair: Steven Harrod
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011-0654: A TOC/Lean Approach for Levelling the Production on a Potting System

Maria Ramos, Faculdade de Ciências e Tecnologia / Universidade Nova de Lisboa, Portugal

Alexandra Tenera, Faculdade de Ciências e Tecnologia / Universidade Nova de Lisboa, Portugal

On a value stream where several products have dedicated and common equipment it is important to understand the capacity of each process and identify the main constraint of the value stream in order to obtain the best performance of the system. Incorporating Theory of Constraints (TOC) and Lean approaches a synchronizing method was developed to improve value stream results. The proposed method was applied to level the production on a potting system making it possible to synchronize the flow with reduced inventory, increased productivity, schedule attainment and improved stability of levelling production but at the same time maintaining enough flexibility to incorporate changes when and if needed. This paper will present how TOC and lean principles were integrated to create a production sequence on equipment with nine hours of lead time and how the right parts in the right quantity for different customers were achieved.

Monday, 8:00-9:30 Sessions

230	Monday, May 4, 8:00-9:30 Room: EC-G Session: OM/IS	Track: GENL, 13	Chair: Jerry Wei
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011-0787: Differentiating Consistency from Intensity in Supply Chain Production Integration

Lee Krajewski, University of Notre Dame, United States

Jerry Wei, University of Notre Dame, United States

Sarv Devaraj, University of Notre Dame, United States

This paper explores production integration up-stream and down-stream in supply chains. We seek to find out when uniformity of production integration up-stream and down-stream, called consistency, pays off. "Consistency" is different from the concept "intensity" because a firm can be consistent while engaging in minimal information sharing and collaborative activities so long as the practice is uniform between customers and suppliers. However, whether a firm is better off with consistency in supply chain production integration remains an unanswered question. We propose and test a statistical measure for consistency. Based on survey data from 119 manufacturing firms, we find strong support for the proposition that on top of intensity, the consistency of production integration also positively relates to a firm's operational performance. We also investigate the moderating effects of some contextual variables and their interactions on performance. These findings have important implications for the relationships between supply chain partners.

011-0864: An Integrated Model of Computerized Physician Order Entry (CPOE) System Implementation: Antecedents and Performance Implications

Asoke Dey, The University of Akron, United States

Kingshuk Sinha, University of Minnesota, United States

Sriram Thirumalai, University of Utah, United States

Computerized Physician Order Entry (CPOE) systems are computer-based systems that enable physicians to directly enter medical orders for patient treatment and/or diagnostic tests and provide real-time information to physicians, nurses, pharmacists and patients. Despite the potential benefits of CPOE systems i.e., decreased human error; reduced time to care; better clinical decision support at the point of care and enhanced communication, studies show that only 10 to 15 percent of U.S. hospitals have currently implemented CPOE systems. In this study we explore the key antecedents and performance implications of CPOE implementation. The empirical analysis in the study is based on data from 188 acute care hospitals in the U.S. The findings highlight the significance of organizational and user readiness and technology integration in motivating the usage and subsequently realizing the performance benefits of CPOE systems. Theoretical contributions and implications for practice are discussed.

011-0956: Information Systems Enablement of Supply Chain Processes in Turbulent Environments

Anand Jeyaraj, Wright State University, United States

Dwight Smith-Daniels, Wright State University, United States

Information systems are now recognized as important enablers of supply chain processes in organizations. A variety of supply chain processes including procurement, distribution, and fulfillment are enabled by information systems, which include a combination of enterprise resource planning and inter-organizational systems for internal and external activities respectively. Such enablement has generally been accomplished by organizations over an extended period of time through acquisition, customization, implementation, assimilation, and routinization of relevant information systems. Despite considerable research, understanding of information systems enablement of supply chain processes is somewhat constrained due to the lack of attention to the effects of "turbulent environments" experienced by organizations. The turbulent environments are an amalgam of different aspects including changes to technologies, business practices, supply chain processes, partner relationships, and broader environment. Our discussion highlights the ways in which the effects of turbulent environments may be accommodated when enabling supply chain processes using information systems.

011-0855: Integrating Quality Management and Supply Chain

Fariborz Partovi, Drexel University, United States

This paper presents a prescriptive methodology for strategic quality planning in a manufacturing environment. Specifically the methodology is used to prioritize various activities in supply chain with respect to the wants of the customers and then to suggest improvements as needed in aforementioned activities. We will demonstrate the applicability of our proposed methodology in a manufacturing organization.

231	Monday, May 4, 8:00-9:30 Room: EC-H Session: Social Issues and Health Systems in LA&C	Track: LA&C, 4	Chair: Candido Perez
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011-0889: Industrial Consolidation: Case Study of a Diagnostic Medicine Business Based on a Real Options Model

Ricardo Rochman, FGV-EESP, Brazil

Eber Silva, FGV-EESP, Brazil

This paper develops a model of decision making based on the Real Options theory for firms in consolidating markets. The model aims to identify the most suitable time for the beginning of a process of mergers and acquisitions in particular economic segments. The developed model has the perspective of increasing power and market participation only. Procurement opportunities may be seen as real options. Purchases are always associated with substantial costs. By exercising an option an acquisition becomes profitable when its surplus exceeds its investment so as to offset the reward of the option. From the model van den Berg and Smit have developed was adapted the presented model to an application for the selected case, the Support Services Segment of the Diagnostic Medicine, whose consolidation of markets in Brasilia and Goiania was initiated from 2006. The results show the model validity as well as conditions for its use.

011-0495: Physicians or Engineers as Supply Chain Managers: Which is the Best Choice for Hospitals?

Monday, 8:00-9:30 Sessions

Candido Perez, IESA, Venezuela

This paper empirically analyzes the usual practice of relying on physicians as hospital supply chain managers (SCM), comparing their performance against other SCM managers through a well-known individual-group task (Beer Game). This sample includes 104 physicians engaged in hospitals' director roles and 368 business executives from other economic sectors. I found evidence against the hypothesis of relying on specialized professional managers--mainly industrial engineers--to manage supply chains. In addition, time-series studies show a memory recency effect among participants.

011-0484: Corporate Social Responsibility: Peruvian Business Cases

Patricia Quiroz, Pontificia Universidad Catolica del Peru, Peru

The paper shows the best practices in Corporate Social Responsibility (CSR) of Peruvian companies in agribusiness, mining and services (hotels). These practices are focused in environmental management (mainly water and energy consumption), labour (gender, age, level of education, career opportunities in the company) and community (projects). The common issue of these selected companies is that they create sustained value, work in harmony with the environment through best practices in all their processes and therefore they have the respect of their different stakeholders: clients, workers, providers, and community. The paper shows selected companies with a sustainable development approach which is inherent to their organization culture; it reflects in the strategic and operational plans, covering the economic balance, social balance, and environmental balance.

011-0652: The Structure of the Production and Operations Management Field: A Social Network Analysis in Brazil

Guilherme Martins, Fundacao Getulio Vargas, Brazil

Michele Martins, Fundacao Getulio Vargas, Brazil

Joao Mario Csillag, Fundacao Getulio Vargas, Brazil

This study investigates how the construction of scientific knowledge in the Production and Operations Management field was structured in Brazil in the period from 1997 to 2008. By using data from 2,329 articles, networks were constructed in which the nodes are researches, and two researches are connected if they have coauthored a paper. The study assumes that the construction of scientific knowledge is a social process understood by a recursive dynamic between social and intellectual dimensions. The results illustrate the dynamics between competition and cooperation in the field along the construction of scientific knowledge. The findings point out a fragmented network surrounding clusters of scientific collaboration that concentrates the most part of the scientific production and researchers in the field. The study shows that when well positioned in the network, the author has higher probability of having higher productivity.

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Monday, May 4, 8:00-9:30 Room: EC-I

Track: PROJ, 2

Chair: Gary Mitchell

Session: Risk and Uncertainty in Project Management

011-0083: An Empirical Study of the Impact of Risk Management on Project Performance

Marly Carvalho, University of São Paulo, Brazil

Roque Rabechini Jr, UNINOVE, Brazil

This study aims to identify the relationship between risk management and project performance. The key issues in risk management were adopted from the literature review performed. The construct project performance encompasses both the process performance and the product performance aspects. The hypotheses were tested based on a field study that involved 257 projects. The results indicated that the activities associated with risk management related positively to project performance measures.

011-0084: The Contingent Effect of Complexity on Risk Management Profile

Roque Rabechini Jr, UNINOVE, Brazil

Marly Carvalho, University of São Paulo, Brazil

This paper aims to understand the contingent effect of project complexity on the practice of risk management. An empirical research study in 4 Brazilian States that involved 415 project managers was performed. Different risk management profiles, with different practices according to the type of project were included, and levels of complexity were considered. The theoretical review was performed and the main issues and conceptual gaps were identified and addressed in a questionnaire. The results show that even though the risk management practices were performed in a non-standardized base the variable is positively related to project performance. Moreover, there is a very small incidence of cases where there was risk management without reaching the project expected results. Besides, it was possible to observe that in more than 95% of cases there was not the participation of a risk manager or a professional equivalent.

011-0723: The Sensitivity of Project Schedules to Disruption: Project Characteristics and Environmental Factors

Stephen Swartz, University of North Texas, United States

This research investigated project scheduling techniques under variability and disruption. Seven traditionally "high performing" scheduling algorithms were used to build project schedules. The schedules were then executed under varying conditions in discrete event simulations. Activity variability and disruption length were experimentally manipulated at two and three levels. Project characteristics were manipulated through the use of a designed problem set of project networks. Performance outcome variables included traditional measures (Duration, Net Present Value) and the ability of the project to absorb a disruption and regain the schedule. Results indicate that schedules are sensitive to environmental factors, which interact with the characteristics of the project itself. No single algorithm performed best on all measures under all conditions; but some algorithms did consistently perform better under certain contexts. The findings suggest a "fit" model approach to project scheduling, and a fit model is presented.

011-0463: A New Approach to Measuring Slack in Stochastic Project Networks

Monday, 8:00-9:30 Sessions

Gary Mitchell, *University of Portland, United States*

Ted Klastorin, *University of Washington, United States*

The concept of slack in deterministic activity networks is well developed in the project management literature. However, there has been little discussion of slack measures in stochastic activity networks. How should stochastic slack measures be calculated? How can practitioners use stochastic slack and related concepts to better manage projects? In this paper, we propose a new definition for stochastic slack that addresses these questions.

Monday, 9:45-11:15 Sessions

235	Monday, May 4, 9:45-11:15 Room: Cloister North Session: Managing Servitization	Track: SRVC, 13	Chair: Marko Bastl
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011-0327: Measurement in Service-Service Scorecard

Rajesh Tyagi, HEC Montreal, Canada

We review the use of measurement, key performance indicators, KPI, and measurement models in services. After identifying gaps in existing frameworks and discussing challenges associated with the understanding of service firms' performance, a newly developed framework is presented. Service Scorecard complements other initiatives such as ISO 9000, Lean Six Sigma, Maturity Models and process improvement methodologies. A research agenda to tackle the challenges related to the validation of Service Scorecard is also provided.

011-0730: Manufacturing Firms Diversifying into Services: A Conceptual and Empirical Assessment

Ivanka Visnjic, Catholic University Leuven, Belgium

Bart Van Looy, Catholic University Leuven, Belgium

Manufacturing firms often diversify into related service activities due to expected leverage effects of existing technological expertise, customer relationships and brand identity. Previous research has conceived this process as one-directional, whereby the installed product base in the end defines the boundaries of service diversification. Within this contribution, based on concepts forwarded by economical theories of multiproduct firms, we argue that the presence of both product and service activities within one and the same firm can be conceived as bi-directional. When testing our propositions on product and service performance data of 48 national subsidiaries of a large international equipment manufacturing company by means of fixed effect panel data models, the presence of positive, strategic, complementarities becomes apparent. Moreover, adopting more sophisticated service models generates additional beneficial effects. Managerial implications on the level of business model choice and directions for further research will be discussed.

011-0601: The Servitization of Manufacturing: A Longitudinal Analysis

Andy Neely, University of Cambridge, United Kingdom

The nature of manufacturing is changing. Globally, increasing numbers of manufacturers are supplementing their product offerings with services. Known as the servitization of manufacturing, many argue that this strategy will enable manufacturers in developed economies to compete with low cost producers. However recent research has called into question the financial consequences of servitization. Studies presented at previous POMS conferences have illustrated that, under certain circumstances, pure manufacturing firms generate higher profits as a percent of sales revenues than servitized firms. This paper extends these debates by presenting for the first time longitudinal data on the servitization of manufacturing. Using comparable data sets created at different points in time - 2007 and 2009 – the paper presents an analysis of global trends in servitization.

011-0324: Challenges in Transforming Manufacturing Organisations into Product-Service Providers

Veronica Martinez, Cranfield School of Management, United Kingdom

Stephen Evans, Cranfield University, United Kingdom

Jennifer Kingston, Cranfield University, United Kingdom

Marko Bastl, Cranfield School of Management, United Kingdom

This paper aims to present the challenges experienced by UK manufacturing companies undergoing a servitization journey to becoming product-service providers. It will emphasise real life complexity and the most common and problematic challenges experienced by practitioners. The paper uses an exploratory multiple-case study approach based on semi-structured interviews, questionnaires and documentation. Twenty senior managers were interviewed from four product-service organisations resulting more than 400 pages of interview data. Data were analysed by researchers from eight different disciplines. This research identified the critical and frequent challenges experienced by UK manufacturing companies undergoing a servitization journey to becoming product-service system providers. They are condensed into five pillars which constitute the architecture of challenges in servitization. This paper contributes to knowledge with a new model; it explains the importance of the strategic, operational and social tests that organisations confront when adopting servitization strategies. The research may be limited by its qualitative nature.

236	Monday, May 4, 9:45-11:15 Room: Cloister South Session: Powerful Partners in SC	Track: SCM, 14	Chair: Sezer Ulku
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011-0628: Demand Management in Pharmaceutical Supply Chains: A Multi-Case Study

Priscila Miguel, FGV-EAESP GVcelog, Brazil

Manoel Reis, FGV-EAESP GVcelog, Brazil

Alexandre Pignanelli, FGV-EAESP GVcelog, Brazil

Despite being one of the key business processes in supply chain management due to the great opportunities of process improvement it brings, demand management, in practice, is still inefficient, resulting in operational problems in many supply chains. Comparing quantitative data of three different pharmaceuticals chains in Brazil and based on interviews, this study evaluated the synchronization level between supply and demand and identified the main differences among the cases. Although the theme is relevant in the industry, evidenced by strategic departments responsible for the process, key concepts like information sharing, cooperation and process integration are not implemented, resulting in high demand variability and distortions between supply and demand. Another conclusion is that Brazilian tax policy and industry regulation are strong barriers for companies to improve their operational supply chain performance. Finally, it became clear that the excessive power of pharmaceutical distributors in Brazil is also a negative factor.

Monday, 9:45-11:15 Sessions

237	Monday, May 4, 9:45-11:15 Room: Captain Session: Channel Coordination	Track: SCM, 28	Chair: Mahdi Zanddzari
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011-0740: Visual Real-Time Integrated Supply Chain Operations

Jan Ola Strandhagen, SINTEF, Norway

Heidi Dreyer, NTNU, Norway

Today, planning and control of supply chains is performed in batch mode. Although a decreasing batch period is a dominant trend, we still have not seen the real time control application for the entire supply chain. Enabling ICT as RFID technology and fast visualisation facilitates integrated supply chain operation. These enablers will allow real-time track and trace of the supply chain, and the information collected and visualised will enable a new level of real-time decision making. Mathematical programming modules are integrated in the visual control studio, allowing automation of rerouting and rescheduling. A particular research challenge is connected to handling incomplete data sets, as the technology is still not 100% reliable. A second research challenge is creating a unified model describing the control principles and rules applied in the semi-automated control. Methods and solutions to meet these challenges will be presented in this paper.

011-0932: Channel Coordination under Random Selling Season: Quantity Buy-Back and Price Protection

Mahdi Zanddzari, The University of Maryland, United States

Philip Evers, University of Maryland, United States

Technological innovation and fierce market competition make both the time between and the demand during two successive product introductions random, while extant work in price protection assumes a deterministic selling season. That is, under a random selling season, the manufacturer (she) is pro-early introduction, whereas the retailer (he) is pro-extended selling season. Any efficient trade-off should consider both a random selling season and a variable demand. Thus, a problem wherein she gives a target date for the introduction of the subsequent product to the retailer, and he places an order based on this date as his selling season, besides pertinent incentives for both early and tardy introduction, is considered here. Specifically, the performance of "No left-over sale" channel versus a "Left-over sale" one are compared when a quantity buy-back policy and rebate policy are used. Findings show both channels ensure coordination, yet only the latter channel can assure a win-win outcome.

011-0849: Repeat Procurement Auctions

Christopher Held, Georgia Institute of Technology, United States

Atalay Atasu, Georgia Institute of Technology, United States

Mark Ferguson, Georgia Institute of Technology, United States

We explore the impact of entrant bidder defection on the outcome of repeat procurement auctions. In practice, many buyers repeatedly award to incumbents and use the procurement auction solely as a means to apply pricing pressure on the incumbent. We propose a model that includes entrant bidding pool defection based on awarding. Based on whether a contract is awarded to an incumbent, bidders subsequently update their beliefs about the probability of winning and act strategically in future bidding rounds. As a result, bidders can become less aggressive or even opt out of future rounds as repeat incumbent awarding occurs. We explore the optimal policies of the incumbent given this bidder behavior.

011-0423: Flexibility and Price Discount: An Incentivized Quantity Flexibility (QFi) Contract

Wenming Chung, University of Texas at El Paso, United States

Srinivas Talluri, Michigan State University, United States

Ram Narasimhan, Michigan State University, United States

This research designs a new contract that combines the quantity flexibility (QF) mechanism and the price discount incentive. It seeks to balance the inventory risk between the traditional QF contract and the price discount contract for the buyer and the supplier in a supply chain. The supplier decides whether to offer the discount incentive and the buyer determines the ordering and forecasting quantities. We found that the QFi contract is able to achieve supply chain coordination. It also allows firms to identify areas where the QFi contract is able to Pareto-improve from the traditional QF contract under certain circumstances. We address discussions, managerial implications, and provide directions for future research opportunities.

011-0960: The Role of Complementary Resources in the Development of E-Supply Chains and Financial Performance

Yoo-Taek Lee, Babson College / TOIM Division, United States

Kathleen McKone-Sweet, Babson College / TOIM Division, United States

Sung-Yong Ryu, Soonchunhyang University, Korea, Republic of (South Korea)

Supply chain research recognizes Internet technology as an important medium for improving the efficiency of supply chain management and resulting in competitive advantage. However, according to IT strategy literature drawn on resource-based theory information technology per se is not a source of competitive advantage - while IT can contribute to achieving competitive advantage only when it creates resource complementarities. This paper explores the role of complementary resources in the development of Internet-enabled supply chains (called "e-supply chain" in this paper) using secondary data collected from a survey of 500 firms spread across 11 industries in one country. The result of analysis enhances our understanding of how Internet applications and complementary resources can work together to create competitive advantage in supply chains.

238	Monday, May 4, 9:45-11:15 Room: Yeoman Session: Product Movement	Track: SCM, 31	Chair: Fernando Bernardi de Souza
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011-0557: Integrated Replenishment Plan for Supply Chains with Transshipment Distribution Policy

Hua Zhong, SUNY College at Oneonta, United States

Monday, 9:45-11:15 Sessions

Miguel Lejeune, *George Washington University, United States*

We consider the problem of constructing an integrated inventory-production-distribution plan for a multi-stage (suppliers, manufacturers, distributors) supply chain operating in an environment in which the customers' demand is deterministic. The replenishment plan is such that it minimizes the costs of the supply chain while satisfying service level requirements over a multi-period planning horizon. The supply chain uses a maritime transportation fleet and can coordinate transshipments among its distributors. The transshipment feature permits significant savings, but increases the combinatorial complexity of the problem. The problem is formulated as an integer optimization problem. A new solution method is proposed. Its tractability will be discussed with respect to its implementation on an industrial problem.

011-0201: Evaluation of Logistics Provider as Integrator Agent in Supply Chains

Mauro Vivaldini, *Methodist University of Piracicaba, Brazil*

Silvio Pires, *Methodist University of Piracicaba, Brazil*

Fernando de Souza, *São Paulo State University, Brazil*

This article presents the Logistics Provider (LP) as an integrator in supply chains, as well as a set of basic requirements necessary for this model of management. It is assumed that the operational processes in the supply chain, when integrated by the LP, promote the management and contribute positively to the results. Initially, based on a review of literature, the text discusses the role of the LP as an integrator agent in supply chains. This helps to analyze the integration process, and to establish the basic conditions required for the LP performing this role. After, by a study whose methodology is a multi-case conducted with five LPs operating in Brazil, the set of requirements is applied for assessing the ability of integration of the LP. The study establishes a minimum level of performance required for the LP to act as an agent for integration in supply chains.

011-0094: Transshipment of Inventories: Dual Allocations vs. Transshipment Prices

Xiao Huang, *University of Southern California, United States*

Greys Sosic, *University of Southern California, United States*

We study a newsvendor game with transshipments, in which n retailers facing stochastic demands for an identical product are allowed to transship their inventories after meeting their local demands. In a setting with two retailers, we compare two allocation methods for residual profit - transshipment prices and dual allocations - that were previously analyzed in literature, and compare their performance. Our analysis suggests that dual allocations may yield higher efficiency among "more asymmetric" retailers, while transshipment prices work better with the retailers who are "more alike". We then extend our analysis to a repeated setting and develop conditions for achieving system-optimal solution. Within this framework, we also study dual prices in expectations. This enables us to establish a link between transshipment prices and dual prices, and to develop heuristic transshipment prices for settings with more than two retailers.

011-0742: Lot-Sizing and Synchronization in the Mean for Supply Chain Networks

George Polak, *Wright State University, United States*

Gregory Kellar, *Wright State University, United States*

Xinhui Zhang, *Wright State University, United States*

It is common to represent a supply chain as a network with flows, but this conventional model is inadequate for capturing the aspect of timing. In most cases, flows consist of discrete batches or lots, and a crucial part of supply chain integration is synchronization of these lots in some sense at every transshipment node. Ideally, incoming and outgoing shipments would be perfectly matched in time and size. Relaxing this ideal, we say that a node is synchronized in the mean when the average number of incoming turns of a material equals the average number of outgoing turns. We propose a nonlinear integer program that determines lot-sizing decisions to minimize the sum of all ordering, holding, and transportation and handling costs subject to goal constraints on synchronization in the mean at transshipment nodes.

011-0106: Integrating The Operations & Logistics Functions to Improve Port Competitiveness

Nik Dholakia, *The University of Rhode Island, United States*

Douglas Hales, *The University of Rhode Island, United States*

The classical approach to Supply Chain Management has involved the integration of the Operations, Logistics, and Purchasing functions. While newer models (i.e. the Lambert model of the Global Supply Chain Forum) integrate as many as eight functions, the importance of the Logistics and Operations functions remain high. This is especially important in a global environment where most of the world's logistics functions rely on seaports to transport goods. While much of the literature discusses Supply Chain Integration models in general, none has examined using the interaction between Operations and Port Logistics as a competitive weapon in Supply Chain Management. Traditionally treated separately, this study finds that many of the Logistics activities that define Port Competitiveness can be enhanced through greater interaction with Operations. This is important for countries such as China, Korea, and the U.S. whose economies rely so heavily on Port Competitiveness.

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Monday, May 4, 9:45-11:15 **Room:** Scribe
Session: Small to Medium-sized Enterprises (SME)

Track: GENL, 11

Chair: Joao Albino

011-0988: João Monlevade's Business Incubator – Startup Company's Perceptions

Renato Moraes, *Universidade de São Paulo, Brazil*

Rodrigo Lima, *Univ Federal de Ouro Preto, Brazil*

This paper presents a study about graduated companies from the business incubator of João Monlevade. Its intent is evaluating the company's perception about business incubator contributions in its trajectory. João Monlevade is a Brazilian city with 71 thousand citizens and its economy is strongly based on siderurgy. Since its foundation, 22 companies have passed by the João Monlevade's Business Incubator, 10 of these were contacted in this research and 6 participated and were interviewed. The instrument for collecting the data employed was a semi-structured interview script, with open questions. The total start up companies throughout business incubator is almost 22, and ten of them are still in market. This means a mortality tax of 55%. In Brazil, enterprises younger than five years old have a mortality tax of 80%, as traditional as technological sectors.

Monday, 9:45-11:15 Sessions

011-0148: Model for Knowledge Management in Small Companies: Case Study

Ana Carolina Pimentel, UNESP, Brazil

João Pedro Albino, UNESP, Brazil

The search for competitive advantage in a global environment must consider the use of tacit and explicit knowledge circulating inside companies. Differential factors can be easily replicated nowadays. Due to the great volume of knowledge and information, it is necessary to create a system that allows the management of important knowledge. Existing models for Knowledge Management are based in large companies' reality. In Brazil, most of the companies are smaller ones. This work presents a simplified model to implement Knowledge Management in Brazilian small and medium companies, based in a unique case study with limited scope. Despite some human and financial restrictions, Knowledge Management can help smaller companies, preserving organizational memory and increasing processes efficiency. To observe a unique case prevented the generalization of the model. But the recommendations can be references to other companies, because projects like this must approach particular issues of each organization.

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Monday, May 4, 9:45-11:15 **Room:** Knave

Track: HLTH, 14

Chair: Justin Drupsteen

Session: Cost Control and Process Improvements in Healthcare

011-0360: How Can The Employer Reduce Its Pharmacy Benefit Costs?

Ozden Gur Ali, Koc University, Turkey

Murali Mantrala, University of Missouri at Columbia, United States

Burak Cavdaroglu, Rensselaer Polytechnic Institute, United States

Pharmacy Benefit Managers (PBMs) play a very important role in managing prescription drug benefits in the U.S., and are viewed as an important tool in reducing employers' spending on the health care of their employees. However, there is currently a limited understanding of how PBMs work and how employers should contract with them so as to ensure profit-maximizing PBMs actually achieve the outcomes desired by employers. This paper strives to shed more light on how PBM actions driven by employer-PBM contract elements (incentive compensation and formulary enforcement) and market competition in the drugs' quality, price and pull marketing efforts, affect outcomes for employers and their employees. We also provide guidelines for a cost minimizing, health benefit maximizing employer contracting with PBMs. The authors develop and numerically analyze a model of pharmaceutical sales in a category with two branded and a generic drug of different molecules managed by a PBM.

011-0531: Determining the Strategic Focus and the Efficiency of the Service Process in Dutch Community Pharmacies

Timothy Broesamle, University of Groningen, Netherlands

Jos van der Werf, University of Groningen, Netherlands

Han de Gier, University of Groningen, Netherlands

Dutch community pharmacists want to expand their patient services to include medication management; this service requires significant patient interaction. In order to understand the potential effects of the medication management service on the design of the current service process, the authors assessed the strategic focus and efficiency of the current service process. Through a series of semi-structured interviews and observations, we found that Dutch pharmacies' service process is designed so that most activities occur without patient interaction. Patient contact only regularly occurs at the end of the process when the pharmacy assistant provides drug safety information. By applying data collected from a previous study to Chase's model of facility efficiency, we also show that the patient contact time to service creation time is low. We are currently using these initial findings to study the operational and organizational effects of introducing a high-contact service into a system focused on service efficiency.

011-0581: Integral Planning and Control of Shared Resources in Health Care Operations

Taco van der Vaart, University of Groningen, Netherlands

Justin Drupsteen, University of Groningen, Netherlands

Jacob Wijngaard, University of Groningen, Netherlands

Finding balance between service level and resource utilization in hospitals is a reoccurring problem in modern health care, particularly in hospital units shared by many different patient groups, as for example diagnostic radiology. Hoekstra and Romme (1992) propose an integral approach towards shared resources, however little research has been conducted into this subject.

The aim of this research is to understand the planning and control of shared resources in hospitals. More specifically we examine the role of contextual conditions and the impact of planning and control approaches on four dimensions of service delivery performance.

The analysis is based on a multiple-case study within a diagnostic radiology department of a hospital in The Netherlands.

In our results the adverse effects of non-integral planning become apparent in the positive outcomes for specific patient groups or on specific performance dimensions at the expense of other patient groups or other performance dimensions.

011-0854: A Synthesis on Adoption and Implementation of logistics Process Innovations in Healthcare

Sarah Bourque, HEC Montreal, Canada

Marie-Helene Jobin, HEC Montreal, Canada

Guy Pare, HEC Montreal, Canada

Operations can be a source of competitive advantage. Healthcare managers have realized the potential benefits that can be gained through logistic process innovations. Many jump on the "best practice bandwagon" in the pursuit of operational efficiency; however, results vary, one size does not fit all. Each organisation is distinct and should be mindful in its innovation adoption and implementation process to increase probability of success. Past research in this field has for the most part focused on clinical innovations. Using Rogers' Innovation Diffusion Theory and the Resource Based Theory this research paper will seek to synthesize literature linked to innovation diffusion and healthcare logistics. Considering the fundamental differences in the context of clinical and support activities we aim to understand the similarities and differences of the innovation diffusion processes. We conclude by suggesting future research that might be conducted to validate and further elaborate our findings.

Monday, 9:45-11:15 Sessions

011-0856: Improving Process Quality in Healthcare: A French Executive Education Initiative

Cyril Foropon, I.H. Asper School of Business, University of Manitoba, Canada

Laoucine Kerbache, HEC Paris, France

Healthcare systems across the globe are plagued by spiraling costs, quality concerns, shortages of doctors, nurses, staff, space, and other resources (Umble and Umble, 2006). The healthcare systems of industrialized countries are under the pressure to manage the growing healthcare costs better (Karvonen et al, 2004). Healthcare provider organizations are frustrated with their inability to show measurable improvements in the areas of quality, safety, service, and satisfaction. The purpose of this article is to illustrate some issues related to operations management initiatives in the healthcare industry. The discussion begins with a description of the root causes of operating issues identified in the specialized literature. Then, the article highlights challenges encountered with healthcare administrators registered in an executive education program recently launched in a European business school. The conclusion deals with our case-study research that will focus on the operations management practices both in the French and Canadian healthcare systems.

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Monday, May 4, 9:45-11:15 **Room:** EC-D1
Session: Multiple Methods for Empirical OM Research

Track: EMPR, 15

Chair: Steven Kramer

011-0868: To What Extent Does e-Government System Acceptance Improve Organisation Agility?

Soud Almahamid, Al Hussein Bin Talal University, Jordan

The purpose of this study is to empirically explore to what extent e-government system acceptance improves organisation agility. The motivation for conducting this study is the fact that this work has never been done in a Jordanian context; in addition, it is an empirical research where important findings will emerge and as a result, relevant recommendations will be considered. It is expected that this study will contribute to the knowledge of both academics and practitioners. A cross-sectional survey questionnaire method of data collection was adopted. The results suggested that e-government systems acceptance improves organisation agility. Also, it shows that there are positive relationships between e-government system acceptance and organisation agility dimensions (responsiveness, competency, quickness, and flexibility). By focusing on e-government system acceptance, it gives policy makers an idea how e-government system acceptance can positively increase organisation agility. This paper represents the first attempt to link e-government system acceptance with organisation agility.

011-0453: Operations Management Keywords And Employer Online Job Postings

Steven Kramer, Loyola College in Maryland, United States

Christy DeVader, Loyola College in Maryland, United States

George Wright, Loyola College in Maryland, United States

Operations Management (OM) terms are characterized in a number of specialty dictionary sources compiled by OM experts. Similarly, there are specific OM skills identified as key by expert OM practitioners for OM practitioners. Here we look to validate what is proposed as "key skills" to the OM community by reviewing online job postings for citations of such skills. We evaluate not only traditional OM jobs but ALL job types to appreciate where these skills are desired.

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Monday, May 4, 9:45-11:15 **Room:** EC-B
Session: Topics in the Management of Innovation

Track: PITM, 14

Chair: Kalinga Jagoda

011-0504: Impact of Management Systems Performances on Technological Changes

Ivan Janicijevic, Faculty of Organizational Science, Serbia and Montenegro

Nedeljko Zivkovic, Faculty of Organizational Science, Serbia and Montenegro

Management systems performances are one of the more present problems in management field research today. Performances of various management systems and their impact on technological changes are analyzed in this paper. Quality, environmental, health and safety and social corporate responsibility management systems performances are separately analyzed as potential drivers for technological changes in organizational systems.

011-0208: Evaluation Criteria of New Product Development Process

Kung-Jeng Wang, National Taiwan University of Science and Technology, Taiwan, Republic of China

Yun-Huei Lee, Tamkang University, Taiwan, Republic of China

New product development is one of the most importance processes for firms to increase their profit and competitiveness. This study presents the results of a comparison study between Taiwan and Indonesia in the employment of evaluation criteria for NPD process. This study is guided by a stage-gate process to derive a structured NPD performance evaluation framework. We use 20 evaluation criteria that are grouped into five dimensions: market, financial, product, process, and intuition-based measures. The findings reveal that evaluation criteria under market-based dimensions are more stressed during the later phases of NPD gates. Financial-based criteria are appearing importantly during the business-analysis gate and product-based criteria are strongly higher than other evaluation dimensions in the product-testing gate. The results also show some significant differences in the evaluation dimensions from both countries across the firms with different level-factors, with different NPD drivers and innovation strategies, and with different types of developing new products.

011-0951: Efficacious Management of Technology Transfer Projects: Lessons from a Canadian Case Study

Kalinga Jagoda, Mount Royal College, Canada

Robert Lonseth, Mount Royal College, Canada

Monday, 9:45-11:15 Sessions

Adam Lonseth, *Mount Royal College, Canada*

Technology transfer has become an essential feature of today's business setting. Firms that own technology have many ways of exploiting their technological assets for profitability and growth. While internal exploitation of technological assets, through designing, developing, manufacturing, and selling products and processes continues to be important, interest in external exploitation through technology transfer has intensified in recent years. However, evidence exists to show that technology transfer projects are often confronted with many complexities and problems. Careful planning and good implementation of such projects are thus seen as important prerequisites. This paper examines a case of technology transfer from the packaging industry in Canada. The stage-gate model for planning and implementing technology transfer is used to analyze the case and the authors identify critical success and failure factors with respect to technology transfer. The value of the stage-gate model for planning and implementing technology transfer is also highlighted.

011-0698: Effective Training and Education Processes for Large Scale IT Implementations

Jeffrey Ogden, *Air Force Institute of Technology (AFIT), United States*

Thomas Sprague, *Air Force Institute of Technology (AFIT), United States*

Effective education and training programs are vital to the success of large scale IT implementations, such as ERP systems, but are often the most overlooked or underfunded parts of these implementations. While the literature supports the importance of education and training programs to ERP implementations, little has been done to identify what qualities within these programs are important to implementation success. This study was initiated to support the upcoming United States Air Force ERP implementation, the largest single instance implementation ever attempted. To support this implementation and begin to close the gaps in the literature, this study first examined the reoccurring education and training factors within the literature, and then conducted case studies to see which of these factors that companies implementing ERP systems felt were important. The findings from these studies will be presented at the conference.

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Monday, May 4, 9:45-11:15 **Room:** Gallery
Session: Socio-technical systems and ergonomics II

Track: BDOM, 10

Chair: Matthew Douglas

011-0599: Commercial Motor Vehicle Driver Safety: An Application of Ethics Theory

Matthew Douglas, *University of North Texas, United States*

Safety is important in ethical, socially responsible operations management (OM; Brown, 1996). Safety research in OM is ripe for extension (Brown et al., 2000) and commercial motor vehicle (CMV) operations provide an interesting context in which to study operations safety. Little research has focused on operational factors that influence CMV drivers' safety-related decisions and behaviors. Hunt and Vitell's (2006) theory of ethical decision-making provides a foundation for better understanding drivers' safety-related decisions. The current study addresses the broad question: "How do CMV drivers make safety-related decisions, and how do various organizational influences affect drivers' safety decision-making processes?" Experimental design and multivariate statistical analysis are used to address the research question. This area of inquiry has the potential to demonstrate the importance of operational influences on CMV driver safety and provide the OM field with theory-driven empirical evidence to guide future research (re: Schroeder, 2008).

011-0048: Goals and Deadlines: An Operational Perspective

José Antonio Larco, *Erasmus University Rotterdam, Netherlands*

Kees Jan Roodbergen, *Erasmus University Rotterdam, Netherlands*

M.B.M. René De Koster, *Erasmus University Rotterdam, Netherlands*

Jan Dul, *Erasmus University Rotterdam, Netherlands*

Setting challenging goals for improving performance has been widely reported in industrial psychology. We present an operational perspective of goal setting and show its potential use for enhancing production efficiency and capacity flexibility. To achieve this, we build a behavioral operational model that is consistent with the current empirical results of goal-setting and that uses recognized behavioral and ergonomic theories currently available to explain these results. The operational model is capable of making testable predictions of the workers' workplace under the influence of goals. These predictions are tested in a laboratory study. Based on these results, we provide some insights for setting goals to achieve enhanced productivity and cope with fluctuating demand.

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Monday, May 4, 9:45-11:15 **Room:** EC-A
Session: Spare Parts and Warehousing

Track: INV, 7

Chair: Annalisa Cesaro

011-0137: Optimal Stock Allocation in Single Echelon Inventory Systems Subject to a Service Constraint

Annalisa Cesaro, *Università Roma Tre, Italy*

Dario Pacciarelli, *Università Roma Tre, Italy*

This paper deals with spare optimization in multi-location inventory systems with single item and repairable spare parts. Lateral and emergency shipments occur in response to stockouts. A continuous review basestock policy is assumed for the inventory control of the spare parts. The resulting model is a queueing network with blocking, which can be studied using a Markov chain modeling approach. The objective is to minimize the total costs for inventory holding, lateral transshipments, and emergency shipments subject to a target level of operational availability of the whole system. We model the stock allocation problem as a non-linear integer program and exploit its special structure to design a primal-based and dual-based algorithm. Our solution procedure is based on a convergent Lagrangian and objective level cut method. Computational experiments, carried out on practical data from an airport equipment maintenance context, show that this method finds an optimal allocation for all practical instances for which the optimum is known.

Monday, 9:45-11:15 Sessions

011-0309: The Convergence in Workers' Skill Levels Under Learning and Forgetting: The Fixed-Point-Property Approach

Sunantha Teyarachakul, ESSEC Business School, France

Doğan Çömez, North Dakota State University, United States

Hakan Tarakci, Melbourne Business School, Australia

This paper presents a study on the convergence of workers' skill levels under learning and forgetting in processing time in a batch-manufacturing environment. The convergence properties are examined under assumptions of an infinite horizon, a constant demand rate, and a fixed lot size. Our work extends the convergence results of Teyarachakul, Chand, and Ward (2008) beyond Globerson and Levin's (1987) exponential forgetting function and Wright's (1936) learning curve to more general classes of learning and forgetting functions. We also discuss why early papers other than Teyarachakul, Chand, and Ward (2008) did not find other types of long-term behaviors beyond convergence to a fixed point, and illustrate how our model could be modified and applied to other circumstances.

011-0394: The WIP Storage Policy Study under the Insufficient Rack Condition

Hsi-Chuan Chen, Chienkuo Technology University, Taiwan, Republic of China

This paper focused on the WIP storage location assignment of the warehouse under the constraints of insufficient rack storage space. This paper first calculated the relative importance index for each storage item according to the transportation frequency and the transportation distances to each rack. All storage items are classified into three categories: Class A, B, and C. Class A items are first assigned to their storage location by the transportation problem. Class B and C are then followed the same procedure. The storage location should be reconsidered when a new storage keeping unit (SKU) is coming or when finished goods are delivered. In addition, this study applied a web-based database allowing users to query the information of storage items through 2D bar code (QR code) to encode the item ID and the URL of a web database.

011-0873: An Inventory Model for Spare Parts Subject to Stochastic Demand and Lead-Time

Samuel Conceição, Federal University of Minas Gerais, Brazil

Gerson Da Silva, Federal University of Minas Gerais, Brazil

The main objective of this paper is to develop an inventory model to control spare parts in a steel company, considering stochastic demand and lead time, slow-moving and intermittent demand. We use a methodology to classify them and develop several models for lead time demand (LTD) based on statistical distributions to determine safety stock, reorder point and order quantity. The consumption of more than 20,000 spare parts was evaluated. The models were based on statistical distributions: Poisson, Laplace, Gamma and Normal. As forecasting model we use the Willemain's Bootstrap Model. We compare the results of each model and use the concept of Service Level, Fill Rate and Total Costs. In terms of global results, the Gamma distribution model presented the lowest total cost, and the Normal distribution presented the best fill rate and service level. Laplace model also achieved good results with respect to the total costs.

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Monday, May 4, 9:45-11:15 Room: EC-F
Session: LEAN Implementation

Track: JIT, 7

Chair: Divesh Ojha

011-0216: World Class Manufacturing Practices and Their Adherence to the Manufacturing Strategy Model

Marcelo Silva, Pontifical Catholic University of Parana, Brazil

Sergio Gouvea da Costa, Pontifical Catholic University of Parana, Brazil

Edson Pinheiro de Lima, Pontifical Catholic University of Parana, Brazil

The objective of this paper is to verify the adherence of World Class Manufacturing (WCM) practices to the model of manufacturing strategy. After a bibliographical review focused on defining World Class Manufacturing and the model of Manufacturing Strategy theories, four case studies are presented. They were carried out in companies of the automotive parts industry. The case studies sought to identify the adopted practices and the extent of their utilization. The study results show to what extent each practice is adherent and whether it is possible to state that World Class Manufacturing represents a model of the content of manufacturing strategy.

011-0447: Sequential Implementation of JIT Practices

Richard White, University of North Texas, United States

Divesh Ojha, University of North Texas, United States

Ching-Chung Kuo, University of North Texas, United States

This study investigates the holistic implementation of JIT. We contend that the most important elements of holistic JIT systems—focused factory, reduced set-up times, group technology, total productive maintenance, multi-function employees, uniform workload, just-in-time purchasing, Kanban, total quality control and quality circles—should be implemented in a sequential manner for a firm to reap sustainable operational gains from JIT implementation. Data collected in a cross-sectional field study about implementation of JIT in U.S. manufacturers are used to test the suggested sequence of JIT implementation and the impact of the JIT practice bundles on non-value added work. The results indicate that implementations of JIT management practices should be in this order: first, conformance quality related practices; second, delivery reliability related practices; third, volume flexibility related practices; and finally, low cost related practices.

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Monday, May 4, 9:45-11:15 Room: EC-G
Session: OM/IS

Track: GENL, 14

Chair: Sarv Devaraj

011-0168: An Empirical Examination of the Effects of Business Environments and Information Technology on Value Chain Integration

David Peng, Texas A&M University, United States

Gregory Heim, Texas A&M University, United States

Monday, 9:45-11:15 Sessions

Rogelio Oliva, *Texas A&M University, United States*

This paper investigates the individual and joint effects of business environments and information technology on value chain integration. It examines three environment dimensions including complexity, dynamism, and munificence. It captures information technology (IT) supporting manufacturing shop floor operations, enterprise integration, and inter-firm collaboration. The effects of business environments and IT on value chain integration activities are empirically examined using a study sample of manufacturing plants in electronics, machinery, and transportation industries. The paper contributes to the operations management literature by empirically investigating the environment-IT-integration links at a more fine grained level than the existing literature. The results provide useful insights on aligning value chain integration and information technology investments with environment characteristics.

011-0875: Knowledge Spillover across Process Innovation Implementations

Shekhar Jayanthi, *Texas A&M University, United States*

Sarv Devaraj, *University of Notre Dame, United States*

Kingshuk Sinha, *University of Minnesota, United States*

Knowledge spillover from one innovation implementation to the next is essential to realizing the potential of innovations effectively. Using a servomechanism, we capture the dynamics of innovation implementation to examine knowledge spillover across successive implementations. We present the theoretical rationale to specify three components of the servomechanism related to realization of successive innovation implementations over time. Using a wafer fabrication plant of a semiconductor manufacturing firm as the research setting, our empirical analyses based on yield – realization of innovation implementations – during a two-and-a-half-year period revealed that load and feedback components of the servomechanism are the primary modes of knowledge spillovers during the transition from NMOS to CMOS process technology. The paper integrates theories and approaches in communication, management of innovation, and process change. Further, the paper addresses scalability by integrating the industry-level group phenomenon with individual-level innovation implementation phenomenon.

011-0966: A Metaphor for the Interface between OM and IS

Tiru Arthanari, *University of Auckland, New Zealand*

David Sundaram, *University of Auckland, New Zealand*

Organizations are systems that carry out requisite processes to convert inputs to certain outputs, with the intention of adding value. For this to happen, operations management, information and decision processes need to be fused together synergistically. We highlight this with the following metaphor: though notes are played by different performers in an orchestra to produce music, the music is really experienced in the perception of the whole composition and this is made possible by the information of the notes already played, the expectation of the notes that might follow and the deviations around these kept within bounds that embellish the experience. In a similar manner, organizational performance is music, and notes or information alone do not make the music; operations and information flows fuse together, to produce the synergy in a seamless manner. In this paper we illustrate this metaphor with case examples.

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Monday, May 4, 9:45-11:15 **Room:** EC-H
Session: Agricultural issues and clustering in LA&C

Track: LA&C, 5

Chair: Joao Amato Neto

011-0104: Regional Clusters and Technological Spillover : A Brazilian Case Study

João Neto, *University of São Paulo, Brazil*

The debate concerning the regional clusters of companies and local productive arrangements has gained special prominence in the literature due to the growing importance of this phenomenon relating to the experience of socioeconomic development of several countries in the last decades. Besides, the largest interest regarding this theme is due to the intensification of inter-regional competition and its implications, in particular for the situation of emergent economies. The present study aims to analyse the phenomenon of technological spillover concerning the specific Brazilian high technological cluster in São Carlos, a medium-sized city located in the center of the state of São Paulo, Brazil. Lately this region has been home to around 100 high technology enterprises, all of them involved in strategic areas: computer, robotics, automation, fine chemicals, electronics, genetics, and new materials. The methodological approach is based on a simple case study.

011-0917: The Development Experience of Two Viticulturist Clusters: Petrolina (Brazil) and Tierra Amarilla (Chile)

Suzana Souza Santos, *Universidade Paulista - UNIP, Brazil*

João Chang Junior, *Centro Universitário da FEI, Brazil*

Mateus Chang, *ESALQ - USP, Brazil*

This paper studies the problem of the development in arid and semiarid regions, by means of the construction of a comparative methodology using two agribusiness cases of successful viticulture: Petrolina/Brazil and Tierra Amarilla/Chile. Taking into account the existing theoretical bases of cluster's development, the historical aspects, geographic, and institutional characteristics of each region, the analysis of the results of a field research that was accomplished in both sites is developed with the construction of one typology of these viticulturist groupings that allow an evaluation of the competitive advantage, the interrelationships among actors, agents, and local public power; and the questions related to credit access and incentive. The result indicates that none of the groupings has all the necessary requisites for the consolidation of competitive advantages in their respective territory.

011-0895: Brazilian Agricultural Risk Management in the Cooperative Context

Edmilson Moraes, *Centro Universitário da FEI, Brazil*

Vilmar Moreira, *Pontifícia Universidade Católica do Paraná, Brazil*

Monday, 9:45-11:15 Sessions

Given the variety of activities and operations that an agricultural cooperative in Brazil can perform, risks can emerge from several sources. In this country, cooperatives are considered as organizations that have social functions and, despite being a requirement for social performance, the economic performance normally is not prioritized. This study assumes that in Brazil the cooperative doctrine may limit adoption of some strategies to cope with market risks. Therefore it was verified whether the cooperatives of a Brazilian state are willing to stimulate their members to change their production portfolio in order to improve the relationship between return and risk of the agribusiness. This relationship is analyzed in some scenarios generated by an efficiency analysis that was performed using Markowitz's model (efficiency frontier). Gross margins' variability of 19 selected commodities within a period of 11 years was used as a proxy for market risks.

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Monday, May 4, 9:45-11:15 **Room:** EC-I

Track: PROJ, 3

Chair: Larry White

Session: Measurement and Improvement in Project Management

011-0288: Using Maturity Models to Improve Project Management Practice

Naomi Brookes, Aston Business School, United Kingdom

Robin Clark, Aston University, United Kingdom

This paper presents the findings of an investigation to evaluate the role of Project Management Maturity Models (PMMM) in improving practice. PMMM are widely used constructs. Implicit within their use is an idea that they improve project performance. However, limited empirical evidence exists to understand the comparative effectiveness of these approaches. Furthermore, there are a number of key omissions in some existing maturity models. The paper critically evaluates existing project management maturity models and delineates a number of differences between them. (These include differences in scope and definitions of maturity.) The evaluation shows that PMMM are typically used reactively and not proactively and that they do not have sufficiently rigorous protocols in the evaluation of project management maturity. The paper concludes by highlighting the limited empirical evidence that has linked project maturity and project performance and makes suggestions for further investigations to fill this gap.

011-0809: The Role of Experience and Background in Project Performance

Dwight Smith-Daniels, Wright State University, United States

Vicki Smith-Daniels, Arizona State University, United States

We provide results illustrating the role of levels of experience and functional background in determining project performance in an experimental environment involving the planning and execution of a project in small teams. Varying levels of uncertainty, ranging from variation to complexity, characterize the project environment. Results are provided for 150 teams composed of practicing project managers and team members with one to twenty-five years either as project team members or project managers.

011-0668: The Perils and Pitfalls (and Pleasures) of Using MS Project 2007 in a Project Management Course

Larry White, Eastern Illinois University, United States

We examine the pros and cons of using of MS Project 2007 in an introductory Project Management course. We analyze the overlap between the capabilities of MS Project 2007 and the contents of a typical introductory course. We evaluate the assumptions built into MS Project 2007 and discuss the problems (or opportunities) those assumptions may create for student learning. We consider the benefits of using features of MS Project 2007 that are not covered in the introductory course.