POM 2004

2nd World Conference
15th Annual POMS Conference

POM's Expanding Constellation

Program

Cancun, Mexico, April 30-May 3, 2004

POM's Expanding Constellation

Production and Operations Management

Second World Conference
Fifteenth Annual POMS Conference

Conference Program

Cancun, Mexico
April 30 - May 3, 2004

Program Editor: Michael F. Gorman

European Operations Management Association
Production and Operations Management Society
Japanese Society for Production Management

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A Special Welcome to POMS 2004 Annual Meeting!

The Second World POMS conference, ***Operations Management 2004: The Expanding Constellation*****,** promises to be one of the most enjoyable and intellectually stimulating events of the year. The conference theme depicts an expanding constellation of operations management activities from design to production to delivery in a world network of products and services. This outstanding POMS program, in collaboration with the European Management Association (EurOMA) and the Japan Society for Production Management (JSPM), has been designed to enhance member networking and knowledge sharing with international thought leaders and colleagues. As the global society dedicated solely to the advancement of the operations management profession, POMS' membership has grown substantially over the past several years, and this is reflected by the record conference registrations. We will have 500 interesting and diverse paper presentations in parallel sessions, including those in invited sessions sponsored by POMS Colleges on Supply Chain Management and Service Management.

POMS has attracted a distinguished group of academicians and practitioners to share their experience with state-of-the-art thinking in their areas of expertise. Highlighting the conference theme are the two plenary sessions. On Saturday morning following the opening address, you will hear from Nampachi Hayashi, who is the Executive Advisory Engineer of Toyota Motor Corporation. He will speak on the "Essence and Evolution of the Toyota Production System: The Demands of Today." You will learn about Toyota's challenges of reducing lead times of delivery to the consumption areas with typically higher labor costs in a global manufacturing environment and where moving production to low-cost production economies is the norm. The Sunday program will start off with a plenary session given by Bart J. Groot, Vice President for Dow Central and Eastern Europe. Bart will discuss his experience with "Sustainable Transformation Management: Dow Chemical's Acquisition of an East German Chemical Operation." You will learn about key cultural and logistical challenges of Dow's unprecedented restructuring and upgrading manufacturing facilities.

There are also a number of exciting and special programs being offered this year.

- I am pleased to announce that the Operational Advantage Group (OAG) will hold its inaugural roundtable meeting at this conference. OAG is POMS' industry support group. Invitations have been sent to executives from all over the world to convene for discussion about how to integrate the activities of industrial executives with the academic interests of POMS members. As a POMS member, you are exclusively invited to take part in this high-level gathering.
- If you are junior faculty, make sure to take advantage of the New Faculty Development Program offered at this year's conference. It will give you an opportunity to network with other junior faculty and share research ideas.
- Kal Singhal, POMS Journal Editor-in-Chief and Paul Kleindorfer, POMS VP Publications will host a special "Meet the POMS Editors" session, where members can meet the new Department Editors.
- Ed Davis, POMS VP Education and I will be hosting a special session on "Teaching in Supply Chain Management" and Ananth Raman, POMS SCM College co-president, will lead a panel discussion on "Setting a Research Agenda for the Supply Chain Community for the Next 10-20 Years." Nirup Menon, Dan Pantaleo and Ashok Soni will have a panel presentation on "Incorporating SAP into the OM Curriculum"
- At Monday's luncheon, we will announce the first POM Fellows, the Wickham Skinner and CIBER Award winners.

I also invite you to attend the President's reception on Saturday evening and on Sunday afternoon the POMS General Business Meeting that will be hosted by incoming POMS President Gabe Bitran. The POMS Colleges on Supply Chain Management and Service Management will hold their Business Meetings on Saturday afternoon.

To my knowledge, this is the largest POMS offering to date! Of course, make sure to take advantage of the beautiful conference surroundings in Cancun, Mexico. There are nearby sites of historical interest as well as beautiful water, beaches and tremendous shopping and nightlife. I am looking forward to a wonderful conference and to catching up with friends in Cancun.

Sincerely,
Aleda
Aleda V. Roth - President – POMS

Aleda V. Roth
Distinguished Professor of Operations, Technology and Innovation Management, and Chair, Global Supply Chain Management Concentration
The Kenan-Flagler Business School

JSPM A Look ahead to the Third World Conference: Japan

As one of the supporting organizations, we would like to express our feelings of gratitude, congratulations, and honor as we share the experience of 2nd World Conference of Production and Operation Management, with POM members all over the world.

The Japan Society for Production Management joined 1st World Conference on POM held in Sevilla, Spain, in 2000, as one of the co-sponsoring organizations. It's encouraging for us to see the agreement to have the World Conference every four years to be implemented successfully, which was reached in Sevilla based on the mutual trust between the three POM organizations' leaders. We believe 2nd World Conference on POM shall be another thrust for the development of POM by providing POM professionals with the augmentation mechanism of our knowledge by the international exchange of our ideas and wisdom.

JSPM was established in 1994. It's new for the old history of the discipline. The knowledge of POM used to be and is still dispersed in separate society activities such as Quality Control, Scheduling, Maintenance, Industrial Engineering, Management Science etc. But the knowledge of those societies has been requested to be integrated to develop the architecture of effective management knowledge for real business and educational purposes. The objectives of the establishment were to organize researchers, experts, consultants and business people to develop the management discipline based on the function of production, to increase the proprietary knowledge base of POM by organizing various related knowledge to enrich and reshape POM as a management discipline, to promulgate the knowledge in the form of real application and education in business and school. Now the membership goes over five hundreds. We respect theoretical knowledge as well as practical one to achieve the objectives.

JSPM is in charge of 3rd World Conference in 2008 as the hosting organization. The site is not yet decided, but it's located somewhere in Japan. We will mobilize our resources, people and organizations, related to POM as well as those in Asian countries to make the Conference successful. The world is now watching the growing economy of Asia driven by the knowledge of POM. The year 2008 must be right time to see it. We look forward to seeing you again there and exchanging the latest knowledge and ideas at 3rd World Conference of POM.

Best wishes and regards.

Masanori Kodama
President of the Japan Society of Production Management

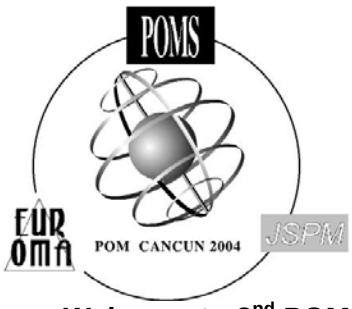
A special welcome from Euroma

On behalf of the Board of the European Operations Management Association (EurOMA) I am very pleased to welcome delegates to this 2nd World Conference on Production and Operations Management. Having attended the 1st World Conference in Sevilla I have seen the opportunities that such an event provides for members of the international POM community to meet and discuss their interests. I know many links and collaborative projects have emerged as a result of such joint meetings. From looking at the pre-conference details and delegate list I am sure this conference in Cancun will be equally successful in this respect.

EurOMA was formed in 1994, although its roots go back much further because it grew out of the United Kingdom Operations Management Association (OMA-UK). In the ten years since its formation EurOMA has developed significantly in terms of the strength and diversity of its membership. Now there are members from 32 countries, which of course means that many of them are from outside Europe. At the annual conference we see members from as far away as Japan, Brazil, South Africa and New Zealand. The annual conference is the highlight of the year for EurOMA but there are other events such as the Eden Doctoral Seminar on Research Methodology in Operations Management, which is held annually in conjunction with the European Institute for Advanced Studies in Management (EIASM), which additionally provides an administrative and secretarial service for the association. Earlier this year EurOMA also provided support for an operations management event in Spain, aimed at increasing the membership in that country. Further such events are planned elsewhere, especially in recognition of the enlargement of Europe this year. In fact next year's conference in Budapest, Hungary, will be the first to be held outside the "old" EU.

Last year our annual conference in Como, Italy, was organised jointly with the Production and Operations Management Society (POMS), which after the World Conference in Sevilla provided the second opportunity for the two associations to collaborate at an international meeting. At Cancun we look forward to strengthening our relationship with POMS as well as the Japan Society for Production Management (JSPM).

David Bennett
President, EurOMA



POM Cancun 2004

Operations Management 2004:
The Expanding Constellation
2nd World POM Conference
and the
15th annual POMS Conference.

Welcome to 2nd POM World Conference in Cancun

Welcome to the 2nd World POM Conference in Cancun, Mexico. The theme of the conference, ***Operations Management 2004: The Expanding Constellation***, is quite appropriate and useful for our times. Recent advances in technology and the developments in international trade and warfare have made us aware of the expanding organizational boundaries and the problem complexities that need to be considered in managerial and executive decision making. This in turn requires the Production and Operations Management to expand its concepts and tool kits to solve ever increasing set of problems. Because of their vary nature, research projects leading to useful approaches to handle new and emerging complex problems require global cooperation and collaborative working environment. The 2nd World POM Conference in Cancun creates and fosters such a global collaboration and exchange of ideas. The joint efforts of the Production and Operations Society, European Operations Management Association (EuROMA) and Japan Society for Production Management (JSPM) has been instrumental in creating this spirit of global networking. Therefore, I am sure that you will find your participation in this conference to be exciting, interesting, and valuable.

I am fortunate to serve as the General Lead Co-chair of this conference. When I accepted this challenge to collaborate with representatives from EuROMA and JSPM (whom I discovered later were Jose Machuca and Michiya Morita), I was not sure such collaboration would work and that we will be able to create harmony in face of conflicting ideals, goals, and desires. Nevertheless, as we started to work together, I noticed the development of an inner strength that could have only come from the joint working of the general co-chairs and other members of the conference committee and POMS Board. Therefore, we have been able to uphold the tradition set at the 1st POM World Conference in Seville four years ago and have paved the way for the 3rd POM World Conference in 2008 in Japan.

As participant and contributor to this conference, I thank you. Without you, there would be no 2nd World POM Conference. You are an essential and integral part of this conference. I appreciate the confidence and support I received from Aleda Roth, POMS outgoing President, Jim Gilbert, POMS VP for Meetings, and Sushil Gupta, POMS Executive Director. The untiring work and dedication of Jack Kanet, whom I persuaded to accept the Program Chair responsibilities, is clearly instrumental in creating the successful conference program. The imaginative help of Rohit Verma, POMS Newsletter Editor, and Raju Balakrishnan, POMS Online Editor helped the communication processes and the abstract submission and processing activities relatively seamless. Gabe Bitran, POMS incoming President, provided guidance at those critical points that would have made a real difference to the experience of the conference by the participants. In addition, I owe my gratitude to each member of the conference committee and their respective organizations for enabling us to encroach upon their valuable time and resources to get he job done. To all of you: thank you for the job well done. Now let us have some real fun.

Sincerely,

Jatinder (Jeet) N. D. Gupta, Ph.D., CFPIM
Conference General Lead Co-Chair
POMS Representative

Professor and Eminent Scholar in Management
Accounting and Information Systems
University of Alabama in Huntsville

A LOOK BACK: FROM "POM SEVILLA 2000" TO "POM CANCUN 2004"

When in 1996 I accepted to chair the International Conference of the Production and Operations Management Society (POMS) for the year 2000, I came up against the need to find an enticing theme for the Conference. The end of the century was a good excuse, almost an invitation, to reflect on scientific disciplines. Ours, Operations Management, has gone through, and is still going through, a time of change and of new and difficult challenges, with an expanding field of studies and a demand for new approaches to solve new problems in new contexts. Given this scenario, Marty Starr and myself thought it would be suitable to choose the theme: "*POM Facing the New Millennium: Evaluating the Past, Dealing with the Present and Planning the Future of Operations*".

This choice led me to realise that if we really wanted to think deeply about what the theme for the Conference involved, this should originate out of world-wide discussion. In this way it would be possible to take a look at the problems surrounding POM from a wide variety of standpoints and points of view, and through the looking-glasses of different cultures. In short, there was a *need for experts in POM from all the various geographical areas in the world* to discuss the problems facing companies when it comes to managing Operations in a globalised economy which is undergoing very swift change and in the face of ever-greater competition. It was important for doubts and knowledge to be shared and, finally, that proposals should come out of this discussion pointing to means of solution.

In my opinion, this goal could not be easily achieved within the context of a regular POMS Conference. For this reason, I suggested the organization of the *First World Conference on Production and Operations Management*, to be held in Seville (Spain). The idea was accepted and POMS, EurOMA and JSPM (the Japanese Society of Production Management) agreed to collaborate in different ways, as did the most important Spanish academic associations in Business Administration, ACEDE and AEDEM.

Finally, the challenge was overcome and global co-operation was successful. I think that the objective that was the *creation of a new Conference-product* through the combination of top-quality scientific work and available time for tourism and social activities to facilitate networking, has proved to be effective and viable. As a symbolic gesture, Bob Hayes (President of POMS), Chris Voss (President of EurOMA) and Masanori Kodama (President of JSPM) put their signatures to one of the old barrels at the Sherry wineries in Jerez to sanction their commitment to the celebration of new World Conferences every four years.

Today, I am happy to see that the seedlings set in Sevilla have blossomed. This *Second World Conference on POM*, being held in Cancun, has attracted a great number of colleagues from all over the world. The hard work of the Conference team, the collaboration between POMS, EurOMA and JSPM, and, it goes with out saying, the attractive location, have all helped to achieve what, I am sure, will be another successful World Conference.

I would like to finish this letter stressing that the most important factor in the Conference success was the organizing team. A group of 15 instructors and two administrative staff worked shoulder to shoulder with me for 24 months in an enthusiastic, efficient and effective way. I thank them once again: M. A. D. Machuca, R. Alfalla Luque, F. Arenas Márquez, M. Asenjo Salazar, E. Chávez Miranda, S. García González, R. García Sánchez, J. M. García Vázquez, P. Garrido Vega, M. González Zamora, C. Medina López, G. Molleda Jimena, M. Nieto Antolín, R. del Pozo Barajas, M. Sacristán Díaz, and S. Vázquez de la Marta and L. Machuca Guerrero.

Welcome to POM Cancun, 2004.

José A.D. Machuca
Sevilla Conference Co-Chair (EurOMA Representative)

POMS

PRODUCTION AND OPERATIONS MANAGEMENT SOCIETY

AN INTERNATIONAL SOCIETY TO EXTEND AND INTEGRATE KNOWLEDGE PERTAINING TO PRODUCTION AND OPERATIONS MANAGEMENT

Purpose: Production and Operations Management Society (POMS) is an international professional organization representing the interests of POM professionals from around the world. The purposes of the Society are:

- to extend and integrate knowledge that contributes to the improved understanding and practice of production and operations management (POM);
- to disseminate information on POM to managers, scientists, educators, students, public and private organizations, national and local governments, and the general public; and
- to promote the improvement of POM and its teaching in public and private manufacturing and service organizations throughout the world

Future Vision: The Production and Operations Management Society (POMS) has become the "Gateway to the POM World". The long term goal and vision for POMS is that it should become the "home" organization for all POM professionals and be recognized as such by other professional organizations, accreditation bodies, university administrators, business and industry leaders, and our own colleagues in business schools. POMS must become the repository of fundamental POM information and the most authoritative source of developments in the POM field.

To achieve this goal, POMS facilitates communication among professors and POM professionals from all over the globe. POMS provides the following multi-dimensional links which create a "virtual department" and provide avenues for sharing ideas that impact teaching, research and practice.

- ***electronic links*** which include POMS website (**www.poms.org**) and e-mail to and from the POMS home office (**poms@fiu.edu**).
- ***the printed word*** which includes ***Production and Operations Management***, an increasingly influential quarterly journal solely devoted to the POM field, and the newsletter - ***POM Chronicle***.
- ***face-to-face contact*** at POMS-sponsored conferences both in the United States and in other countries with an opportunity to network with members of POM community from all over the world.

The Society's approach to Production and Operations Management is problem-centered; it does not rely on particular methodologies. We are dedicated to uncovering and understanding the canon of knowledge in POM. We encourage reviews and reinterpretations of past research and the provocative idea that initiates new research. Pedagogy remains core interest of the Society; conference sessions, the website, and bulletins are evidence of this interest. The ***tangible benefits*** of the Society include:

- Receipt of the quarterly ***Production and Operations Management*** journal.
- Receipt of the quarterly ***POM – Chronicle***.
- Discounted registration fee at the POMS annual conference.
- Periodic receipt of Job Bulletin, Research Bulletin, and other e-mail announcements.
- Continuing access to the portions of the POMS website that will be locked in the future:
  - Pedagogy area -- links to course websites and syllabi at many schools; links to case collections and international groups; clearinghouse for sabbaticals and leaves around the world.
  - Membership area -- find phone and e-mail addresses of other members easily.

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Journal: ***Production and Operations Management*** is the official journal of the Society. The inaugural issue of the Journal was published in 1992. Members of POMS receive the Journal as a part of their membership benefits. The criteria for acceptance of manuscript include originality, significant contribution, readability, and organization of the manuscript. The Journal publishes high quality papers on all topics on POM. The Journal recognizes that the knowledge in POM is not restricted to a single discipline and that it covers several areas, including behavioral science, operations research, statistical analysis, decision support systems, information systems, strategic planning, economics, and engineering. The Journal has published several special issues on topics of current interest which include: Total Quality Management, Manufacturing Strategy, Capacity Constrained Planning and Scheduling, Global Operations and Technology Management, Global Supply Chain Management, Internship Projects at MIT Leaders for Manufacturing Program, Teaching POM: Visions, Topics and Pedagogies, and Service Marketing and Service Operations. Several universities cosponsor the journal.

Annual Conferences: POMS' annual conferences provide a forum to POM professionals for interaction on topics of importance to the POM field. There are normally two conferences every year – one in U.S.A. and one in another country. The conferences include contributed papers, workshops, plenary sessions, tutorials, and panel discussions. POMS' conferences always have a theme; are smaller but more cohesive and more intimate than many other conferences; and spend considerable time in plenary and semi-plenary sessions that serve to unite us all. The themes of some of the recent conferences include:

- Teaching POM: Visions, Topics, and Pedagogies (Indianapolis-1996),
- World Best Practice in POM (Australia -1996),
- Integrating POM Research and Practice in the 21st Century (Miami - 1997),
- Reflections: The History of Thought in Operations Management (Santa Fe - 1998),
- Competitiveness and Wealth Creation – Role of POM (South Africa - 1998),
- Creating a New POM Architecture for the 21st Century (Charleston -1999),
- Operations Management for Global Economy – Challenges and Prospects (India – 1999),
- Expanding Boundaries of POM (San Antonio – 2000),
- POM facing the New Millennium (Spain – 2000),
- POM Mastery in the New Millennium (Orlando – 2001),
- Operations Management in the Internet Era (Brazil – 2001),
- POM High Tech (San Francisco – 2002),
- POM in the Service Economy (Savannah – 2003),
- One World? One View of OM? (Italy – 2003),
- Operations Management 2004: The Expanding Constellation (Cancun, Mexico – 2004).

The conference in Spain (2000), the 1st World POM Conference, was cosponsored by European Operations Management Association (EurOMA) and Japan Society for Production Management (JSPM). The conference in Cancun, Mexico (2004) is the 2nd World POM conference and is cosponsored by EurOMA and JSPM. The conference in Italy (2003) was a joint conference with EurOMA. POMS conferences are supported by contributions from various sponsors that include universities, book and software publishers, and private businesses and industries.

Books: POMS published its first book in Technology and Operations Management Series in 1998. The Book, ***Global Supply Chain and Technology Management***, was edited by Hau L. Lee (Stanford University) and Shu Ming Ng (Hong Kong University of Science and Technology). This book project was financially supported by the School of Business and Management, Hong Kong University of Science and Technology, the Research Grant Council of Hong Kong, and the Stanford Global Supply Chain Management Forum. The second book, ***Supply Chain Management: Innovations for Education***, edited by M. Eric Johnson and David F. Pyke (both from Dartmouth College) was published in June 2000. This book project was financially supported by Dartmouth College.

Membership: POMS has about 1000 members from 44 countries. Non-U.S.A. members account for about 30% of all members.

Web Page: POMS' web page was developed by a grant from CIBER at Indiana University, Indianapolis, Indiana, U.S.A. POMS' web page provides important links to information about research and teaching in POM, meetings and conferences, POM journals, POM job opportunities, and information about members. Web page address is www.poms.org.

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PRODUCTION AND OPERATONS MANAGEMENT SOCIETY

AN INTERNATIONAL SOCIETY TO EXTEND AND INTEGRATE KNOWLEDGE PERTAINING TO PRODUCTION AND OPERATIONS MANAGEMENT

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Production and Operations Management

The flagship research journal of Production and Operations Management Society

Production and Operations Management announces a new departmental structure. Papers should be submitted directly to **department editors**, listed below. Please visit the POMS Web site http://www.poms.org/POMSWebsite/Journal.html for more information.

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WELCOME TO CANCUN!

Cancun has much to offer and caters to a variety of visitors. It consists of two areas, the Hotel Zone and downtown.

Hotel Zone
The Hotel Zone, a 16 mile long island, is the area of Cancun where the majority of visitors spend their time. On the inland side of the Hotel Zone is ***Laguna Nichupte***, a vast lagoon that serves as home to numerous marinas, water front restaurants, shopping malls, golf courses, and water activities and tours. The area near the center of the island is known as the "Party Zone" and houses many of the area's nightclubs, discos, and better restaurants.

Downtown
Cancun Centro is a pleasant city with some great restaurants, modern shopping facilities, and a diversion from the glitz and hype in the Hotel Zone. Also, prices for almost everything are more reasonable in the city.

DINING

From continental dining, to fresh seafood & shellfish, to traditional Mayan cuisine, Cancun offers an assortment of dining options with over 200 restaurants to choose from. Settings range from casual bistros and fast-food to elegant upscale surroundings. Competition has brought down dining prices in Cancun, and dining in town tends to be less expensive than dining in the hotel zone. Many hotels have excellent restaurants, offering cuisines of enormous variety. Try some of the local Mayan dishes, such as Huevos Moltuleños, Cochinita or Pollo Pibil, and Sopa de Lima. The local beer is Montejo, a hearty brew made in Merida.

Restuarants within 1.5 miles of Hilton Hotel			
Restaurant	**Location**	**Distance**	**Specialty**
Café Salsa	Kukulcan Blvd.	14.5 km	International
Captain Cove's	Kukulcan Blvd.	16.5 km	Seafood
Careyes	Kukulcan Blvd.	16 km	International
Champions	Hotel Marriot	14.5 km	American
Cilantro	Hotel Hyatt	14 km	International
Club Grill	Ritz Carlton	14.5 km	American
Cote Sud	Le meridien Blvd.	14 km	International
Crab House	Kukulcan Blvd.	14.8 km	Seafood
Il Fantino	Ritz Carlton	15 km	Italian
La Capilla	Kukulcan Blvd.	14.5 km	International
La Casada	Hotel Melia	16.5 km	Mexican
La Dolce Vita	Kukulcan Blvd.	14.5 km	Italian
La Valentina	Kukulcan Blvd.	15.6 km	Mexican
Laguana Grill	Kukulcan Blvd.	15.6 km	Seafood
Lorito Joe's	Kukulcan Blvd.	14.6 km	Seafood
Mikado	Hotel Marriot	14.5 km	Japanese
Proscuitto's	Hotel Melia	16.5 km	Italian
Rosato	Kukulcan Blvd.	16.5 km	Italian
Sirenita	Kukulcan Blvd.	17.5 km	Seafood

Hilton Restaurants	**Specialty**	**Other Notes**
Hoyo 19	Snacks & lighter foods	Serves breakfast & lunch
Italien Restaurant Pizza & Pas	Italian	
Kiosko	Sandwiches & snacks	Serves lunch & dinner
Mitachi	Japanese	
Spice	Mexican	Buffet style

FACILITIES AVAILABLE THROUGH HILTON HOTEL

On Site

- Fitness Room
- Golf course
- Driving Range
- Putting Green
- Pool
- Tennis Court
- On Site Beach
- Jogging Track
- Playground
- Sight Seeing Tours
- Walking Track

Nearby

- Bowling 4 km
- Horseback Riding 1 km
- Jet Skiing 4 km
- Fishing 4 km
- Scuba Diving 4 km
- Snorkeling 4 km
- Water Skiing 4 km

NEARBY ACTIVITIES IN CANCUN

Boating Excursions

A whole variety of boat cruises to the Nichupte lagoon, Isla Mujeres, Contoy Island, and other destinations are available every day. Modern motor yachts, catamarans, trimarans, and sloops take swimmers, sunbathers, snorkelers, and shoppers out. Some tours include a snorkeling stop at ecological parks, snorkeling equipment, continental breakfast, lunch, and a shopping tour. Most tours leave at 9:30 or 10 AM and last approximately 5 to 6 hours. Sunset and night cruises go to the beaches of Isla Mujeres and usually include a lobster dinner or Mexican buffet and open bar.

Bullfight Show

Cancun has its own small bull-ring near the northern end of Blvd. Kukulcan in the downtown area. Bullfights are specially performed for tourists and are combined with folkloric dances and a Mexican horse-riding charro-style performance. The show is held every Wednesday at 3:30pm.

Golf Courses

There are a number of golf courses in the area. They offer great views of the water, beaches, and other beauties in the area.

Folkloric Ballet

Nightly performances of the Ballet Folklorico de Cancun are held at the Cancun Convention Center. To enjoy the traditional Mexican dances, you can go for dinner or just the show.

Mayan Ruins

In the jungle near the lagoon is a pyramid called ***El Rey*** (km 17), which was probably once a royal burial ground. At ***Yamil Lu'um*** (km 12), the highest point of the island, are two ruins thought to have originally been lighthouses.

Shopping

Cancun's shopping facilities range from ultra modern malls with chic boutiques and shops to street vendors and open-air markets. The traditional ***Kui Huic*** and ***Mercado 28*** markets are located downtown. The largest shopping areas are *Flamingo Plaza (km 11.5), Kukulcan Plaza (km 13), and Plaza Caracol.*
Some other shopping areas include ***La Isla Shopping Village***, ***Forum Plaza***, and ***Coral Negro Artisan Market*** in the Hotel Zone.

For more information on anything in this packet, please see the hotel concierge.

TRANSPORTATION

Major Roadways
The major avenue through the Hotel Zone is ***Kukulcan Blvd.*** It stretches approximately 14 miles and is the only major roadway on the island. In downtown Cancun, the main street is ***Avenida Tulum***, easily recognizable for the huge seashell sculpture in the roundabout. Many restaurants and shops are located along this street. A parallel street is ***Avenida Yaxchilán***, which is known for its cheaper prices. ***Avenida Yaxchilán*** and ***Sunyaxchén*** form the major hub of downtown.

Buses
Public buses in Cancun run between the Hotel Zone and downtown from 6 AM until midnight and cost approximately 5 pesos. Bus stops are dotted throughout the Hotel Zone along Kukulcan Blvd. and Downtown. From Downtown to the Hotel Zone, look for buses marked 'HOTELES'. They go right to the far end of the Hotel Zone and make frequent stops in between. From the Hotel Zone to Downtown, look for buses marked 'EL CENTRO'. Buses will be crowded during rush hour from 7 to 9 AM, 1 to 3 PM, and 7 to 9 PM.

Rental Cars
Rental agencies are situated throughout Cancun: the airport, downtown, and the Hotel Zone. An economy car with air-conditioning, manual transmission, and unlimited mileage begins at $50 a day, not including a 10% tax.

Taxis
Taxis are everywhere. If you flag one down, you will find it is much cheaper than hiring one parked in a taxi rank. Taxis do not have meters; so, do negotiate the fare before getting in to avoid a possible dispute. Hotels post a list of fares to certain destinations.

Walking
You can always explore Cancun on foot, especially in the Hotel Zone. A red paved path [the ciclopista] winds its way alongside part of Kukulcan Blvd.

OTHER USEFUL INFORMATION

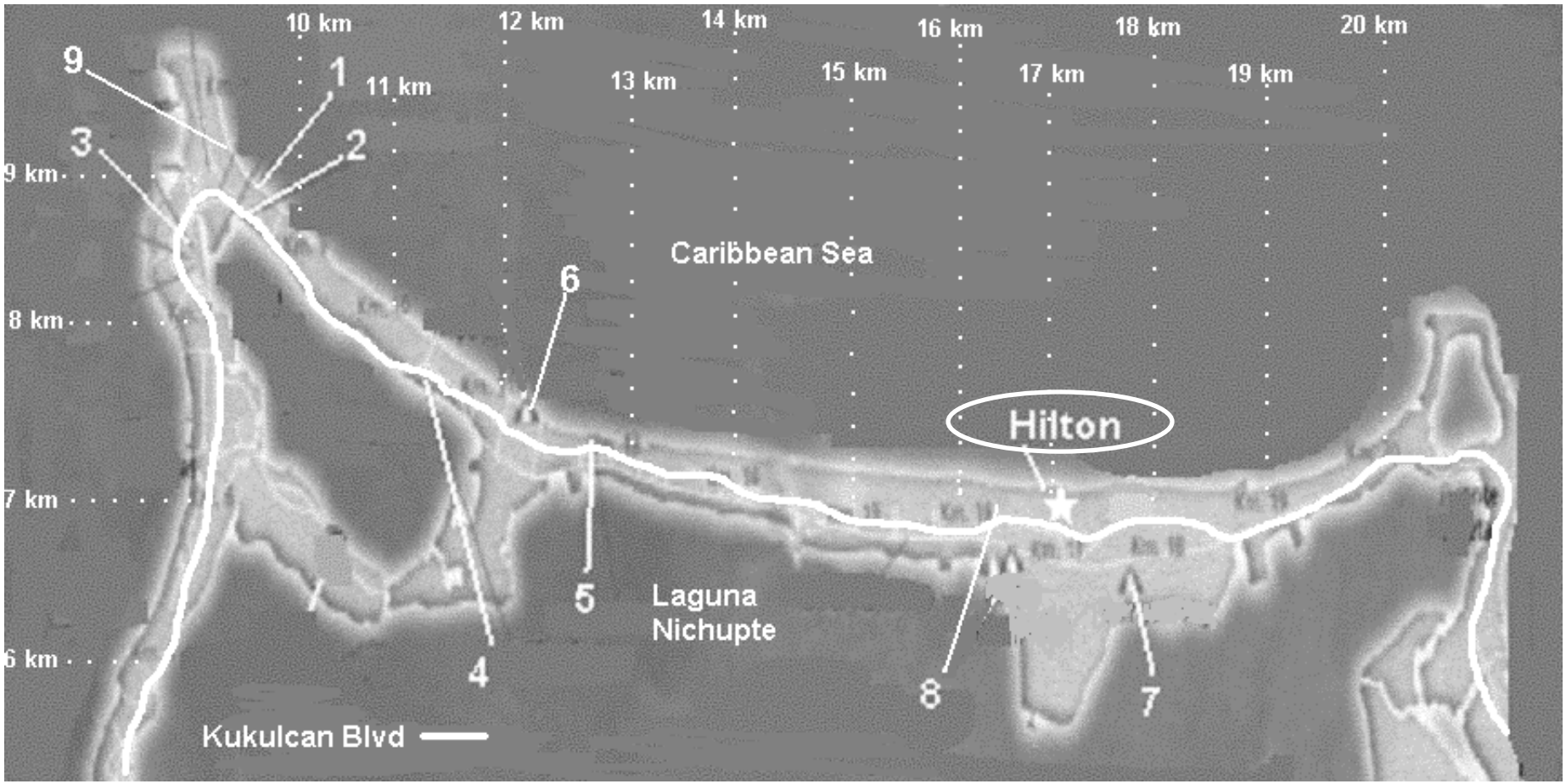
Business Hours
Most stores are open from 10 AM to 10 PM daily in the Hotel Zone. Stores downtown may close between 2 PM and 4 PM for the traditional "siesta" and re-open until 9 PM. Most stores in the downtown area, except for the shopping malls, are closed on Sundays.

Currency
The official currency of Mexico is the peso, but many places along the Riviera Maya accept dollars. US Dollars are easily exchanged into pesos in banks, major hotels, airports, and exchange houses. Mexican banks are generally open from 9 AM to 2:30 PM weekdays only. Exchange houses are open longer and offer quicker service. Most credit cards are accepted in shops, hotels, and travel agencies. It is wise to travel with some cash or travelers checks because credit cards are often not accepted in smaller establishments.

Electricity
The standard current in the hotels in Mexico is 110 volts AC. European travelers should bring a converter or check their electric devices in advance.

Tips and Taxes
In cases where the gratuity is not included or provided for, 15% is the accepted amount. Most items sold in Mexico have a "value added tax" or sales tax of 10% that is additional to the posted price. In Spanish, it is called IVA. You will see it itemized separately on your receipt.

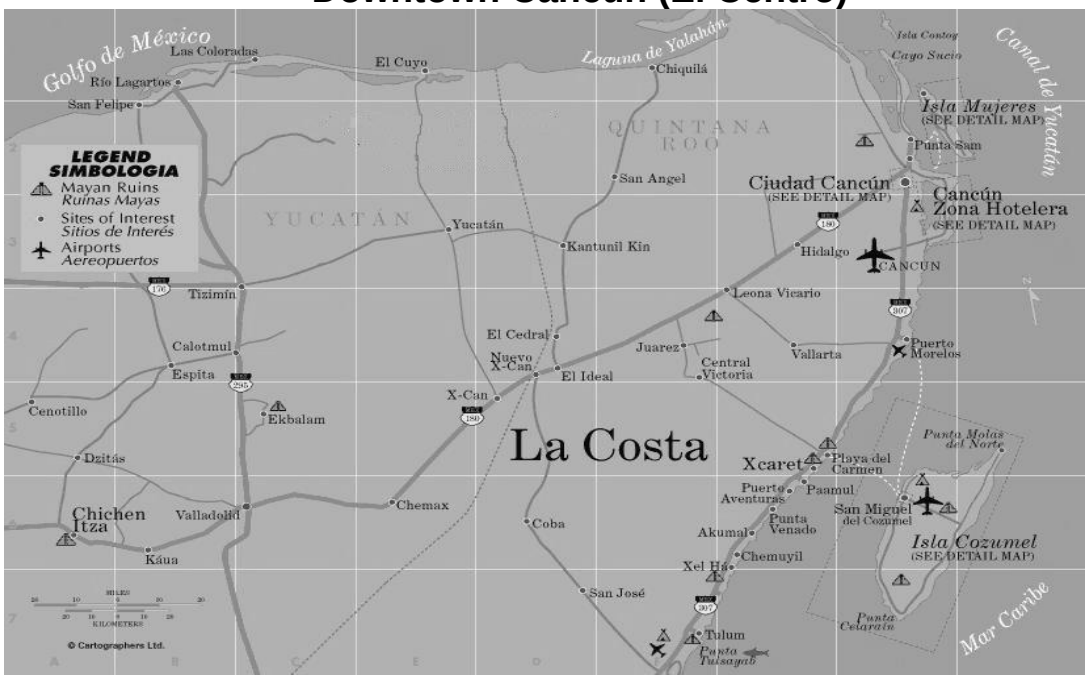
Hotel Zone Map



Key

1. Forum Plaza	4. Plaza Flamingo	7. Ruinas del Rey
2. Coral Negro	5. Plaza Kukulcan	8. Ruinas San Miguelito
3. Plaza Caracol	6. Yamil Lu'um	9. Cancun Convention & Visitors Center

Downtown Cancun (El Centro)



Cancun Surrounding Area

POM 2nd World Conference
Overall Timetable

Time	Event	Location
Thursday, April 29, 2004		
16:00-18:00	Registration	Convention Desk
Friday, April 30, 2004		
08:00-17:00	Registration	Convention Desk
08:00-17:00	Board Meeting	Caribe
10:30-12:00	Parallel Sessions	Caesar 1-8
13:30-15:00	Parallel Sessions	Caesar 1-8
15:00-15:30	Coffee break	Caesar Foyer
15:30-17:00	Parallel Sessions	Caesar 1-8
Saturday, May 1, 2004		
08:00-17:00	Registration	Convention Desk
08:15-08:45	Opening Ceremony	Miramar
08:45-10:00	Plenary Session I	Miramar
09:00-17:00	Exhibits	Caesar Foyer
10:00-10:30	Coffee break	Caesar Foyer
10:30-12:00	Parallel Sessions	Caesar 1-8, Caribe, Coral, Mediterráneo 1, 2
13:30-15:00	Parallel Sessions	Caesar 1-8, Caribe, Coral, Mediterráneo 1, 2, Miramar 1, 2, 3, 4
15:00-15:30	Coffee break	Caesar Foyer
15:30-17:00	Parallel Sessions	Caesar 1-8, Caribe, Coral, Mediterráneo 1, 2, Miramar 1, 2, 3, 4
17:00-17:30	Service College Business Meeting	Caesar 8
17:30-18:00	Supply Chain College Business Meeting	Caesar 6
18:00-19:30	President's Reception	Miramar Garden
Sunday, May 2, 2004		
08:00-17:00	Registration	Convention Desk
08:45-10:00	Plenary Session II	Miramar
09:00-17:00	Exhibits	Caesar Foyer
10:00-10:30	Coffee break	Caesar Foyer
10:30-12:00	Parallel Sessions	Caesar 1-8, Caribe, Coral, Mediterráneo 1, 2
13:30-15:00	Parallel Sessions	Caesar 1-8, Caribe, Coral, Mediterráneo 1, 2, Miramar 1, 2, 3, 4
15:00-15:30	Coffee break	Caesar Foyer
15:30-17:00	Parallel Sessions	Caesar 1-8, Caribe, Coral, Mediterráneo 1, 2, Miramar 1, 2, 3, 4
17:15-18:00	POMS General Business Meeting	Caesar 8
18:00-19:00	*Production and Operations Management* Department Editors' Reception (sponsored by Hilton)	Pool Deck
Monday, May 3, 2004		
07:00-08:30	Parallel Sessions	Caesar 1-8, Caribe, Coral
08:00-09:00	Registration	Convention Desk
08:00-12:00	Emerging Scholars Program	Mediterráneo (1&2)
08:30-08:45	Coffee break	Caesar Foyer
08:45-10:15	Parallel Sessions	Caesar 1-8, Caribe, Coral
10:15-10:30	Coffee break	Caesar Foyer
10:30-12:00	Parallel Sessions	Caesar 1-8, Caribe, Coral
12:15-14:00	Closing Ceremony, Awards Luncheon	Miramar

Code:	Plenary Event	SCM College Event	Service College Event	Break

Guide to the Conference Program

The program's contributed and invited abstracts have been categorized into 5 thematic clusters as shown in the table below. Color-coding of the session labels in the Parallel Session Guide enables quick reference to the sessions of a given cluster.

Contributed Presentation Track Clusters

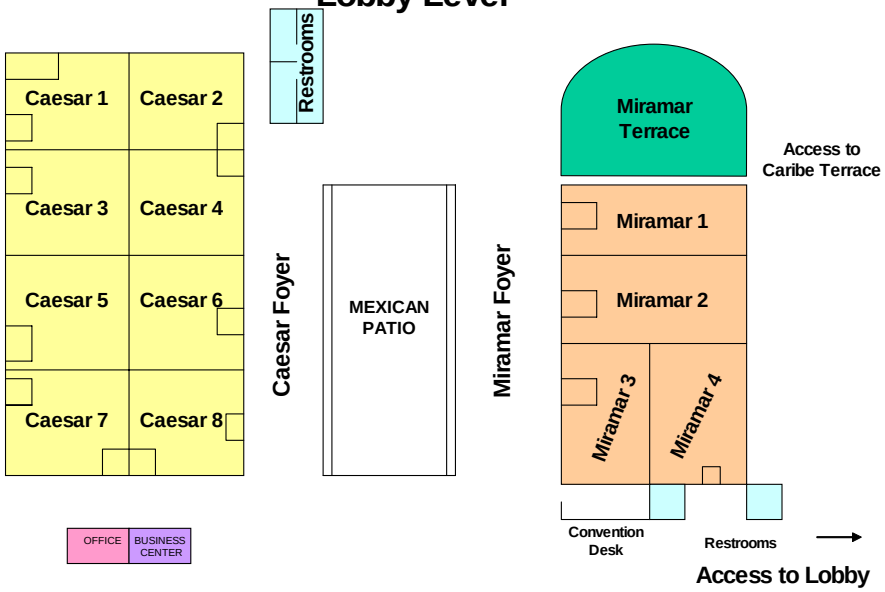
Cluster	Track Description	Number of Contributed Abstracts
Operations and Logistics	Ops. Planning, Scheduling, and Control	46
	Logistics and Distribution	26
	Purchasing and Materials Management	16
	JIT Manufacturing/Lean Manufacturing	11
	Internet-Enabled Operations	13
	Enterprise Resource Planning	6
Service and Quality	Service Operations Management	40
	Quality Management and Six Sigma	17
	Continuous Improvement	9
Environment and International	Global Supply Chain Management	44
	Environmental Management	9
	OM in Emerging Economies	4
	Global Operations	7
Strategy and Design	Operations Strategy	45
	Product and Process Design	28
	Performance Measurement	17
	Mass Customization	8
	Operations Flexibility	7
POM Pedagogy	Innovation in Teaching	24
	Cases in Operations Management	17
	Mathematical/Software Tools	5
	TOTAL:	399

In addition to contributed paper sessions, the program features specially organized sessions – either POMS-invited or sponsored by one of the two newly organized POMS colleges. These special sessions are designated by color coded shading in the Parallel Session Guide.

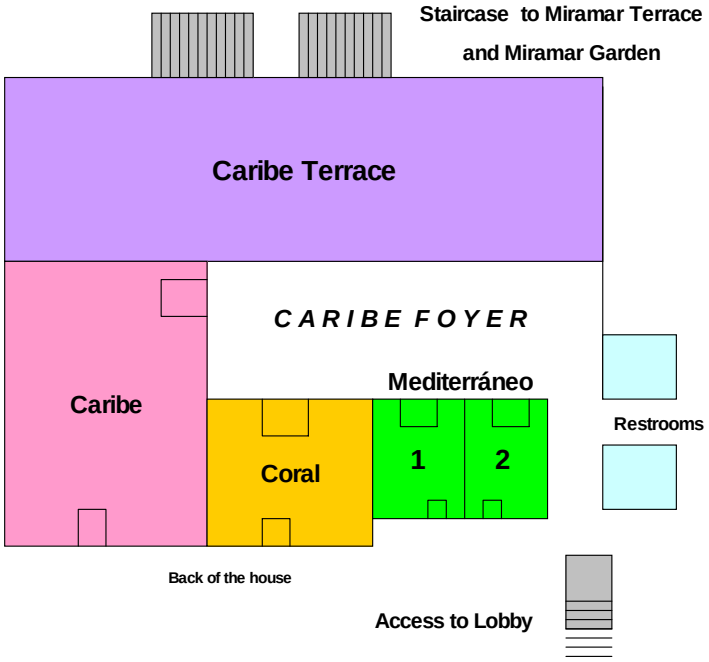
Hilton Cancun Floor Plan

Floor Plan

Lobby Level



Mezzanine Level



Special Sessions Summary

Plenary (See Plenary Events section for more details)

Sat 8:15	Opening Ceremony
Sat 8:45	Plenary I: Mr. Bart Groot, Dow Chemical, Inc.
Sun 8:45	Plenary II: Mr. Nampachi Hayashi, Toyota Motor Corp.
Mon 12:15	Closing Ceremony, Awards Luncheon

Tutorials (See Tutorial section for details)

Fri 10:30	Session 1: Commercializing Research (Sampson and Thompson)
Fri 13:30	Session 6: Electronic Invoice Implementation (Smunt)
Fri 15:30	Session 15: Constraint Programming in Operations (Dong & Focacci)
Mon 8:45	Session 119: Spreadsheet Analytics in Operations (Camm)
Mon 10:30	Session 128: Planning and Scheduling in Service Industries (Pinedo)

Fora (See Fora section for details)

Sat 10:30	Session 17&29: Operational Advantage Group (Starr and Goldhar)
Sat 15:30	Session 45: THENEXOM (Machuca)

Panels and Workshops (See Detailed Parallel Session Program)

Fri 10:30	Session 4: Japanese KEIRETSU Now (Uehara)
Fri 10:30	Session 5&10: ILOG Optimization Technologies (Dong)
Fri 15:30	Session 13: Teaching SAP to OM Students (Menon)
Sun 10:30	Session 67: Creating SCM Majors (Davis)
Sun 13:30	Session 79: Teaching the Supply Chain Concentration (Johnson)
Sun 15:30	Session 93: Meet the Dept. Editors of *POM* (Singhal)
Mon 8:45	Session 121: Setting an SCM Research Agenda (Raman)

Business Meetings

Sat 17:00	POMS Service College Business Meeting
Sat 17:30	POMS SCM College Business Meeting
Sun 17:15	POMS General Business Meeting

Other

Mon 8:00	POMS Emerging Scholars Program (Kanet and Parker) See description.

Sessions in Spanish Language The program features 36 papers presented in Spanish. These special sessions are color coded in the Guide to the Parallel Sessions.

Invited/Sponsored Sessions The program features 30 special paper sessions either invited or sponsored by one of the two POMS colleges.

PLENARY SESSION

Sustainable Transformation Management:

Dow Chemical's Acquisition of an East German Chemical Operation

Saturday, 8:45 -- Miramar

Bart J. Groot
The Dow Chemical Company

In 1995 The Dow Chemical Company acquired three former East German chemical sites. In partnership with the German government, Dow had five years to bring them to world-class and globally competitive standards. The unprecedented restructuring required simultaneous:

- demolishing of obsolete facilities,
- upgrading of existing plants,
- building of new world-class facilities with state-of-the-art technologies,
- remediation of significant environmental pollution, and
- restructuring of a workforce once guaranteed lifetime job security.

This vast project required extraordinary logistic and technical coordination. The greatest change, however, occurred in the employees whose own lives were being transformed through the process.Cultural transformation focused on the reality that survival required full integration into Dow, keen focus on the market, and a meaningful contribution to regional development. Clear progress measures and emphasis on culture were priorities. The change philosophy committed to respect for cultural differences as long as there is buy-in to the overall objectives.

About the Speaker

Bart J. Groot is Vice President for Dow Central and Eastern Europe and General Manager of the Dow Olefinverbund GmbH (formerly called Buna Sow Leuna Olefinverbund GmbH (BSL)). Groot's career with The Dow Chemical Company began in Terneuzen/The Netherlands in 1970 when he joined as Production Engineer in the Ethylene Oxide plant. After various positions in this plant he became Production Manager for Organic Chemicals in 1981 and was appointed Planning Manager for Terneuzen in 1983. In 1985 he moved to Stade/Germany and became Production Manager for Electro Chemicals. In 1987 he was named Manager Materials Management in Germany and was named Site Manager Aratu/Brazil in 1988. In 1991 he became Vice President Operations for Dow Brazil and moved back to Europe in 1992 to become Site Manager of the Rhine Center / France and Germany. After conducting the Due Diligence for the BSL companies and the successful negotiation of the BSL privatization with the Treuhandanstalt / BvS, he was named General Manager BSL in June 1995 and since January 2001 he additionally assumes responsibility as Vice President for Dow Central and Eastern Europe. Groot holds a bachelor's degree in chemical engineering from the Technische Hoge School Amsterdam, The Netherlands.

PLENARY SESSION
Essence and Evolution of the Toyota Production System:
The Demands of Today

Sunday, 8:45 -- Miramar

Nampachi Hayashi
Toyota Motor Corporation

Can we really enhance cost competitiveness by moving parts production base to cheaper labor cost countries?

Can we really contribute to the economic development of the country that has the production base? And moreover, what can remain with us if we move production base to cheaper labor cost countries from one to another?

When we think about lead-time advantage, shouldn't manufacturing be located in the consumption area? We believe that this idea contributes to the real development of the economy of each country. Even though labor cost is expensive, we believe that we can find out ways of survival.

We would like to introduce the essence of the Toyota Production System as our direction.

About the Speaker

Mr. Nampachi Hayashi was born in Tokyo in 1943. Immediately after graduating from Musashi Institute of Technology in 1966, he joined Toyota Motor Corporation. He was assigned to the Engineering Service Department of the Machining Division of the Motomachi Plant. In 1970 when Toyota's famed Mr. Suzumura of Operation Management Consulting Department met with Mr. Hayashi, he assigned Mr. Hayashi for a mission of promoting Kaizen activities and its training in-house, and on affiliates' production jobsites, while Mr. Hayashi remained in the Department of the Machining Division of the Motomachi Plant. Mr. Hayashi is part of the last generation of students of the legendary Mr. Ohno and Mr. Suzumura. In 1981 he was promoted to Production Manager, in 1987 Deputy General Manager, and in 1988 Project General Manager of Production Control Division, Operation Management Consulting Department. There he worked on promotion and development of TPS (Toyota Production System) inside Toyota and overseas. In 1991 he was assigned to Project General Manager at the Takaoka Plant to work on productivity improvement of assembly and logistics issues. In 1993 he was re-assigned to the Operations Management Consulting Division. He was appointed Senior General Manager of the division in 1998. In July 2001 he was promoted to his present position, Executive Advisory Engineer.

Tutorial: Commercializing Research
Friday 10:30 -- Caesar 2

Scott Sampson, Brigham Young University
Gary Thompson, Cornell University

One way to turn research into commercial opportunities is by patenting research findings. There are various approaches to obtaining patents, and not all research is patentable. Scott Sampson will discuss issues and options for obtaining patents, and will describe his experience applying for patents. A second means of turning research into commercial opportunities is by creating a company that turns the ideas into products or services, which the company then sells. Gary Thompson will describe his experiences with the company he created to sell his scheduling software and services.

Gary M. Thompson is a tenured Professor of Operations Management in the School of Hotel Administration at Cornell University, where he teaches graduate and undergraduate courses in Service Operations Management. He also serves as Executive Director of the school's Center for Hospitality Research (TheCenterForHospitalityResearch.org). He has consulted for several prominent hospitality companies and is the founder and president of SchedulExpert, Inc., a small software development firm whose course scheduling software is used in over 30 universities worldwide.

Scott Sampson is an Associate Professor of Operations Management and Rollins Fellow of e-Business at Brigham Young University. He has published his services research in Production and Operations Management, Management Science, Decision Sciences, Journal of Operations Management, and other journals. In addition, he has filed multiple patents. After paying a sizable amount of "tuition" to a patent attorney, Scott has attained the distinction of "Writing as Well as a Third- or Fourth-year Patent Attorney."

Tutorial: Constraint Programming in Operations and Logistics Management
Friday 15:30 -- Caesar 8

Filippo Focacci, Thomas Dong , ILOG S.A., Gentilly, France.
e-mail: ffocacci@ilog.fr, tdong@ilog.com url: http://www.ilog.com

The goal of this tutorial is to demonstrate the basic concepts of Constraint Programming and the strengths of this solution approach for the resolution of complex manufacturing scheduling problems. We will introduce the principles of constraint propagation and tree search, and show how those principles can be applied to scheduling problems, providing a natural framework to integrate advanced Operations Research algorithms.

Finally, we discuss a manufacturing scheduling problem inspired by industry problems the authors have encountered over the years. A manufacturing scheduling solver is presented that finds low-cost, feasible solutions to the defined problem. Based on ILOG optimization components, the solving mechanism embeds constraint programming and local search methods. The solver is demonstrated via a graphical and rules-based interface, which is used to implement solutions generated by the solver, and to maintain and configure the scheduling system even as business logic changes over time.

Filippo Focacci is a Senior Scientist at ILOG and leads the development of ILOG's solution in manufacturing scheduling. He received a PhD from the University of Ferrara and has co-authored several papers that have been published in Operations Research journals, books and conference proceedings.

Thomas Dong is a Senior Product Manager and has responsibilities for ILOG's scheduling algorithms and vertical solutions. He received an M.S.E (Operations Research) from Princeton University, and has applied O.R. techniques in practice for several firms in transportation, financial services and manufacturing.

Tutorial: Phasing out the Invoice Paper Chase: B2B Electronic Invoicing Implementation Friday, 13:30 -- Caesar 2

Tim Smunt
Wake Forest University
Babcock Graduate School of Management

American companies now generate 15 billion B2B invoices each year with a total transaction volume over $9 trillion. Since most invoices still arrive in paper form to A/P departments, the cost to process them results in a significant expense line on the P&L. Indeed, a number of major corporations have already implemented electronic invoicing and payment systems (sometime called Electronic Invoice Presentment and Payment - *EIPP* – systems, or simply e-invoicing) in the hopes of reducing the costs of processing invoices from their suppliers. However, only about 20% of all B2B invoices are now sent electronically, although recent surveys suggest a fast ramp-up will occur and that more than 60% of B2B invoices will be sent electronically by the end of 2005. Estimates of future U.S. productivity increases during the next few years typically top $30 billion.

This workshop will provide an overview of the current revolution of B2B e-invoicing and will illustrate how a major U.S. insurance company was able to double their A/P productivity and receive large strategic benefits from the new information gathered using EIPP. The workshop will also present opportunities for new research in this service operations context. You will learn the following in this workshop:

- A list of the major corporations who have already implemented e-invoicing.
- A list of the major Application System Providers (ASPs) who are providing a third-party presence to more easily connect suppliers with buyers.
- The typical direct cost savings that are made possible from e-invoicing.
- The strategic benefits to the payers (buyers).
- The need for process alignment efforts before implementation.
- Alternatives to 100% implementation of e-invoicing.
- The types of companies most suited to early adoption.
- An agenda for service operations management research in B2B invoicing.

Tim Smunt is Professor of Management at Wake Forest University's Babcock Graduate School of Management, where he has been a faculty member since 1995. He has taught in a number of MBA programs in both the US and in Europe, including Executive MBA programs at Washington University, Purdue University, University of Illinois, Wake Forest University and Warsaw University. His prior industrial work experience was with McDonnell Douglas Corp. (now Boeing). He completed his doctoral studies in Operations Management at Indiana University (1981) and received his MBA from the University of Missouri-St. Louis (1978) and his BS in Industrial Management from Purdue University (1976).

He has published numerous articles in a variety of journals. Tim is currently the Director of Development and Corporate Relations and Vice President for the Decision Sciences Institute. He has also served Wake Forest University as the President of the University Senate and as a faculty representative to the board of trustees.

Tutorial: Planning and Scheduling in the Service Industries
Monday, 10:30 -- Caesar 5

Michael Pinedo
Stern School of Business
New York University

This tutorial focuses on planning and scheduling in the service industries. The planning and scheduling models in services as well as the solution methodologies used tend to be different from those used in manufacturing environments. This talk goes into four classes of models. The first class considered includes interval scheduling models and reservation systems. The second class involves timetabling and tournament scheduling. The third class consists of transportation models (tanker scheduling, aircraft routing and scheduling and train timetabling). The fourth and last class are the workforce scheduling models. We conclude with a summary of the similarities and the differences between the model formulations and solution techniques used in the various different areas.

Michael Pinedois the Julius Schlesinger Professor of Operations Management and Deputy Chair of the department of Information, Operations and Management Sciences at the Stern School of Business at New York University.

His research focuses on the modeling of production and service systems, and, more specifically, on the planning and scheduling of these systems. He has written or jointly written numerous technical papers on these topics. He is author or coauthor of five full-lenghth texts.

Tutorial: Spreadsheet Analytics in Operations Teaching and Research
Monday, 8:45 -- Caesar 6

Jeffrey D. Camm
College of Business Research Fellow
Department of Quantitative Analysis and Operations Management
University of Cincinnati

In this tutorial we will focus on the use of spreadsheets (Microsoft Excel) in teaching and research in operations. We will provide a variety of operations examples to illustrate the power of spreadsheet analytics, namely the ability to easily integrate data visualization, statistical analysis, optimization and simulation.

Jeffrey D. Camm is Professor of Quantitative Analysis, College of Business Research Fellow and Head of the Department of Quantitative Analysis and Operations Management at the University of Cincinnati. He is the supply chain and operations management functional editor for *Interfaces*, and an associate editor for *INFORMS Transactions on Education*. Dr. Camm's joint work with Procter & Gamble in supply chain optimization was a finalist in the 1996 Edelman Award Competition. In 1999, he was named UC’s Ronald J. Dornoff Fellow of Teaching Excellence.

Forum: OPERATIONAL ADVANTAGE GROUP (OAG)
Saturday, 10:30 -- Caesar 2
Saturday, 13:30 -- Caesar 2

This is the first meeting of the OAG roundtable. OAG is POMS' industry support group. Invitations have been sent to executives from all over the world to convene for discussion about how to integrate the activities of industrial executives with the academic interests of POMS members. We invite participation by those who are interested in developing a long-term agenda of cooperation between educators and industry executives from manufacturing and services, including information systems. Professor Martin Starr will begin the discussion about planning for the OAG and Professor Wick Skinner (another architect of the OAG plan) will help to moderate the discussion. Professor Sushil Gupta will introduce the proposal for an annual OAG-POMS award to an industry executive for outstanding contributions to the P/OM field. Planning materials will be distributed. This session will conclude at noon. The table below presents the three year plan for establishing OAG. We have invited the Plenary speakers (Saturday) Mr. Bart Groot (DOW, Germany) and (Sunday) Mr. Nampachi Hayashi (Toyota Motor Corp.) to be present at both the morning and afternoon meetings. We expect that many attendees will want to continue the discussion about the OAG initiative through lunch.

The group will reconvene at 1:30pm. The afternoon session of the OAG will be a Workshop conducted by Professor Joel Goldhar regarding his research and the Workshop's ideas about the role of COOs. Joel has named his Workshop "COOs--The Missing Link in Business." The abstract for this Workshop follows:

> A Workshop of current/retired Chief Operating Officers (and interested Academics) will discuss their roles in relation to the roles of the CEOs in their firms. Observations and anecdotes of firms experiencing (catastrophic or evolutionary) failure will be tied in to the existence of weak (or non-existent) COO functions. Contributions from the audience (their experiences) will be welcomed. Issues to begin include:
>
> 1. Is a strong COO necessarily an effective COO?
> 2. What are the defining interactions between COO and CEO and the Board of Directors for success?
> 3. What organizational structures support successful COOs?
> 4. What research needs to be done to define the role of effective COOs?

After an hour Professor Wick Skinner will act as rapporteur to encourage attendees to formulate their opinions about this fascinating topic.

OPEN FORUM / FORO ABIERTO

- In English and Spanish / En inglés y español -

Saturday, 15:30 -- Caesar 2

Thematic Network for the Excellence in Operations and Supply Chain Management (THENEXOM): Enlarging the European Network to Americas and Asia

Red Temática para la Excelencia en la Dirección de Operaciones y de las Cadenas de Suministro (THENEXOM): Ampliando la Red Europea a América y Asia

José A.D. Machuca* (jmachuca@cica.es)
Rafaela Alfalla (alfalla@us.es)
Macarena Sacristán Díaz (macarena-sd@us.es)

SUMMARY

The EurOMA-sponsored THENEXOM network has recently been approved by the European Commission through its Socrates community action programme. THENEXOM's short-term goal is to analyse the present state of Operations and Supply Chain Management in European universities and to identify strengths and weaknesses in order to instigate the use of better practices. A census will be drawn up of OM teachers throughout the 24 european countries making up the network. A survey can then be taken of the teaching-staff, -content and -methods employed. The network's medium-term aim is to tighten links between teaching, research and business practice by reducing imbalances. In compliance with EU recommendations, strategic connections are being sought with Americas and Asia to expand aforesaid objectives and actions throughout the world. All this will be commented upon and discussed during the oral presentation. Taking into account the great interest of the proposed network, for the development of POM and Supply Chain Management, we highly encourage your participation in this Special Event. For future contacts with THENEXOM, write to thenexom@us.es.

RESUMEN

Recientemente ha sido aprobada por la Comisión Europea (programa de acción comunitaria Sócrates) la red THENEXOM, promovida por EurOMA. Su objetivo a corto plazo es estudiar la situación de esta disciplina en las universidades europeas, buscando identificar fortalezas y deficiencias y promover el empleo de las mejores prácticas. Para ello se elaborará un censo de docentes de DO en los 24 países europeos representados en la red (por 27 instituciones universitarias); éste permitirá el desarrollo de un survey sobre profesorado, contenidos y metodología docentes. A medio plazo, la red ha de servir para estrechar vínculos entre enseñanza, investigación y práctica empresarial, limando los posibles desfases. Siguiendo las recomendaciones de la UE, se persigue conexiones estratégicas con America y Asia para extender mundialmente los objetivos y actuaciones mencionados. Todo ello será comentado y debatido durante la presentación oral de la misma. Dado el enorme interés de este tipo de red para el desarrollo de la Dirección de Operaciones y de la Gestión de las Cadenas de Suministro, se recomienda la asistencia a este "Special Event". Para contactos posteriores con THENEXOM, puede escribir a: thenexom@us.es.

POMS Emerging Scholars Program
MON 8:00 -12:00 -- Mediterráneo 1&2

The Program:

The Production and Operations Management Society is committed to fostering the development of young professionals pursuing academic careers in the field of OM, and has thus commissioned this special session of the conference. The program's goal is to provide junior OM professionals with career-building advice in developing excellence in their personal programs of teaching, research, and service in Operations Management. Participation in the program is by invitation only. In order to foster discussion and interaction the program is limited to 15 participants.

The program will consist of a set of guided discussions on topics relevant to academic career building in the field of Operations Management. The discussions will cover a broad range of topics such as (but not limited to): excelling in the classroom, new methodologies for research and teaching, book writing, charting and managing a winning research stream, choosing publication outlets, dealing with lazy editors, dealing with impertinent reviewers, doing research in non-PhD granting universities, funded research, professional service – getting involved with what and when, service opportunities in the POMS, consulting, juggling your activities – doing it all, setting priorities, etc.

Facilitators:

Jack Kanet, University of Dayton
Geoff Parker, Tulane University

Discussion Leaders:

Bernhard Fleischmann University of Augsburg
Jim Gilbert, Rollins College
Sushil Gupta, Florida International University
Bob Hayes, Harvard University emeritus
Mike Magazine, University of Cincinnati
Ram Narasimhan, Michigan State University
Wick Skinner, Harvard University emeritus
Marty Starr, Rollins College

Timetable:

08:00 - 08:50	registration, **buffet breakfast***, introductions, welcome (Skinner)
08:50 - 09:00	pause
09:00 - 10:15	discussion sets 1, 2 (Hayes/Gupta, Magazine/Starr)
10:15 - 10:45	intermission, informal meeting of POMS leadership
10:45 - 11:45	discussion sets 3, 4 (Fleischmann/Kanet, Gilbert/Narasimhan)
11:45 - 12:00	wrap-up

*Courtesy of University of Dayton, School of Business Administration

Awards Luncheon
Monday, 12:15 -- Miramar

2004 WICKHAM SKINNER AWARDS

The Wickham Skinner awards are intended to encourage POM scholarship and publication, to promote significant research in the field, to reward academics who have achieved unusually high accomplishment early in their careers, and to facilitate the sharing of innovative new ideas about teaching POM, and thereby to establish POMS as the leading professional society in the field of production and operations management.

A. BEST UNPUBLISHED PAPER PRESENTED AT THE CANCUN MEETING AWARD

The best unpublished paper presented at the Cancun Meeting will receive a prize of $1,000 and will undergo an expedited review by the POMS *Journal.* The runner-up will receive $500.

B. EARLY-CAREER RESEARCH ACCOMPLISHMENTS AWARD

Accomplishments can be measured in many ways, with publications and presentations given primary importance. The judges will evaluate the **impact** of the body of work in terms of its ability to broaden, extend, and alter the way that POM is conceptualized, practiced, and viewed.

The awards include:

1. Public Recognition of the award winner(s) at the POM-2004 Cancun Meeting
2. A plaque
3. A check for $1000
4. Complimentary POMS membership for the following two years

C. TEACHING INNOVATION ACHIEVEMENTS AWARD

This award is intended to foster the improvement of POM pedagogy through the sharing of innovative teaching methods.

The awards include:

1. Public Recognition of the award winner at the POM-2004 Cancun Meeting
2. A plaque
3. A check for $1,000
4. Complimentary POMS membership for the following two years

CIBER INTERNATIONAL CASE WRITING AWARD

Indiana University CIBER is pleased to announce the sixth CIBER International Case Writing Award in the amount of $2500.

Detailed Parallel Session Program

Session 1: FRI. 10:30 - Caesar 2

Commercializing Research

Service College Sponsored Tutorial

by

Scott Sampson, Brigham Young University
Gary Thompson, Cornell University

(See Tutorial section for details)

Session 2: FRI. 10:30 - Caesar 4
Strategy of Operations I / Estrategia de Operaciones I

Cluster: Strategy and Design

Chair: **Jaume Ribera**, University of Navarra

1. Study and Evaluation of the Manufacturing Strategies in the Sector of Plastics Injection in Medellín / Estudio y Evaluación de las Estrategias de Manufactura en el Sector de Inyección de Plástico en la Ciudad de Medellín

Juan Arrieta Posada, Universidad EAFIT
Luz Ardila Lopez, Universidad EAFIT
Johanna Angarita Gómez, Cauchos y suelas Rally

This article shows the evaluation of manufacturing strategies employ in Medellín's Plastic injection industry, in agreement with the infrastructure of their productive systems; establishing the relation between those and the existing theory about manufacturing strategy. / Este artículo presenta la evaluación de las estrategias de manufactura empleadas en las empresas de inyección de plástico en la ciudad de Medellín - Colombia, de acuerdo con la infraestructura de los sistemas productivos que ellas poseen y la relación que tienen estos sistemas, con la teoría existente sobre las estrategias y las prioridades competitivas asociadas a la manufactura.

2. Configurations in Manufacturing Strategy: An Application to Spanish Industries

Eloisa Diaz, Rey Juan Carlos University
María Luz Martin, Rey Juan Carlos University

Much of the research in manufacturing strategy has analysed the content and the process of this functional strategy, however the theorical and empirical evidence in generic configurations research hasn't been too developed. This deficiency is more accused in the Spanish case. The purpose of this paper is to identify a taxonomy of manufacturing strategies in a representative sample of Spanish manufacturers belonging to different sectors or industries. The taxonomy was developed with a cluster analysis, and is based on competitive priorities such as: cost, quality, flexibility, delivery, aftersale service and, environmental protection. The study findings indicate the existence of two generic manufacturing strategies: manufacturers in search of the excelence and, quality and delivery oriented manufacturers. Furthermore for each manufacturing strategy, the differencies between competitive strategy, structural and infraestructural production decisions and, performance measures, are explored and compared.

3. The Outsourcing of Core and Non-Core Service Operations and Its Impact on the Priorities of the Operations' Strategy

Tomás Espino-Rodríguez, Universidad de Las Palmas de Gran Canaria
Víctor Padrón-Robaina, Universidad de Las Palmas de Gran Canaria

The purpose of this work is to determine the factors influencing the outsourcing of hotel service operations. We take specificity and substitutability as our reference, as well as the performance of the operations, which enables us to determine the core or non-core character of the service operation. Secondly, and based on the classification of the operations depending on their importance to competitive advantage, we analyze the influence of outsourcing on the operational objectives. The results reflect that hotels have a greater propensity to outsource service operations that do not affect competitive advantage. These are the operations that are less specific, more substitutable and have lower performance. It can also be seen that the outsourcing of non-core services is determined by cost reductions, while in the case of core or complementary services, outsourcing has greater potential to influence the non cost-related objectives of the operations strategy.

4. Outsourcing of the Manufacturing and Distribution Process from the Internal and Relational Capability View

Tomás Espino-Rodríguez, Universidad de Las Palmas de Gran Canaria
Manuel Rodríguez-Díaz, Universidad de Las Palmas de Gran Canaria

The purpose of this study is to examine the factors influencing the decision to outsource the process of manufacture, delivery and receipt of orders. Most research into outsourcing decisions and their determinants has been performed from the view of the transactions costs theory, mainly by analyzing specificity as the most important

factor at the time of taking the outsourcing decision. In this respect, and in an attempt to fill this gap in the literature, this work analyzes the outsourcing process from the relational and resource-based view in a representative sample of firms operating in a local, national and international context in a region of Spain. The results reflect that the operation performance and the possibility of establishing relational capabilities are the factors that most influence the outsourcing of the process under study, rather than the fact that the operation may be valuable or generate core competences for the firm.

Session 3: FRI. 10:30 - Caesar 6
Environmentally Conscious Manufacturing

Cluster: Environment and International

Chair: **Surendra Gupta**, Northeastern University

1. Exploring Synergy Between Economic Development and the Environment Through Reverse Logistics

Samir Srivastava, Indian Institute of Management, Lucknow
Rajiv Srivastava, Indian Institute of Management, Lucknow

The traditional focus of manufacturing on use of virgin materials needs to be replaced by an approach that creates and exploits synergies between economic development and environment. This paper describes an integrated approach to reverse logistics that partially addresses this concern. Our approach captures real life scenarios and provides near optimal solutions related to different aspects of reverse logistics under various strategic, operational and customer service related constraints. The model incorporates costs and operations activities from inspection and collection of returns to recovery and resale of recovered modules for selected categories of products in Indian context.
The findings indicate that a reverse logistics network not only minimizes use of virgin materials but can be economically profitable too. The impact of quality, quantity and timing of returns on the overall decisions and profits is significant. Government policies and consumer behavior highly impact these and therefore need to be examined carefully.

2. The Use of Recycled Materials in Manufacturing: Implications for Supply Chain Management and Operations Strategy

Joy Field, Boston College
Robert Sroufe, Boston College

Based on the findings from an in-depth case study of a containerboard mini-mill and supplementary interviews with other mini-mill managers, we posit several hypotheses related to the use of recycled materials, supply chain structure, supplier relationships, and operations strategy. In summary, because the benefits of the changes in the supply chain and supplier relationships accrue primarily to non-integrated firms, we expect the use of recycled material inputs to be dominated by non-integrated firms. With decreasing capital costs over time, the ratio of non-integrated to integrated firms should increase. Further, we expect non-integrated firms to employ non-price-based means for securing their supply of recycled material inputs. Finally, we expect the use of recycled materials to indirectly lead to greater use of non-cost-based operations strategies and facilitate the emergence of new operations strategies in the industry. We generalize these hypotheses to other industries that use recycled materials.

3. Multi-Objective Optimization in Disassembly Sequencing Problems

Surendra Gupta, Northeastern University
Seamus McGovern, Northeastern University

Product disassembly takes place in remanufacturing, recycling, and disposal. The disassembly line is the best choice for automated disassembly, so it's essential that it be designed and balanced to work efficiently. The multi-criteria disassembly line balancing problem (DLBP) seeks to: provide a feasible disassembly sequence, minimize the number of workstations, minimize idle time, and balance the line (ensure similar idle times at each workstation) as well as addressing other, disassembly-specific concerns. However, finding the optimal balance is computationally intensive due to factorial growth, with exhaustive search quickly becoming prohibitively large. In this paper, a metaheuristic is presented for obtaining near-optimal solutions to the DLBP. An example is considered to illustrate implementation of the methodology. Conclusions drawn include the consistent generation of near-optimal solutions, the ability to preserve precedence, the superior speed of the metaheuristic, and its practicality due to its ease of implementation.

4. Crucial Issues in Closed-Loop Supply Chain Design

Surendra Gupta, Northeastern University
Kishore Pochampally, Northeastern University

Although many quantitative models have been reported in the literature for designing a supply chain, none of them address issues that are crucial for closed-loop supply chain. We examine a variety of such issues including – (i) selection of economical products to process, (ii) identification of efficient production facilities in the region where the supply chain is to be designed, (iii) optimal transportation of products across the supply chain, (iv) prediction of success potentials of collection centers as well as recovery facilities of interest, (v) sale of end-of-use products on potential second-hand markets, (vi) design of efficient marketing methods – especially for the reverse supply chain, and (vii) involvement of

consumers and local government, along with company executives, in decision making. Possible strategies to approach the topics are suggested, too.

5. Multi-Kanban Model for Multi-Product Disassembly with Multiple Demands
Surendra Gupta, Northeastern University
Gun Udomsawat, Northeastern University
Yousef Al-Turki, King Abdulaziz City for Science and Technology

Manufacturers engage in environmentally conscious manufacturing because of growth in demand for environmentally friendly products, government rules and regulations and lower cost of recycled materials and remanufactured components. These products are intended to minimize the overall environmental detriments by incorporating design-for-disassembly and include reused and/or reusable components. Many manufacturers take back used products from consumers so that reusable components and materials may be recovered. Disassembly is an effective tool for product recovery. A disassembly line is perhaps the most suitable setting for disassembly of products in large quantities, yet it causes several problems for traditional production control mechanism. This paper looks at the implementation of pull-type mechanism in a disassembly line setting. We propose a multi-kanban mechanism that is designed to operate efficiently under environments such as multi-product arrival and multi-demand arrival. We demonstrate its effectiveness using a simulation model. An example is presented to illustrate the concept.

Session 4: FRI. 10:30 - Caesar 7

Japanese KEIRETSU Now

JSPM Invited Workshop

Osamu Uehara
Institute for Supply Management Japan, Inc.

"KEIRETSU" has longtime been viewed as Japanese sub-contractors' transaction system, very particular and notorious among U.S. and European businesses. Today's rapidly changing business-world may result in the need to adjust its ways of working and its concept to a successful marketplace if we are to achieve high levels of sustainable success. We see some excellent Japanese companies are now modifying their "KEIRETSU" system in order to succeed in a global market. As KEIRETSU system is one of the many transaction types, we have reached a conclusion that the supplier relationship would be a key to define and describe better this transaction system. This workshop shows how traditional supplier relationship has been refined and some development models help us maximize the value of our supply base and our personal value to the organization.

Session 5: FRI. 10:30 - Caesar 8

Understanding Best Approaches and Practices for Using ILOG Optimization Technologies to Solve Your Optimization Problems Part 1 of 2

ILOG, Inc. Sponsored Workshop

Thomas Dong
ILOG, Inc.

The goal of this 2-part workshop is to help you maximize your understanding of ILOG CPLEX, ILOG OPL Studio and other ILOG decision support technologies. The workshop will introduce the full range of ILOG decision support technologies for Production and Operations Management. In Part 1 of the workshop, Mr. Dong will discuss ILOG CPLEX, ILOG's leading mathematical programming optimization solver. Part 2 of the workshop will progress to understanding how to rapidly develop and deploy mathematical programming applications using ILOG OPL Studio. Application demonstrations and examples will be shown. To provide a broad understanding of optimization technology options, Constraint Programming will then be introduced, compared, and contrasted with Mathematical Programming. This final presentation will provide a foundation for the tutorial session discussing Constraint Programming in Operations and Logistics Management. Complete presentation note taking and supplemental take away resource materials will be provided to all attendees.

Session 6: FRI. 13:30 - Caesar 2

Electronic Invoice Implementation

Service College Sponsored Tutorial

by

Timothy Smunt, Wake Forest University

(See Tutorial section for details)

Session 7: FRI. 13:30 - Caesar 4
Strategy of Operations II / Estrategia de Operaciones II

Cluster: Strategy and Design

Chair: **Cristina Ceballos Hernández**, University of Seville

1. La Localización Industrial. Una Aproximación Multicriterio

Teodoro Ravelo, Universidad de La Laguna
María Carmen Moreno, Universidad de La Laguna

El presente trabajo pretende, por un lado, desvelar la naturaleza e importancia de los factores que actualmente determinan la estrategia de localización de la empresa industrial; y por otro lado, determinar el poder de atracción que los distintos polígonos y zonas de preferente localización industrial dentro de una determinada área geográfica ejercen sobre las empresas que en ella pretenden instalarse. Ello permite, en primer lugar, determinar en qué medida los procesos de reestructuración del sistema productivo han influido en las tendencias tradicionales de localización en la pasada década y en las pautas de comportamiento de las distintas zonas industriales. Y en segundo lugar, contrastar la eficacia y validez de los instrumentos y políticas de incentivación y ordenación del territorio actualmente vigentes.

2. Oportunidades Tecnológicas de la Electrónica en Jalisco, México

Luis Antonio Delgadillo Gutiérrez, Universidad de Guadalajara
María Elena Armendáriz Silva, Universidad de Guadalajara

Este estudio evalúa oportunidades tecnológicas para mipymes Electrónicas en Jalisco, México para mejorar la competitividad, productividad y calidad de sus productos, con un holismo de crecimiento modernización e innovación. Se analiza; innovación en productos, procesos y organización, bajo adopción de esquemas de manufactura ligera, JIT, SCM, ERP, I&D, outsourcing, como impulsores de una economía de cadenas productivas globales. Se estudian; entretejido e interdependencias socioproductivas regionales y efectos en la retención e incremento del empleo, referenciadas por la dirección de la competencia internacional y la difusión de las innovaciones. Se atienden muestras representativas en niveles; Grande, Mediana, pequeña y micro empresa, con variables en evaluación: Innovación, Tecnología, Organización y gestión empresarial, desempeño, procesos productivos y productos; mercados y distribución.

3. Redes de Valor Como Diferencial Competitivo: El Caso de Una Pequeña Empresa de Consultoria

Luis Daniel Strumiello, Faculdade Adventista Paranaense
Irwin Susanibar, Faculdade Adventista Paranaense

Este trabajo analiza el nuevo entorno de negocios, en el cual la tecnologia digital proporciona grandes oportunidades para los que estén dispuestos a invertir. Además, propone una nueva forma de hacer negocios, en la cual toda la red que envuelve la empresa y desarrolla los productos se une en el sentido de agregar valor al cliente. La constatación que la competición ocurre cada vez más entre las cadenas productivas y no entre empresas es fundamental para que estas puedan comprender cuales son los criterios realmente valorados por el cliente en el producto, para ofrecerlos y atenderle buscando la exelencia en el servicio. La aplicación de la estructura propuesta en una empresa demostró las ganacias que pueden ser obtenidos al aplicar la estructura de red de valor. Fueron identificadas varias influencias en el sector productivo en función de la aplicación de la metodologia en la lógica de negocios.

4. La Influencia de las Cuestiones Ambientales en los Sistemas Productivos

Luis Daniel Strumiello, Faculdade Adventista Paranaense
Kleber Angeli, Faculdade Adventista Paranaense

El trabajo analiza las influencias ocurridas en los sitemas productivos en función de las cuestiones ambientales. Estas que por un tiempo fueron banderas de ecologistas radicales, están presentes en el día a día del ciudadano común, el nivel de involucración en relación al presente asunto varia de país para país. Esta maduración ecológica se refleja en los productos consumidos y en la basura que resulta. En un primer momento los factores ambientales pueden ser considerados ventajas competitivas, pero después de esta fase, la concepción de "producto verde" será inherente a este. Junto a esto, debe haber una mayor eficiencia en la utilización de los "procesos verdes", para que estos proporcionen lucro a las empresas, alcanzando de esa forma el objetivo de protección a la naturaleza, junto a la posibilidad de obtención de lucro financiero a las empresas.

Session 8: FRI. 13:30 - Caesar 6
The Undergraduate OM Curriculum

Cluster: POM Pedagogy

Chair: **Ashok Soni**, Indiana University

1. A Technology-Driven Operations Management Curriculum

Ashok Soni, Indiana University
Kurt Bretthauer, Indiana University
F. Robert Jacobs, Indiana University

This presentation will cover the undergraduate Operations Management curriculum at Indiana University's Kelley School of Business. This curriculum is a blend of Operations Management, Decision Sciences, and Information Technology with heavy emphasis on IT as an enabler. It includes courses in areas such as Business Process Analysis, Supply Chain Management,

Project Management, Decision Support Systems, and Enterprise Technologies and Applications. The curriculum has been very successful with very high enrollments and solid placement rates.

2. Challenging and Improving Operations Management Undergraduate Courses by the Use of Soft Systems Methodology

Felipe Graeml, Universidade Federal de Santa Catarina
Alexandre Graeml, EAESP/Fundação Getúlio Vargas - Brazil
Rolf Erdmann, Universidade Federal de Santa Catarina

This paper presents a Soft Systems Methodology (SSM) analysis used to define and improve undesired problematic situations in Operations Management (OM) undergraduate courses. The original idea of this analysis was to find new perspectives for OM courses that could motivate undergraduate students to take this subject, leading them to a better understanding of how to match theory and practice in different realities. The study collects and joins professor's/lecturer's and tutor's perceptions in a Brazilian and a British university, which revealed problematic situations that could be better managed. The Soft System Methodology (SSM) is a constructivist model that can help decision-makers better understand undesired situations and lead them to consensus or compromise solutions. A pictorial representation of the complex real world problematic situation was made by a “rich picture”, which represented different points of view. The “rich picture” helped professors/lectures better understand their own related problem concerns.

3. Performance in the Introductory Operations Management Course: Cognitive Style, Study Patterns and Success

Carl Briggs, Indiana University
Rex Cutshall, Indiana University
Kenneth Schultz, Indiana University

This paper reports on an ongoing study of students enrolled in a large introductory integrated undergraduate business course (N=570). A measure of cognitive style (the Cognitive Style Index, CSI, developed by Allinson and Hanes, 1996) and a measure of study patterns (the Revised Approaches to Studying Index, RASI, developed by Entwistle et al., 2000) are used in this analysis. The paper examines the psychometric properties of these measures, and then applies them in measuring the impact of student learning and study patterns on performance in the introductory operations management material. Differences in performance within functional areas are examined. This research extends previous work in the area in several ways, and promises to provide insight into student retention and success in the gateway operations management course.

4. Bringing JIT to Life in the Classroom

Debra Bishop, Drake University

This presentation will describe an innovative and engaging method for introducing critical JIT concepts to an introductory operations management class. Using a few inexpensive materials and twenty to thirty minutes of class time - this activity has consistently received positive feedback as a learning experience. Key learning concepts include: small lot production, flexible resources, push versus pull, waste reduction, uniform production levels, quality at the source, and facility layout.

Session 9: FRI. 13:30 - Caesar 7
Operations Strategy I

Cluster: Strategy and Design

Chair: **Michiya Morita**, Gakushuin University

1. Cooperative Complexes and Self-Management Organizations

João Amato Neto, University of São Paulo

The Social Economic movement has grown every day in many parts of the world as an alternative form of production and work organization. Inserted in the Social Economic there are a lot kinds of organizations based on the self-management approach as cooperatives . The main principles of cooperatives are: 1. the principle of the voluntary adhesion (“open doors”); 2. the principle of the democratic administration: “a partner, a vote”; 3. the principle of the partners' economic participation; 4. the principle of the autonomy and independence; 5. the principle of the interest for the community (education, formation and information). The aim of this paper is to analyze the main benefits of this kind of productive organizations in terms of income and job creation. A multiple case study is used as a methodological framework in order to analyze some Brazilian cooperative complex in the metal-engineering industry.

2. Co-Operative Technology Management Models and Tools in Material Technology Based Enterprise Networks

Petri Kalliokoski, VTT Industrial Systems
Tiina Valjakka, VTT Industrial Systems

In this paper, we present a co-operative technology management model and practical tools for SME enterprise networks for managing technology opportunities before the concrete product development process. The presented model and tools are based on the experiences of action research study of material technology network with five enterprises and four separated materials (steel, aluminum, plastic and copper). The technology management model and related co-operation tools were developed with close co-

operation between the companies and researchers during the collaborative research project. The tools were piloted in co-operative meetings between the companies and customers. The main results of the study show that SMEs can apply the systematic models and tools for managing co-operative technology development in the areas of product and material technology. The shared technology strategy enables a customer-oriented and focused development of core competencies.

3. Technology Acquisition and Innovation: An Integrative Approach for Organizational Success

Rachna Kumar, Alliant International University
Meenakshi Krishnamoorthy, Alliant International University
Miguel Cardenez, San Diego Global University

This paper presents an integrated organizational model where technology plays a key role. The paper is divided into three parts. The first part introduces background literature on the ETK concept and synchronization. ETK refers to Emotional Intelligence, Technology Awareness and Knowledge Management. The second part focuses on the formulation of an integrative model for an organization's behavior. The third part is devoted to several live examples that illustrate the synchronized behavior. The practical steps needed to implement this synchronization model in any organization are then outlined in the concluding part.

4. Communication Systems As Drivers of Excellent Manufacturing

Michiya Morita, Gakushuin University

We show how high performance manufacturers construct their communication systems by aligning various types and aspects of communication to lead to good performances. We explore the aligned structures of communication of them. Managerial excellency rests on how to link various internal and external activities effectively to achieve strategic and operational objectives. We propose that the effective linkage of activities is supported by the good communication systems aligned to support them.

Session 10: FRI. 13:30 - Caesar 8

Understanding Best Approaches and Practices for Using ILOG Optimization Technologies to Solve Your Optimization Problems Part 2 of 2

ILOG, Inc. Sponsored Workshop

Thomas Dong
ILOG, Inc.

Session 11: FRI. 15:30 - Caesar 2
Joint Replenishment/Supplier Relations

Cluster: Strategy and Design

Chair: **Nezih Altay**, University of Richmond

1. Strategic Outsourcing Among Die and Mold Industry

Nobutaka Odake, Nagoya Institute of Technology

Die and mold is tool, equipment or machine which is indispensable for manufacturing parts. Japan has the largest output in the world which has been declining with the breakdown of the bubble economy as a turning point though. Consequently the most of the firms in the industry have fallen in their income. However the growing firms are observed even in such circumstance. One is the type of flexible specialization by high value-added products and intends to execute "product integration", the other narrows the business domain and intends to execute "process integration" by dispatching engineers to the clients. Though the resource of competence of both firms seems high grade equipment and high-end CAD system apparently, the capability of designing, engineering or the combination between engineering and marketing is quite important substantially. It is the key factor SMEs get opportunities in outsourcing from big firms strategically.

2. An Efficient Optimal Solution Method for the Joint Replenishment Problem with Minimum Order Quantities

Eric Porras, Erasmus University
Rommert Dekker, Erasmus University

We study the joint replenishment problem (JRP) for m items under deterministic demand, with a minimum order quantity constraint for each item in the replenishment order. We first study an iterative procedure that proves to be not efficient in this case. Further, we derive bounds on the basic cycle time and propose an efficient global optimization procedure to solve the JRP with constraints. A real example is evaluated.

3. Solution Approaches for the Dynamic Demand Coordinated Replenishment Problem

Nezih Altay, University of Richmond
Li-Lian Gao, Hofstra University
Powell Robinson, Texas A&M University

This paper analyses leading solution approaches to the coordinated replenishment problem with dynamic demand. The two main approaches are identified as arborescent networks and multiple Wagner-Whitin type models. A computational study of these two approaches is provided and results are discussed.

Session 12: FRI. 15:30 - Caesar 4
Lean and Agile Operations / Producción Ajustada y Producción Ágil

Cluster: Strategy and Design

Chair: **Bernardo Villarreal**, Universidad de Monterrey

1. Planificación de la Producción de la Cadena de Suministro en un Entorno de Personalización en Masa

Josefa Mula, Polytechnic University of Valencia
Raúl Poler, Polytechnic University of Valencia
Jose Garcia, Polytechnic University of Valencia

La Personalización en Masa consiste en el diseño, producción, marketing y entrega de productos y servicios personalizados partiendo de un sistema de producción en masa. Algunas de las estrategias de la Personalización en Masa son: una adecuada gestión de la cadena de suministro, la creación de empresas virtuales, la potenciación del diseño modular del producto, la elección de las mejores Tecnologías de la Información y Comunicaciones (best-of-breed IT) y la fabricación ágil. En este contexto, el proyecto europeo GROWTH GIRD–CT-2000-0821 denominado "Virtual Enterprise for Supply Chain Management" trata de introducir el concepto de empresa extendida y promover la colaboración entre el fabricante de automóviles y sus proveedores. Basándose en los resultados de este proyecto, este artículo analiza y describe las características principales requeridas por una cadena de suministro del sector del automóvil para alcanzar la Personalización en Masa, desde el punto de vista de la planificación de la producción.

2. Producción Ajustada en la Cadena de Suministro de la Construcción

Josep Capó, Universidad Politécnica de Valencia
Francisco Lario, Universidad Politécnica de Valencia
Antonio Hospitaler, Universidad Politécnica de Valencia

El sector de la construcción está viviendo importantes cambios tecnológicos y organizativos. Para poder sobrevivir, las empresas constructoras deben adaptarse a ellos, para lo cual se hacen necesarias la integración y aplicación de técnicas productivas y organizativas procedentes de otros sectores más avanzados. En este contexto cobra especial importancia la aplicación de los principios del Lean Production o Producción Ajustada a la construcción, lo cual es conocido como Lean Construction. Se analizará en este trabajo la aplicabilidad del Lean Production a la construcción y, en particular, a la cadena de suministro que se forma para cada proyecto constructivo concreto, para lo cual se estudiarán sus principales características, así como las condiciones que deben darse en las empresas participantes para que esto sea factible, consiguiéndose un aumento de los niveles de calidad, una reducción de costes y plazos y, en definitiva, la satisfacción del cliente final.

3. Improving Agility Through Postponement: An Application

Bernardo Villarreal, Universidad de Monterrey
Guadalupe Elizondo, Universidad de Monterrey

Agility is a business-wide capability that is actually required to compete successfully. It embraces organizational structures, information systems and logistic processes. Christopher [2000] describes a scheme for achieving higher levels of agility. Two fundamental elements of this is the minimization of both, total lead time and inventory levels. The aim of an agile company or supply chain should be to carry inventory in as generic a form as possible. This is the concept of postponement, a vital element in any agile strategy. This paper is concerned with the implementation of strategies for improving service levels for a Mexican company that manufactures fiberglass reinforced polyester panels for industrial applications. The main strategy is concerned with applying the concept of postponement to improve service levels through reducing lead times with lower inventory levels.

Session 13: FRI. 15:30 - Caesar 6

Teaching SAP to OM Students

SAP Sponsored Panel

Chair: **Nirup Menon**, University of Texas at Dallas

Dan Pantaleo, SAP America
Ashok Soni, Indiana University

Incorporating SAP in The OM Curriculum:
This session will expose participants to the use of SAP by faculty in an OM curriculum. SAP's research director will present his vision about the role of SAP in higher education. The session will also feature current research from the SAP-University alliance program. The session is sponsored by SAP.

Session 14: FRI. 15:30 - Caesar 7
Operations Strategy II

Cluster: Strategy and Design

Chair: **Jatinder Gupta**, University of Alabama in Huntsville

1. Motor Vehicle Safety Recalls: An Opportunity for POM Research?

Michael Lewis, Warwick Business School
Nick Oliver, University of Cambridge
Matthias Holweg, Judge Institute for Management Studies
Hilary Bates, Warwick Business School

This paper draws attention to the high volume of motor vehicles subject to safety recall. Regardless of the exact composition and cause of recalls, it should be a subject of significant importance to manufacturers, consumers, regulators and policy makers. Moreover, because the automotive sector has long provided an important setting for OM studies, the 'recall problem' offers a unique challenge and opportunity for developing OM-related explanations. The paper presents a digest of UK and US safety recall figures (covering the period 1992-2002) and, after discussing the limitations of the data, highlights a number of interesting preliminary observations. In particular, the last few years have seen OM emphasize a range of 'best practices' intended to improve performance in areas such time-to-market and innovation that could be related to high recall levels. The paper will conclude by highlighting ways in which this topic might be integrated into future research agendas.

2. Process and Framework of Modern Maintenance Management

Adolfo Crespo Márquez, University of Seville
Jatinder Gupta, University of Alabama in Huntsville

This paper explores different aspects of modern maintenance management. The reader can find, in the first place, a review of the maintenance management concept and a characterization of those factors increasing maintenance management complexity in modern production systems. After that, there is a review of the maintenance management process and framework within these environments that will drive to a definition of both concepts. Process has to do with course of action while framework is related to supporting the structure, therefore the paper defines the course of maintenance actions divided by level of business activities and presents a structure to ensure proper support to current maintenance managers, clarifying the functionality required from information technologies applied to maintenance, the functions of modern maintenance engineering, and the requirements in terms of relationships competencies in maintenance. This work is a result of years of experience within the field of maintenance.

3. Development of Systems and Process Models -- Private Solid Waste Disposal Application

Darrell Tipton, Arcadis G&M
Cecelia Wigal, The University of Tennessee at Chattanooga

This paper presents methods and tools to develop systems and process models for the project development path applied to private solid waste disposal projects. Model development is performed to establish the level of accuracy needed to reveal business opportunities and to establish a model suitable for strategic analysis and business development. The models are central to a comprehensive understanding of how projects in the "heavy-civil" category develop and how that understanding can be used to further the goals of an engineering consulting company.

The paper discussion emphasizes systems definition and analysis, project development processes, and solid waste disposal projects. The development path for solid waste disposal projects is compared to the development path for software and manufacturing projects. Systems and process modeling software are used to create models from the collected data. Limitations with regards to data accuracy and software complexity are discussed.

4. A Framework for Data Gathering and Modeling for a Location Problem of a Large Brazilian Steel Company

Samuel Conceição, Federal University of Minas Gerais
Luis Pedrosa, Federal University of Minas Gerais
Marcellus Vinagre, Federal University of Minas Gerais
Alvaro Neto, Federal University of Minas Gerais

This paper presents a case study research about a complex location problem we have conducted in a large Brazilian steel company with 7 plants, 13 DC´s, more than 1.400 customers and approximately 10.000 products, integrated by a SAP/R3 system. The articles point out a methodology to collect and modeling a large data base and prepare the set of information to solve a network problem. In addition its show how to integrating with accuracy information about production and capacity planning, transportation, sales forecast, logistics service and logistics cost in order to solve a large location problem using the Network design software from SAP.

5. Natural Gas's Marketing Strategy Applied in Brazilians Hotels' Manufacturing Strategy

Ana Beatriz Sousa, Federal University of Rio Grande do Norte
Rubens Ramos, Federal University of Rio Grande do Norte

This paper shows how the marketing strategy of a company is associated with her costumer's manufacturing strategy. A case about a company natural gas supplier that plans her marketing strategy to sell natural gas as source of electric power self generation for hotels will used to

understand how manufacturing strategy of hotels are important as information basis to company's marketing. This paper is considerable because with this it's possible to comprehend how the company's marketing is linked with seeks of competitive of her costumer.

Session 15: FRI. 15:30 - Caesar 8

Constraint Programming in Operations and Logistics Management

POMS Invited Tutorial

by

Thomas Dong, ILOG, Inc.
Filippo Focacci, ILOG, Inc.

(See Tutorial section for details)

Session 16: SAT. 10:30 - Caesar 1
Mass Customization Strategies

Cluster: Strategy and Design

Chair: **Benjamin Clegg**, Aston Business School

1. Mass Customization Strategies in the Area of Supplier in the Automotive Industry

Ralph Seelmann-Eggebert, Fraunhofer Institute IFF
Michael Schenk, Fraunhofer Institute IFF

This presentation refers to the first results of a research project regarding supply-strategies in the automobile industry. The main objective is the examination of potentials regarding Mass Customization (MC) in the automotive industry with emphasis on the small and medium-sized car suppliers. The production and logistic structures are the primary object of investigation in this context. The target of the research project is the development of a tool which consists of three parts: a Quick Check potential analysis, an Action plan and an Economic viability assessment. Using this tool automotive supplier can easily assess their MC potentials. Additionally the project results will give new insights on how to improve the MC capability taking into account the conditions of the automotive supplier industry. This includes MC-relevant adaptations in the supply chain as well as changes in production like the implementation of a highly flexible final production stage.

2. Mass Customization: A Tool for Aligning Marketing and Supply Chain Strategy?

Janet Godsell, Cranfield University

There is increasing momentum behind a movement that believes that in this age of the 'new consumer', organizations need to be customer responsive to survive. This has implications for supply chain management suggesting that different supply chain strategies are required to meet the needs of different buying behaviors. Through the empirical study of supply chain strategy in DCo (a UK manufacturer of vacuum cleaners in the late 1990s) the potential for using mass customization as a means of improving customer responsiveness was considered. The Lampel and Mintzberg (1996) standardization: customization continuum was used as a theoretical framework to explore different supply chain options. The study supported the view that one size does not fit all, and to effectively respond to different buying behaviors a contingent approach to supply chain strategy needs to be employed; encompassing the breadth of the customization: standardization continuum.

3. The End is (Not Quite) Nigh! The Impact of Mass Customization on Manufacturing Trade-Offs

Brian Squire, CENTAIM, University of Bath
Steve Brown, CENTAIM, University of Bath
Jeff Readman, CENTRIM, University of Brighton
John Bessant, Cranfield University

Management literature has suggested that the advent of mass customization marks the end for trade-offs between customization and other competitive priorities (Westbrook and Williamson, 1993; Tu et al, 2001). However evidence supporting this proposition is anecdotal. This paper examines the impact of product customization on four manufacturing trade-offs by drawing upon the results of a survey conducted in 2003 of 101 UK manufacturing firms from eight industry sectors. The study indicates significant compatibility between customization and quality, flexibility, delivery reliability and non-manufacturing costs. However, trade-offs remain between customization and manufacturing costs and delivery lead times. The results contradict the initial proposition that customization can be 'free', and have important implications for firms embarking upon a mass customization strategy.

4. A New Approach for the Production Planning of Flexible Manufacturing Systems Based on the Concept of Operation Types

Tamás Koltai, Budapest University of Technology and Economics
Kathryn Stecke, University of Texas at Dallas
Peter Várlaki, Széchenyi István University
Viktor Juhász, Budapest University of Technology and Economics

Manufacturing systems produce parts to meet demand, either forecast and/or actual. When developing a production plan, an initial question is whether there is enough capacity from the system for the different operations demanded by the production requirements. The paper provides an aggregate production planning model. Aggregation in the paper means that the similar manufacturing operations, which require the

same type of machines, are aggregated into operation types. Applying the concept of "operation types", the variety of the alternative uses of the production capacity can be reduced and a systematic evaluation of capacity utilization and workload balance is possible. The proposed capacity analysis model, can help operation managers to make production planning decisions, make or buy decisions, and can assist when decisions on taking certain orders has to be made. The paper also highlights some further research possibilities based on the operation type aggregation concept.

5. Extending and Virtual Operational Structures
Benjamin Clegg, Aston Business School

An extended enterprise is a group of organizations brought together under a joint strategic purpose; the strategic fit between them is defined on the basis of core competences that might either compete or co-operate. The ability of each of the member companies for fitting their core competencies together is a matter of strategic congruence and operational process alignment. Being a successful member of an extended enterprise requires not only making a profit for your own company, but also helping other members to develop and do the same. This work discusses how organizational structure and operational infrastructure is changing under the practice of 'extending and virtualizing enterprisation' and how products are simultaneously becoming more 'modularized and serviced' in order to meet increasing end user demands for cost conscious mass customization. This is explored using industrial examples and a new framework called The Extended Enterprise Matrix.

Session 17: SAT. 10:30 - Caesar 2

Operational Advantage Group (OAG)

POMS Sponsored Forum
Part 1 of 2

Chair: **Martin Starr**, Rollins College

(See Fora section for details)

Session 18: SAT. 10:30 - Caesar 3
Production Planning Improvements: From Small Mexican Firms to Academia

Cluster: Operations and Logistics

Chair: **Fan Tseng**, University of Alabama in Huntsville

1. Small Mexican Companies Do Need Us
Karina Amposta, Instituto Tecnológico y de Estudios Superiores de Monterrey
Gabriel Fonseca, Instituto Tecnológico y de Estudios Superiores de Monterrey
Karewit Fernandez Juarez, Instituto Tecnológico y de Estudios Superiores de Monterrey
Elizabeth Cortés Sánchez, Instituto Tecnológico y de Estudios Superiores de Monterrey
Dayra Rodriguez Romero, Instituto Tecnológico y de Estudios Superiores de Monterrey
Luis Borges, Instituto Tecnológico y de Estudios Superiores de Monterrey

This paper deals with an analysis of different processes in a small Mexican company, that assembles special commodity packages for different companies. The company is new and it is in a process of adaptation to new equipment and untrained personnel. The authors were doing an analysis of the various processes in order to better organize the assemble processes, by using layout methodologies, work and motion studies, just-in-time implementation, and training the workers in the new environment. Flexibility considerations were taken into account because some of the products are seasonal, and others are more medium-term oriented dependent upon the different customers, and different contracts. The results were achieved by applying the above techniques to guarantee the customer requirements on quality, flexibility, and duration of the contracts. Moreover, a visual management system through colored banners was suggested to control the inventory.

2. Generating Rule Classifications for Production Scheduling Problems
Michelle Squire, North Carolina Agricultural and Technical State University
Christopher Geiger, University of Central Florida

The primary objective of learning approaches in production scheduling is to find a solution or set of solutions that best satisfies the given objective. The success of many learning approaches in the area of scheduling is due to their ability to find near optimal solutions in less computational time than exact procedures. Researchers and practitioners often use learning approaches in scheduling to discover permutations of jobs and resources. This research focuses on approaches that have the ability to learn the scheduling rules that generate permutations of jobs and resources, in which we propose a method to effectively partition like learned rules into groups. An optimization routine is used to optimize rule groupings. This method will prove to be valuable to scheduling researchers and practitioners during rule development, as it will help reduce the search space of rules to rule subsets whose members generate similar performance.

3. Production Scheduling in an Assemble-to-Order System where Component Variety Exceeds Space Available on Assembly Lines
Susan Monkman, University of Texas at Austin

This research, motivated by a real company, addresses production scheduling issues for a make-to-order assembler producing high volumes of products with a wide variety of component options. The assembler has multiple parallel assembly lines, each capable of producing any product variety. Components are delivered to the lines in a JIT fashion and products are assembled in FIFO order. Due to space constraints each line can only stock enough different types of components to produce a subset of the product varieties without requiring a costly changeover. In addition, all lines together cannot accommodate the components required to produce all product varieties, therefore changeovers will be necessary. Finally, demand is uncertain when production must be scheduled. I will present methods to schedule different product varieties across lines and across time in order to produce all product varieties on order in a given time window while minimizing the number of changeovers required.

4. MRP Applications in Academic Planning
Sushil Gupta, Florida International University
Tomislav Mandakovic, Florida International University

This paper demonstrates the use of MRP in academic planning. A degree is considered like an end product. The courses that are required for the degree are considered as component parts.

5. A Comparative Analysis of Heuristics for the Sequence Dependent Setup Flowshop Problems
Jatinder Gupta, University of Alabama in Huntsville
Fan Tseng, University of Alabama in Huntsville
Edward Stafford, Jr., University of Alabama in Huntsville

We consider the sequence dependent setup flowshop problem with the objectives of minimizing makespan and minimizing average completion time. New heuristics are proposed to compare with existing heuristic algorithms. Different data types are used to test the heuristics. Faster and more robust new heuristics are reported.

Session 19: SAT. 10:30 - Caesar 4
Service Operations / Dirección de Operaciones en Servicios

Cluster: POM Pedagogy

Chair: **Isabel Plaza Hidalgo**, Universidad Nacional de Educacion a Distancia

1. El Proceso Productivo Virtual: Una Aplicación al Sector Inmobiliario en España
Isabel Soriano-Pinar, Universidad Rey Juan Carlos
Fernando García-Muiña, Universidad Rey Juan Carlos
Eva Pelechano-Barahona, Universidad Rey Juan Carlos

El incremento de la competitividad, la globalización y el desarrollo y uso de las tecnologías de la información y comunicaciones han provocado que las empresas se planteen la idoneidad de redefinir sus procesos productivos, concentrándose en sus competencias esenciales (Prahalad y Hamel, 1990). Todo ello, favorece el desarrollo de organizaciones virtuales, entendidas como estructuras de producción integradas por diversas empresas que aportan sus conocimientos especializados a fases concretas del proceso productivo. El resultado de las operaciones es un producto de mayor valor añadido para el cliente, lo que otorga una ventaja competitiva al sistema completo y, por consiguiente, a cada uno de sus agentes. El detallado análisis cualitativo de la red constituida alrededor de la empresa Unión de Créditos Inmobiliarios permite comprender esta evolución del proceso productivo del sector inmobiliario español, que incluye desde la búsqueda y financiación del inmueble hasta la contratación de aquellos servicios básicos para su habitabilidad.

2. SOM Research: Content, Methodology, and Sectors Under Study / Investigación en Dos: Contenido, Metodología y Sectores Objeto de Estudio
José Machuca, University of Seville
Mar González Zamora, University of Seville
Victor Aguilar, University of Seville
José Luis Pérez Díez de los Ríos, University of Seville

To date, we have no knowledge of any study on the state-of-the-art of Service Operations Management (SOM) despite the fact that there has been an ongoing call for an increase in research of this type for over twenty years. We hope our study might cover this omission. To this end we have performed an analysis of the 344 SOM articles published in the most relevant journals in the field of Operations Management between the years of 1997 and 2002. The main aspects looked at in the study were the volume of publications, their content, the methodology employed and the sectors of activity the research was applied to. Among other results, we will show that in relation to the volume of publications, the position occupied by SOM is still marginal. A complementary analysis was also performed of SOM publications at the main OM conferences for the period of 2001-2002. / Hasta la fecha no conocemos ningún estudio sobre el Estado de la Cuestión de la Dirección de Operaciones en Servicios (DOS), a pesar de que, desde hace más de 20 años, se viene pidiendo un aumento en dicha investigación y de la enorme importancia de dicho sector. Con nuestro trabajo hemos pretendido cubrir dicha

necesidad. Para ello hemos realizado un análisis de los 344 artículos de DOS publicados entre 1997 y 2002 en las revistas más relevantes para el campo de la Dirección de Operaciones. Los principales aspectos estudiados han sido el volumen de publicaciones, su contenido, la metodología empleada y los sectores de actividad a los que se aplica la investigación. Nuestros resultados muestran diferencias entre la investigación en DOS y en DO, tanto en los contenidos como en los principales métodos empleados. En relación con el volumen de publicaciones, la SOM sigue ocupando un lugar marginal en relación con el total para DO (6,4%), siendo aconsejable tomar alguna medida para que dicha situación cambie. Como complemento al estudio mencionado, hemos llevado a cabo un análisis de las publicaciones de DOS en los principales congresos de Dirección de Operaciones para el periodo 201-2002.

3. A New Approach for Measuring Banking Output: An Application to the Spanish Banking Sector 1992-2003

Isabel Plaza Hidalgo, Universidad Nacional de Educacion a Distancia

The current approaches for measuring banking output, intermediation, production and user cost, have some disadvantages, among which may be stressed, in particular, the view of the bank as a non-services provider. Some banking services are not considered in these methods, especially those services which have been put forward by recent contributions to the theory of the financial intermediation, information production and risk management. The present work proposes a method for measuring banking output, based on four groups of banking services: services offered to bank depositors, profitability, financing and information, improving in some aspects the existing measuring methods. The proposed method is applied on data from the Spanish banking sector during the period 1992-2002 and is compared with previous methods.

Session 20: SAT. 10:30 - Caesar 5
Six Sigma

Cluster: Service and Quality

Chair: **Charles Corbett**, UCLA

1. An ISO 9000: 2000 Quality Management System Implementation Model

Mustafa Shraim, S Q P S

Empirical research has shown that effective internal systems directly impact performance. However, many organizations either have no official quality management system (QMS) or have not re-certified their QMS, which is still based on the 1994 revision of ISO 9000 standard. The ISO-9000:2000 standard can be of great value if its requirements, including customer-focus, process-approach, and management commitment, are effectively implemented. However, such requirements presented challenges for implementation. This paper presents an implementation model by incorporating basic total quality management principles with the process-approach concept required in ISO 9000:2000. Management review and data analysis will be shown to be the vital processes of the proposed model.

2. Comparison of TQM and ISO 9000 Effects in Company Performance: An Empirical Study in Spanish Companies

Micaela Martínez Costa, University of Murcia
Angel Martínez Lorente, Polytechnic University of Cartagena

The effect of Total Quality Management (TQM) and ISO 9000 on performance has been extensively analyzed by researchers, but this sort of research has usually been developed in separated cells. However, there are few articles analyzing the effect of both systems within the same sample of companies. Our paper analyzes statistically both the effect of a TQM system and the ISO 9000 implementation in company performance. A structured questionnaire using the Flynn et al. (1994) scale for measuring TQM has been used to get the data. A postal survey to nearly 3000 Spanish companies with more than 100 employees was sent. This questionnaire was answered by 713 quality managers. The results show a positive relationship between TQM application and operative and external results while only an improvement in operative results after the ISO 9000 implementation has been found.

3. Maintenance Work Order Backlog and the Six Sigma Process

Joyce Hoffman, Stephen F. Austin State University
Joseph Ormsby, Stephen F. Austin State University

Paper manufacturing is a capital and labor-intense process with end products commodity sold in an elastic market. Emphasis on manufacturing costs is a must. In the Pulp & Paper Industry, maintenance is a service to the operations and is a cost captured on the financial report. However, this service is often ignored as a cost to operations when not completed and the maintenance orders are placed on “work order backlog.” A small percentage of backlog orders levels out the swings in the daily work schedule, but a disproportionate number over time may indicate significant problems in the maintenance area. Using the Six-Sigma Process Improvement Model, a framework is developed to identify causes that allow for a disproportional number of backlog work orders and to develop solutions to solve and prevent excessive backlogs which

directly or indirectly constrain an operation/machine and operations' costs.

Session 21: SAT. 10:30 - Caesar 6
Project Management/Scheduling

Cluster: Operations and Logistics

Chair: **Willy Herroelen**, Katholieke Universiteit Leuven

1. A Hybrid Scatter Search Electromagnetism MetaHheuristic for Project Scheduling

Dieter Debels, Universiteit Gent
Bert De Reyck, London Business School
Roel Leus, Katholieke Universiteit Leuven
Mario Vanhoucke, Universiteit Gent

In the last few decades, several effective algorithms for solving the resource-constrained project scheduling problem have been proposed. However, the challenging nature of this problem, summarized in its strongly NP-hard status, restricts the effectiveness of exact optimization to relatively small instances. In this paper, we present a new meta-heuristic for this problem, able to provide near-optimal heuristic solutions. The procedure combines elements from scatter search, a generic population-based evolutionary search method, and a recently introduced heuristic method for the optimization of unconstrained continuous functions based on an analogy with electromagnetism theory, hereafter referred to as the electromagnetism meta-heuristic. We present computational experiments on standard benchmark datasets, compare the results with current state-of-the-art heuristics, and show that the procedure is capable of producing consistently good results for challenging instances of the resource-constrained project scheduling problem. We also demonstrate that the algorithm outperforms state-of-the-art existing heuristics.

2. Heuristic Branch-and-Price for Scheduling Trainees at a Hospital Department

Jeroen Beliën, Katholieke Universiteit Leuven
Erik Demeulemeester, Katholieke Universiteit Leuven

Scheduling trainees (graduate students) is a complicated problem that has to be solved frequently in many hospital departments. In this problem a department has a certain number of trainees at its disposal, which assist surgeons in their activities. For each trainee one has to schedule the activities in which (s)he will assist during a certain time horizon, usually one year. The hard constraints consist of both work covering constraints and formation requirements, whereas the soft constraints involve trainees' preferences and setup restrictions. Starting from an exact branch-and-price algorithm, we show the bounds of optimality solving. Hereby, we will distinguish between decomposing on the trainees and decomposing on the activities. Finally, the branch-and-price algorithm is extended with heuristic features in order to be able to solve larger problems in acceptable time limits.

3. The Impact of Buffering Strategies on the Stability and Quality Performance of Project Baseline Schedules

Stijn Van De Vonder, Katholieke Universiteit Leuven
Erik Demeulemeester, Katholieke Universiteit Leuven
Willy Herroelen, Katholieke Universiteit Leuven
Roel Leus, Katholieke Universiteit Leuven

During execution projects may be subject to considerable uncertainty, which may lead to numerous schedule disruptions. Recent research efforts have focused on the generation of robust project baseline schedules that are protected against possible disruptions that may occur during schedule execution. The fundamental research issue we address in this paper is the potential trade-off between the quality robustness (measured in terms of project duration) and solution robustness (stability, measured in terms of the deviation between the planned and realized start times) of the baseline schedule. We provide an extensive analysis of the results of a simulation experiment set up to investigate whether it is beneficial to apply the critical chain logic and concentrate safety time in project and feeding buffers, or whether it is preferable to insert time buffers that are scattered in a clever way throughout the baseline project schedule in order to maximize schedule stability.

4. A Hierarchical Approach to Multi-Project Planning Under Uncertainty

Erwin Hans, Universiteit Twente
Willy Herroelen, Katholieke Universiteit Leuven
Roel Leus, Katholieke Universiteit Leuven
Gerhard Wullink, Universiteit Twente

We survey several viewpoints on the management of the planning complexity of multi-project organizations under uncertainty. A positioning framework is proposed to distinguish between different types of project-driven organizations, which is meant to aid project management in the choice between the various existing planning approaches. We introduce a generic hierarchical project planning and control framework that serves to position planning methods for multi-project planning under uncertainty and discuss multiple techniques for dealing with the uncertainty inherent to the different hierarchical stages in a multi-project organization.

Session 22: SAT. 10:30 - Caesar 7
Management of Suppliers

Cluster: Operations and Logistics

Chair: **Adrian Done**. London Business School

1. Using the Data Envelopment Analysis for ABC Analysis

Fariborz Partovi, Drexel University

This paper presents Data Envelopment Analysis (DEA) for ABC classification of Stock Keeping Units (SKU) in a pharmaceutical industry. The DEA model was compared with the multiple discriminate analysis (MDA) and Analytic Hierarchy Process (AHP) techniques using a series simulation experiences . The result showed that DEA model had higher predictive accuracy than MDA or AHP models

2. Supply Chain Design: The MakeBbuy Decision Process in the Age of Temporary Advantage

Mauro Sampaio, EAESP/Fundação Getúlio Vargas
Luiz Carlos Di Serio, EAESP/Fundação Getúlio Vargas, São Paulo

In recent years, we have observed a cyclical pattern in the architecture of the supply chains of individual sectors of the economy. Sometimes we see a vertical integrated sector, composed of large dominating companies, other times we see the same sector horizontally disintegrated, constituted of a great number of companies competing in marketing niches. In this highly competitive environment, the command of core competencies with higher added value is essential to the survival of any organization. This article intends to throw some light on this subject by analyzing the evolution of the classical make-buy models and evaluating their adequacy in the age of temporary advantage.

3. Pooling Lead Time Risk by Order Splitting: A Critical Review

John Tyworth, Pennsylvania State University
Doug Thomas, Pennsylvania State University

The policy of pooling lead-time risk by simultaneously splitting replenishment orders among several qualified suppliers has been studied extensively during the past 20 years. The purpose of this paper is to review and discuss the literature in the context of the real problem domain. A critical review and synthesis of the literature will show that extant literature has important gaps in the treatment of system inventories and transportation. Using this wider lens, the theoretical reduction in cycle stock, which has been portrayed as the most important single benefit, vanishes, while substantial increases in the incremental shipping costs appear. The paper closes with suggestions for some future research directions, which are more likely to have an impact on management practices in this area.

4. Revisiting the Dimensions of Purchasing Competence: Invariance Across Groups & Impact Upon Multiple Performance Measures

Adrian Done, London Business School
Mark Frohlich, London Business School
Chris Voss, London Business School

This study builds-upon existing literature regarding the strategic importance of purchasing competence. We cross-validate a second-order construct developed by Narasimhan, Jayaram, & Carter, 2001 using telephone survey data from 200 high-turnover European companies. An additional IT competence dimension was proposed and empirically validated. Second-order CFA invariance testing showed the equivalence of purchasing competence constructs across manufacturing and financial services groups. Set correlation analyses found that particular underlying competence dimensions were significant drivers of specific (Chao et al., 1993) multiple purchasing performance measures. All of the competence dimensions had significant positive impact upon at least one performance measure. The single most important dimension was IT competence which was positively related to quality, purchase-order cycle time and professionalism. Also, certain dimensions had significant negative effects upon specific purchasing performance measures, indicating possible “competency trap” performance limiting phenomena. The findings have clear managerial implications and areas for further research are considered.

Session 23: SAT. 10:30 - Caesar 8
Demand Forecasting

Cluster: Operations and Logistics

Chair: **Giulio Zotteri**, Politecnico di Torino

1. Forecasting Aggregate Time Series with Lumpy Subaggregate Components

S. Viswanathan, Nanyang Technological University
Handik Widiarta, Nanyang Technological University
Rajesh Piplani, Nanyang Technological University

In this paper, we evaluate the performance of top-down (TD) and bottom-up (BU) forecasting strategies in estimating the aggregate data series when the subaggregate time series components are lumpy. TD forecasting has been preferred by practitioners as it exploits the risk-pooling principle to reduce the overall time series variability. However, as this research finds out, TD forecasting does not provide a good forecast when the subaggregate components are lumpy. When both BU and TD use single exponential smoothing, there is no significant difference between the two. However, when the

subaggregate components are forecasted using Croston's method, BU forecasting performs better than TD forecasting in most of the cases. It is found that the relative superiority of BU forecasting increases as the subaggregate time series become more intermittent, the ratio of the penalty cost to the holding cost increases, and the number of subaggregate components decreases.

2. A Case Study on Retailer and Supplier Forecasting Collaboration in the European Grocery Sector

Johanna Småros, Helsinki University of Technology

As a result of the Collaborative Planning, Forecasting and Replenishment (CPFR) initiative, forecasting collaboration has attracted much attention. Many agree that developing forecasts collaboratively and operating according to a shared forecast should be beneficial. Yet, the adoption rate of CPFR has been slow, and the practitioners' enthusiasm seems to be subsiding. This raises an important question: If forecasting collaboration in general is as valuable as suggested, why is it not more common?

The results of an exploratory case study of four collaboration projects involving four suppliers and one retailer operating in the European grocery sector are presented. The main findings are that 1) research on forecasting collaboration and the CPFR model seem to build on incorrect assumptions concerning retailers' forecasting processes, 2) retailers and suppliers have different forecasting and collaboration needs, and 3) it is difficult for many suppliers to operationally benefit from information attained through collaboration.

3. Simulation Software for Real Time Forecasting as an Operational Support Activity

Stefan Bjorklund, Linköping University
Naresh Yamani, Linköping University
Tomas Lloyd, Rationalia

Simulation has become a more interesting tool for many companies in developed/developing countries to use in different types of production system analysis. Additionally, simulation can be used for operations and not only in the planning or designing phases. Recent advances in simulation software have allowed simulation to expand its usefulness beyond a purely design function into operational use. The objective is to use the simulation software for the operational support used for scheduling, daily resource allocation, and process monitoring at the same time, identifying all the new features which are available in the Flexsim software. In order to implement a tool, a virtual production model has been designed to conduct the experiments. In a real time environment all the data has to be retrieved from a company database system but in this work the MS Access database was used to retrieve all the necessary order details.

4. The Impact of Organizational Structures on Forecasting Practices and Performances: Some Primary Results

Matteo Kalchschmidt, Università degli Studi di Bergamo

Demand forecasting has always been a relevant issue both in research and practice. Even if great attention has been paid on this topic, only minor attention has been paid to the organizational structures adopted to deal with the demand management process. In this work attention is paid on how forecasting is developed in the Italian divisions of 6 multinational companies belonging to both industrial and retail sectors. In particular analysis regarding the factors that influence how forecasts are conducted is considered, showing that structural elements such as firm size, number of products, and so on, only partially explain how forecasting processes are conducted, in terms of roles involved, tools adopted and how information are collected. Moreover, results show that companies facing similar forecasting problems (in terms of products, demand variability, supply chain structure, and so on) and similar performances tend to adopt different practices.

5. Forecasting Practices: Empirical Evidence and Guidelines for Research

Giulio Zotteri, Politecnico di Torino
Matteo Kalchschmidt, Politecnico di Milano

Demand forecasting has always been a relevant issue both in research and practice. In the past several papers have investigated the forecasting practices of companies. This research uses data from the GMRG survey to:

- describe current practices in the machinery and textile sectors; in particular we investigate: (i) both upstream and downstream cooperation; (ii) structure of the forecasting process followed by companies; (iii) algorithms and tools adopted; (iv) performance
- investigate contingencies that lead companies to choose various forecasting processes, techniques and tools; among other contingent factors we investigate structural ones (company size and sector), strategic ones (improvement priorities) and demand characteristics (e.g. number of products) ;
- highlight gaps between current research and actual companies' practices; such gaps are discussed to identify areas where support and education are needed and, on the contrary, areas where researchers need to develop new tools and concepts to support companies practices.

Session 24: SAT. 10:30 - Caribe
Supply Chain Network Structure

Cluster: Environment and International

Chair: **Julio Macedo**, Institut Strategies Industrielles

1. Challenges in Interorganizational Structures
Luciana Ballejos, Universidad Tecnológica Nacional
Jorge Montagna, INGAR – Instituto de Desarrollo y Diseño - Santa Fe

The importance reached in several levels by the formation of networks between organizations has generated multiple works about its requirements, challenges and the different technologies used to support them. This work analyzes the concepts and characteristics of Interorganizational Networks (IO Networks) – for example the Supply Chain Network - and Interorganizational Information Systems (IOIS) that enable and support the creation of these structures. Although IO Networks and IOIS are well known terms in the organizations literature, there is a big gap between them because of multiple reasons and possible risks that have to be taken into account previously to an IOIS implementation. To order and relate these concepts, this work proposes a set of stages that need to be defined and integrated before the IOIS definition, to analyze the particularities of the specific network in which it will be used, and to minimize the occurrence of latent risks, which are also analyzed.

2. Structuring the Supply Chain
Rafael Ruiz-Usano, University of Seville
Jose Manuel Framinan, University of Seville
Pedro L. González, University of Seville

A supply chain can be enhanced by accepting new partners or nodes into the network. This happens when the focal company decides to accept new suppliers or new customers into the inter-company network. This situation becomes more complex when the company belongs to an intra-company network. In both cases it seems to be very interesting to investigate the best option to be done (to accept or not to accept the new partners). Several methods can be used to make the best decisions for every possible scenario. This paper deals with the problem of how to structure the new supply network after adding or deleting some partners/nodes. To face this, several approaches coming from different fields of Operation Research and Management Sciences are shown in the paper.

3. Global Supply Chain Mapping - An Object-Oriented Approach
Dipak Misra, Xavier Institute of Management
Kaushik Sahu, Xavier Institute of Management

Global collaboration is one of the major corporate strategies worldwide for integration and coordination of the supply chain from the customers' customers to the suppliers' suppliers. From sourcing to logistics/reverse logistics to in-house activities, even though the aim is to achieve better chain efficiencies through continuous or discontinuous changes, the importance of realization of the ultimate customers' expectations cannot be overstated. In the pursuit of achieving excellent chain efficiencies, the customers' wants often suffer from uncalled for distortion. Often the customer's intent is not fully captured in the first place. We use object-oriented technology to develop a model for the supply chain interfaces using the Quality Function Deployment approach that captures the voice of customer effectively, preserves it undeterred, and disseminates the same throughout the upstream processes to various collaborative partners. We make use of the Unified Modeling Language artifacts to elucidate the business process intricacies.

4. The Internet Productivity Paradox
Jose Lopez Sanchez, UCM-DMR Consulting E-Business Research Center
Beatriz Minguela Rata, UCM-DMR Consulting E-Business Research Center
Antonio Rodriguez Duarte, UCM-DMR Consulting E-Business Research Center
Francesco Sandulli, UCM-DMR Consulting E-Business Research Center

This study considers how Internet usage and Information Technology investment affect firm productivity. We analyze the relationship between information technology investment and productivity with more detail than previous work, by separating IT investment into hardware and software investment categories. The study is also one of the first to test the contribution of the Internet to labor productivity. Our findings provide clear evidence of the relevant contributions of Internet usage and IT investment to the productivity of the firms.

5. Strengths and Weaknesses of Foreign Manufacturers Subcontracted by Virtual Manufacturing Firms
Julio Macedo, Institut Strategies Industrielles

Virtual manufacturing firms design and distribute products made by subcontracted foreign firms. Currently, in North-America, there is a strong competition between virtual and real manufacturing firms. This paper presents the strengths and weaknesses of a set of foreign manufacturers subcontracted by virtual firms. The ultimate goal is to identify survival strategies for the real manufacturing firms. These strengths and weaknesses are obtained by questioning the operations managers of nine Canadian virtual apparel firms. The results show that the foreign subcontractors have low production costs and good quality products. However, they are unable to produce and deliver on time sudden low volume orders. In addition, their delivery delays

are high due to the long transportation delays. Hence, the real apparel firms could implement quick response methods for their serial production and especially for their new product development process to win the competition against the virtual firms.

Session 25: SAT. 10:30 - Coral
JIT and Lean Production

Cluster: Operations and Logistics

Chair: **Kakuro Amasaka**, Aoyama Gakuin University

1. A Configurational View of Lean Production Systems

Rachna Shah, University of Minnesota
Peter Ward, The Ohio State University

There is general agreement that lean practices make up the emergent new manufacturing paradigm. Despite widespread interest and some empirical evidence to support its role in improving firm performance, there is very little understanding related to organizational characteristics of lean firms. The objective of this research is to 1) provide a valid and comprehensive set of lean practices that represent the underlying domains of lean manufacturing; 2) explore different patterns of implementation of lean practices; and 3) compare and contrast strategic and behavioral characteristics among groups that exhibit different patterns of implementation. Using data collected from US manufacturing plants, the study develops a comprehensive index to measure firm leanness. Then, it empirically identifies three different patterns of implementation of lean practices exhibited by firms. Lastly, it finds that the three groups differ systematically from each other in strategic and behavioral characteristics.

2. Implementation of Kanban Supply System in the Brazilian Electronic Industry

Samuel Conceição, Federal University of Minas Gerais
Rodrigo Coelho, Federal University of Minas Gerais

This article presents a case study of the implementation and simulation of the kanban supply system in the internal production environment of an industry in the electronic sector of contract manufacturing. Kanban supply was implemented by means of a buffer centralized in the production area of production, upon which the following is a proposed refinement of the system with the decentralization of the buffer, distributing the materials directly at the service sites of the assembly line. The software Arena was used for the modeling and simulation of the operational conditions of the assembly line. The performance of the production line is measured by how well it meets the demand during the working shift available. An approach using the MOST (Maynard Operations System Technique) method is utilized to estimate the time necessary for assembly operations at the service sites.

3. When Lean Gets Mean: Design of a Kanban System to Cope with Non-Stationary Demand Distributions

Magnus McFarlane, Aston Business School
Doug Love, Aston University
Paul Robins, Aston Business School

Approaches to the design of Kanban systems commonly assume that the demand distribution is stationary and calculate appropriate Kanban quantities accordingly. If changes in demand occur, it is assumed that they're gradual and can be dealt with using incremental adjustment of the system during operation. Significant or rapid shifts in demand patterns undermine that assumption and can lead to system failure for some parts, whilst others may be unaffected. This paper presents a comprehensive design process that can be used to identify and overcome this situation. A case will be used to show how a deterministic simulation can be used to identify volatile parts and calculate an appropriate set of policies. It is also suggested that the same tool is used during normal operation of the system to detect the transition of parts from a stable to unstable demand before problems occur on the shop floor.

4. The Effects of Just-in-Time/Lean Production

Jannis Angelis, University of Cambridge
Robert Conti, Bryant College
Colin Gill, University of Cambridge
Cary Cooper, Lancaster University Management School
Brian Faragher, UMIST

A long-raging debate about the effects of lean production on worker job stress has been waged primarily with case studies and anecdotal evidence. Little statistically valid guidance has emerged to help meet the challenge of operating lean systems that control job stress, and its associated human and operating costs. This is the first large scale, multi-industry empirical study of the relationship of job stress to a range of lean practices, as well as to the degree of lean implementation. The results are based on 1,391 worker responses from 21 manufacturing sites in four UK industry sectors. Eleven work practices are found to be significantly related to job stress and an unexpected non-linear response of stress to lean production implementation is identified. The results and their implications are discussed, and recommended practices described.

5. Applying New JIT - A Management Technology Strategy Model at Toyota

Kakuro Amasaka, Aoyama Gakuin University

The author proposes New JIT, a next generation management technology that contributes to corporate management. New JIT consists of a hardware system founded on three core elements (TMS, TDS and TPS), and a software system (TQM-S) that enables scientific TQM application. In previous studies, the effectiveness of New JIT was successfully proven through its application to a leading Japanese company, Toyota Motor Corporation. This paper analyzes and proves the significance of strategically implementing New JIT—a management technology strategy model verified at Toyota. Studies were conducted by applying New JIT not only to affiliated companies but also to non-affiliated companies, which aims to achieve harmonious coexistence between these companies. The studies successfully achieved simultaneous QCD (Quality, Cost and Delivery) fulfillment, which is a global management challenge in production.

Session 26: SAT. 10:30 - Mediterráneo 1
Object Oriented Optimization and Push-Pull Models

Cluster: Operations and Logistics

Chair: **Erwin Van Der Laan**, Erasmus University Rotterdam

1. A Time Efficient Non-recursive Heuristic (RETIREXT) for Resource Constrained Project Scheduling Problems

Manabendra Pal, Indian Institute of Management, Calcutta
Tarun Bhaskar, Indian Institute of Management, Calcutta
Ranjan Pal, Birla Institute of Technology

This paper considers Resource Constrained Project Scheduling Problems (RCPSP) to obtain the minimum makespan schedule. A non-recursive heuristic called Resource Time Ratio Exponent Technique (RETIREXT) has been developed that evaluates Schedule Performance Index (SPI) at every decision point of a project on all possible subsets with maximum number of activities in each under available resource constraints and then selects the one having the maximum value of SPI. SPI is expressed as a power function with the variables on each subset as the ratio of the required to the available resources of each type respectively and the Maximum Remaining Path Length (MRPL) of each activity on the subset to the duration of the project with no resource constraint. Kolisch and Sprecher benchmark problems' solutions obtained by RETIREXT are compared with that obtained by other methods and RETIREXT has been found to be the most time efficient one for comparable solutions.

2. Extended Job Shop Scheduling by Object-Oriented Optimization Technology

Minoru Kobayashi, Tokai University
Kenji Muramatsu, Tokai University

Almost all conventional benchmarking problems of Job Shop Scheduling Problem (JSSP) are not realistic in the sense that interruptions of operations, uses of alternative machines and so on are not allowed. Its theory is also mainly confined to treat just the decision feature of sequencing. Then, we advocate an extended model of JSSP involving various heterogeneous decision features such as lot splitting (interruption of operation), dispatching as well as sequencing. Consequently, the problem has a feature of combinatorial and continuous dynamic optimization and hence the extension of solution concept and a new solution principle is obligatory. One of the key ideas approaching this new type of problem is to introduce the concept of progress of operations into the model and to formulate it into a transient state in a dynamic optimization problem. Then, we present the methodology denominated the object oriented optimization technology that enables to optimize (near optimize precisely) all of those decision features.

3. Push Pull Mixed Type of Optimal Compound Production Planning Method by Object Oriented Optimization Technology

Takuya Serizawa, Tokai University
Hideyasu Karasawa, Data CakeBaker Corporation
Kenji Muramatsu, Tokai University

In a compound production system where make-to-stock items and make-to-order items share common processes, it is difficult to partition the decision feature of a longer term production plan and the one of a shorter term one (scheduling) at a production planning and scheduling. Fortunately, the object oriented optimization technology (by our terminology) enables us to near optimize the plan of production and work-in-process for each of items involving final products, components, and parts in the longer term plan as well as in the shorter one. The difference is that in the longer one, planning is mainly based on forecasting exploded data. In the paper, we present the optimization method that, by solving the longer one, specifies optimally the terminal condition (the stock level of each item at the end of the planning horizon) of the shorter one by use of the solution at its corresponding timeslot and, one after the other, by solving the shorter one, specifies the initial condition of the longer one.

4. Simple Heuristics for Push and Pull Remanufacturing Policies

Erwin Van der Laan, Erasmus University Rotterdam
Ruud Teunter, Erasmus University Rotterdam

We analyze an inventory system with product returns, where remanufacturing is an alternative for manufacturing. We consider both push and

pull policies. We present simple formulae for approximating the optimal policy parameters under a cost objective including holding, set-up, and backorder costs. In an extensive numerical experiment, we show that the proposed formulae lead to near-optimal policies.

Session 27: SAT. 10:30 - Mediterráneo 2
Perspectives on Critical OM Methods & Techniques

Cluster: Operations and Logistics

Chair: **Raju Balakrishnan**, Clemson University

1. A Single Period Model for Capacitated Real Time Revision of Order Quantities
Amiya Chakravarty, Tulane University
Raju Balakrishnan, Clemson University

We discuss a hybrid control policy comprising of an advance (pre-production) order size agreed upon with suppliers, and a provision for real time order revision at a given rate of surcharge. We show that a rank-order of products can be used for real time revisions, and that a strong buyer-supplier relationship that keeps these surcharges low can actually help increase profits for both parties. We study issues such as compatibility between JIT and flexibility, and the impact of market conditions on overall profitability.

2. Resource Downgrading
Ertunga Ozelkan, University of North Carolina at Charlotte
Metin Cakanyildirim, University of Texas at Dallas

The aim of this paper is to develop models for managing inventory of resources that can be downgraded for some other purpose after being re-used a number of times and before they are declared unsuitable for their intended purposes. This scenario occurs in several industries including (i) test wafer management in the semiconductor manufacturing where high grade wafers are downgraded to lower grades, (ii) in logistics where a long-range hauling truck is converted to a local hauling truck after a certain mileage, and (iii) without loss of generality resource upgrades such as promotions in personnel management can be treated under the same category of problems as well. The typical decisions are the quantity of resource to purchase, to hold, to scrap and to downgrade at different decision periods. We use a network based structure to formulate the problem and study several special cases.

3. An Optimal Breadth-First Algorithm for Preemptive Resource Constrained Project Scheduling Problem
Sanjay Verma, Indian Institute of Management

A simple breadth-first tree search scheme with pruning rules to minimize the makespan of the project is described. A project consists of a set of activities partially ordered by precedence constraints. An activity has a given non-negative duration and uses renewable resources such as manpower and machinery. The total number of available units of each resource is constant and specified in advance. A unit of resource cannot be shared by two activities. An activity is ready to be processed only when all its predecessor activities are completed and the numbers of units of the various resource types required by it are free and can be allocated to it. Once started, an activity can be interrupted and rescheduled later on without any increase in duration of that activity. There are no set-up times. The objective is to assign start times to the activities so that the makespan is minimized.

Session 28: SAT. 13:30 - Caesar 1
ERP

Cluster: Operations and Logistics

Chair: **Sushil Gupta**, Florida International University

1. ERP Implementations and Cultural Influences : A Case Study
James O'Kane, University of Northumbria
Marco Roeber, University of Northumbria

User acceptance and support of a new Enterprise Resource Planning (ERP) system at the early implementation stages are critical key success factors, which have to be targeted with appropriate change management. This becomes even more important in an Asian context where national and organizational culture with a different value and belief system, resulting in different management styles, might not harmonize with Western business culture embedded in the predefined standard business processes of existing ERP packages. This research describes and critically evaluates research into national and organizational culture and the influence of different national cultures on the implementation and reengineering process of ERP packages in an Asian context. Using a case study, realized through a quantitative survey in a Korean sample company, confirmed the expected results from the literature review that culture has an impact on the implementation process and that employee empowerment is an unavoidable consequence of an ERP implementation.

2. Competitive Advantage Through Integrated Information Systems: The Influence of Strategic Configuration on ERP Benefits
Jeff Stratman, Georgia Institute of Technology

The recent wave of enterprise resource planning (ERP) adoptions was largely based on the

assumption that the integration of business information would provide firms with a competitive advantage, yet concrete business benefits have been uneven across adopting firms. The resource-based view holds that competitive advantage is derived from inimitable resources, yet ERP software has become a standard. Socio-technical theory suggests that while ERP technology provides a necessary foundation, internal organizational resources are the true drivers of ERP benefits. Since a firm's strategic configuration is posited to influence the portfolio of organizational competencies available to leverage the benefits of integrated business information, a number of hypotheses are developed based on the notion that firms with different strategic configurations will realize different operational benefits from the adoption of ERP systems. Survey data from North American manufacturing firms that have implemented ERP systems are used to evaluate these hypotheses.

3. A Framework to Assess ERP Implementation

Jorge Montagna, INGAR – Instituto de Desarrollo y Diseño - Santa Fe
Luis Ferrario, Red Megatone – Information Systems Dept.

Various sources point out very high percentages of failures to implement ERP systems. In this work, the main difficulties for this task are analyzed and a systematic classification of fundamental reasons is intended. By considering the reasons that lead to failure, a simple and effective mechanism is generated to evaluate in advance complications the project might present. In this way, the tools to be used can be adjusted to the specific characteristics of the project. Somehow, it is intended to solve the problem presented by general methodologies, which are used for any kind of enterprise, without previously considering its conditions and state to face this type of projects.

4. ERP Systems in Mining Industry: Studying the Software Functionality and the Value Chain

Paulo Sachs, University of São Paulo
Fernando Laurindo, University of São Paulo
Giorgio De Tomi, University of São Paulo

ERP systems have been widely implemented nowadays in several industries. However, as ERP was originally designed to fit former MRP and MRP II users, mostly in discrete manufacturing, few related research has been focused on Mining industry.

On the other hand, process industry – and the mining industry in particular – presents many peculiar characteristics, which are difficult to comply with ERP systems standard functionalities, and very limited research has been developed covering this industry segment. The objective of this paper is to identify how ERP systems manage the functional areas of the mining industry, and how they fit into the mineral value chain IT requirements. A secondary objective is to identify the gaps between ERP's functional capabilities and the mining industry business requirements, and also to point out the perceived benefits they generate to the companies. This paper employs case study and exploratory survey methodologies.

5. Economic Decision Making Using Fuzzy Numbers

Shih-Ming Lee, Florida International University
Kuo-Lung Lin, Florida International University
Sushil Gupta, Florida International University

In engineering economic studies, single values are traditionally used to estimate the cash flows. Since uncertainty exists in estimating cost data, the resulting decision may not be reliable. To overcome the shortcoming of single-valued estimation, the fuzzy numbers could be applied in cash flow analysis. Instead of single-valued estimation, each cost data could be designated as a trapezoidal fuzzy set in this approach. The final result from the cash flow analysis will still be a trapezoidal fuzzy set, which provides the decision-maker with a broader view of possible outcomes. Since the final results are trapezoidal fuzzy number sets, comparison among alternatives is not as straightforward as the traditional economic analysis. A ranking method is recommended in this research to assist decision maker in selecting the best alternative.

Session 29: SAT. 13:30 - Caesar 2

Operational Advantage Group (OAG)

POMS Sponsored Forum
Part 2 of 2

Chair: **Joel Goldhar**, Illinois Institute of Technology

(See Fora section for details)

Session 30: SAT. 13:30 - Caesar 3
International Perspectives on Agile Supply Chains

Cluster: Operations and Logistics

Chair: **Yossi Aviv**, Washington University

1. Evaluation of Different Material Control Methods in a Truck Manufacturing Supply Chain

Fredrik Nilsson, Lund University
Karolina Ingelsson, Lund University
Carl-Henrik Tjärnlund, Lund Univesity

Increased competition requires enterprises to understand factors driving costs in their supply

chain operations. The use of different material control methods is one way to decrease costs. A major truck manufacturer has made several improvements regarding material flows, but savings due to lower stock levels compared to increased transport costs have not been evaluated. The purpose of this paper is to present a case study and discuss the important considerations needed to be made when evaluating the supply chain and what parameters are of most vital importance for costs related to material flows. A case study has been performed to identify what parameters that influence activities. Furthermore, three mappings have been done to evaluate the effects of material control methods on inventory levels and transportation costs. It is concluded that several problems regarding costs are due to lack of knowledge about how transporters in particular, but also suppliers, work.

2. Modeling In-Bound Logistics at a Packaging Firm - Agent-Based Modeling in Action

Fredrik Nilsson, Lund University

The search for approaches and methods that assist managers in the process of decision-making is a never-ending endeavor for all types of management. In logistics and supply chain management, several approaches and methods have been developed and used, and during the latest decade, with the use of more advanced information technology, more comprehensive methods have been developed. One emerging method and approach for the creation of robust and accurate "what-if" scenarios in logistics management applications is agent-based modeling. This article aims at contributing with novel insights of modeling and simulation in logistics management with the use of agent-based modeling as the application. This will be done by describing a theoretical base for agent-based modeling and with the presentation of a case where an agent-based model has contributed to increased precision in the decision-making at a packaging company in the UK and showed impressive results in the strategic decision-making process.

3. A Simulation Approach to Comparing Supply Chain Control Systems

Helen Benton, Aston University
Doug Love, Aston University

Pressure intensifies on supply chains to deliver superior customer value in a timely fashion. Therefore, supply chains need a supportive information infrastructure for the physical supply chain processes to succeed; these solutions vary in their degree of centralization. The use of ERP and Enterprise Application Integration illustrates one perspective that systems should centralize. However, e-Commerce trading exchanges dominate some sectors and led to organizations operating independently, with decentralized control of ordering, production and delivery of goods. With the opposing paradigms both exhibiting success and the inherent complexity of supply chains it is clear that it is not a "one size fits all" scenario. The paper outlines the factors that could impact on the performance of a supply chain system. A simulation model is described that investigates some of these factors and compares the performance of different systems using supply chain wide metrics.

4. Manufacturing Production Planning System Based on Agile Supply Chain Management

Zhixiang Chen, Zhongshan University

Production planning is the core component of MRPII/ERP, but traditional MRPII or ERP lack enough flexibility and responsibility to the outside uncertainty from supply and demand. This paper studies a new production planning method for manufacturers in of agile supply chain environments. The main characteristic of the new system is that it is based on the coordination theory of supply chain, uses the MAS technology to support the decentralized coordination of supply and demand information; one coordination mechanism model based on three level coordination structure is advanced; in order to increase the agility of MPS, a new method of uncertainty management method using advance demand forecasting and order process model is studied.

5. Collaborative Forecasting and Inventory Management - Logistics Capacity Considerations

Yossi Aviv, Washington University

A time series, linear state space framework and its application in a study of the potential value of collaborative forecasting partnerships will be presented. The model includes a formulation of the co-evolution of demand and information, a feature that is critical for the study of supply chain settings characterized by rich and decentralized information.

The presentation will focus on a recent research that explores the value of collaborative forecasting in capacity-constrained manufacturing environments. We describe a linear quadratic control approximation method that results in reasonable and easy-to-implement production planning control strategies for such settings. The research also generates relevant insights into cases with logistics capacities other than manufacturing; e.g., transportation and warehousing.

Session 31: SAT. 13:30 - Caesar 4
Quality I / Calidad I

Cluster: Service and Quality

Chair: **José-Ángel Miguel-Dávila**, University of León

1. Diseño del Cuadro de Mando Integral Para un Hospital Público Desarrollado en Base a Los Modelos de Excelencia

Pastor Jesus, Universidad de Zaragoza
Luis Navarro, Universidad de Zaragoza
Pastor Tejedor Ana Clara, Universidad de Zaragoza

Los modelos de excelencia han sido implantados en numerosas organizaciones y también muchos de ellos disponen de un Cuadro de Mando. Pero pocas organizaciones han utilizado ambos, para conseguir un Cuadro de Mando Integral. No existen muchas referencias bibliográficas, pero algunos autores con Kaplan y Norton, consideraban muy útil su utilización conjunta. En este trabajo se ha desarrollado en un hospital público para obtener el diseño de un cuadro de Mando Integral a través del EFQM. En este estudio se desarrolla la metodología llevada a cabo para llegar al cuadro de Mando Integral, y como se aplicó. Se reducen los 217 indicadores que tenían anteriormente a 25 indicadores principales que emanan directamente de la estrategia definida por el hospital. Los indicadores estaban sin una elaboración adecuada para la comparación temporal y competitiva de la empresa. Se consiguió solucionar las divergencias que se encontraban por no relacionar los modelos.

2. Implantación de Sistemas de Calidad Total en la Construcción

Josep Capó, Universidad Politécnica de Valencia
Guillermina Tormo, Universidad Politécnica de Valencia
Angel Ortiz, Universidad Politécnica de Valencia

Nos encontramos en una época de importantes y grandes cambios tecnológicos y organizativos, por lo que muchas empresas se ven arrastradas a modificar sus planteamientos, para poder afrontar los retos que plantea este nuevo entorno. En la construcción, esta incorporación de nuevas tecnologías y formas organizativas se ha producido de forma paulatina, al contrario que en otros sectores, en los cuales se han dado verdaderas revoluciones. En este trabajo se presenta un modelo desarrollado por el Centro de Investigación de Gestión e Ingeniería de Producción (CIGIP) para desarrollar modelos empresariales, mediante el uso de las metodologías de autoevaluación propias de la Calidad Total, pero introduciendo un componente nuevo; la creación de equipos multi-departamentales y multi-jerárquicos, con roles complementarios, para llevar a cabo dicha autoevaluación. Se presenta aquí la aplicación práctica de esta propuesta en una empresa del sector de la construcción.

3. The Relationship Between Service Quality and Profitability in Services: An Empirical Study in the Spanish Hotel Industry

José-Ángel Miguel-Dávila, University of León

The paper examines the relationship between the aspects of service quality and profitability in service operations through customer satisfaction and loyalty. A model of service performance effects on customer satisfaction and loyalty is introduced and tested in the context of industrial services; specifically, this analysis is developed in the supplier firm at hotels using manager perceptions of provider performance. / El presente trabajo examina la relación entre los aspectos que influyen en la calidad del servicio y la rentabilidad en las operaciones de servicios, a través de la satisfacción del cliente y la lealtad al proveedor. Se presenta y verifica un modelo de los efectos del desempeño en los servicios sobre la satisfacción y la lealtad en el contexto de los servicios industriales; específicamente, en la industria de las empresas proveedoras a los hoteles usando las percepciones de los gerentes.

Session 32: SAT. 13:30 - Caesar 5
Global Operations I

Cluster: Environment and International

Chair: **Hiroki Ishikura**, Osaka Gakuin University

1. The Importance of Strategic Localization Decisions for Automotive Supplier Industry

Marie Opheim, Norwegian University of Science and Technology
Sverre Konrad Nilsen, Norwegian University of Science and Technology

Due to market and production globalization, manufacturing companies must be able to relocate their production facilities close to the sites of global Original Equipment Manufactures (OEMs). A situation where manufacturers must establish several plants to produce almost identical products to globally distributed OEMs is thus becoming more common in the automotive supplier industry. This means that the whole value chain of one extended enterprise have to be re-designed, set-up, and operated; issues such as selection of suppliers, distributors, transporters, etc. must be analyzed. Decision makers have to work with operational, tactical s and strategic decisions.

Based on research carried out in close relation with a manufacturer acting as a 1st tier supplier in the automotive industry, a software toolkit for localization decisions of supplier manufacturing companies will be presented. Special focus will be on cost savings due to an impropriate evaluation of social impacts in different regions for localization.

2. Valuation Problems in Formation and Operation of Soft Alliance

Junsei Tsukuda, Musashi Institute of Technology

Increasing needs are emerging in Japan to form and operate successful soft alliance (SA) of small firms to cope with diversified consumer needs and decreasing demand of traditional products and services. A SA is designed to utilize excess resources of member firms to develop/ manufacture new technology, products or service based on the members' free will. Successful formation and operation of SA require a number of valuation problems to be solved. First how to determine for a firm to participate in SA? Likewise for SA how to determine to allow a firm to join SA or not? How to determine the price of new products jointly made by excess resources of member firms? How the fruits or profit gained by the jointly made products be allocated to each of members and the SA itself? The paper presents principles and scheme for solving these conflicting problems.

3. International Manufacturing Networks: Towards an Integrated Framework

Afonso Fleury, University of São Paulo
Maria Tereza Fleury, University of São Paulo

The literature on International Manufacturing considers three areas for research. The first focuses on the role of foreign factories vis-a-vis the global manufacturing strategy of the corporation. The second widens the scope by considering the network of factories in which the TNC has direct investment. The third discusses the logic behind the formation of international supply chains. The aim of this paper is to advance in the debate by considering the three determinations altogether. The point of departure is a set of research projects that were developed about the evolution of subsidiaries of transnational corporations in the telecommunications, automobile, textile and plastics industries in Brazil. The analysis rely on the International Manufacturing and International Business Management literature. The outcomes provide subsidies for a better understanding of the different shapes of international manufacturing networks and their main determinants.

4. The Spread of International Manufacturing: Evidence from Passenger Car Producers

Harm-Jan Steenhuis, Eastern Washington University
Erik De Bruijn, University of Twente

There is a belief that many manufacturing activities are being relocated from industrially advanced nations toward industrially developing nations. In several industrially advanced countries this shift is perceived as a threat for employment levels and it raises the issue of whether industrially advanced nations are losing their industrial base. In this study we examine the international shift of production. Production trends in the passenger car manufacturing industry were analyzed for the past five years. We analyze the top-10 passenger car producing companies, grouped by region of origin. Our study shows that there is no conclusive evidence that passenger car manufacturers are increasingly spreading their international production towards low labor cost countries. Preliminary sales evidence shows that the location of production might be tied with the location of sales. This means that industrially advanced nations are not losing their manufacturers as long as there is a national demand for their products.

5. An Industrial Network Model for Regional-Independent Production

Hiroki Ishikura, Osaka Gakuin University

Each region became richer by producing and exchanging specific products and services. This mechanism is explained by the comparative advantage theory. However, the theory is premised on supply making demand. Supposing many regions' technologies for products and services have been improving, the productivities have become much higher than before and supplies have provably exceeded demand. If it is true, there is a possibility that regions which do not have enough products and services of an absolute advantage are made poorer by the globalization. Numerical examples are shown about this problem with models. In order to make use of more regional products and services, it is necessary to find economic competitiveness in the community spirit. It is assumed that the competitiveness as a community is in the long-term viewpoint and the mutual reliance. These advantages were investigated for an optimum price and enterprise cooperation by using simple models.

Session 33: SAT. 13:30 - Caesar 6
Supply Chain Studies

Cluster: Strategy and Design

Chair: **Edward Anderson**, University of Texas at Austin

1. Supply Chain Capacity Management with Technology Shocks: A Reverse Bullwhip Effect

Nitin Joglekar, Boston University

We present evidence on supply chain capacity management practices in the presence of technology shocks. These shocks are caused either by new product introductions or changes in the product and process mix. Observed practices are captured in a model to derive conditions where the variance in capacity requirements increases in a manner reverse to the conventional bullwhip effect observed through inventory demand signaling. Managerial implications of the findings for a variety of supply chain management strategies are discussed.

2. Design Integration: Who Should Go Back to Redo their Work?
Jovan Grahovac, Tulane University
Thomas Roemer, Massachusetts Institute of Technology

We view new product development as an iterative process in which the overall task is partitioned and subsequent individual efforts of team members, or external suppliers, are integrated. We analyze various decision rules that can be used in deciding which individual tasks, if any, should be redefined and retried in order to perform another design iteration.

3. Preliminary Results from an Empirical Analysis of Integrating Outsourced Product Design Across Firm Boundaries
Geoffrey Parker, Tulane University
Edward Anderson, University of Texas at Austin
Alison Davis-Blake, University of Texas

We present preliminary hypotheses and evidence from a survey studying how firms outsource portions of their core product development process in environments characterized by rapid technological and market change. In particular, we discuss the role of supply chain integrators whose job is to maintain product coherence across firm boundaries.

4. Logistics Performance Comparison of Brazilian Soda Supply Chain Links
Ronan Quintão, Federal University of Minas Gerais
Samuel Conceição, Federal Univerty of Minas Gerais
Leonardo Augusto, Federal University of Minas Gerais

The objective of this research was to evaluate the logistics performance of four link ups of Brazilian soda chain (packaging suppliers of soda, soda industries, supermarkets and wholesales) the used method was the electronic survey in which fifty-four companies took part with a response rate of 40%. The answers were analyzed based on the supply chain management using the Mann-Whitney and Kruskal-Wallis statistics tests and realizing a descriptive analysis of the data. The companies evaluated the logistics performance of the chain by indicators, selected upon bibliographic revision, and identify the degree of use of those indicators.

5. A Model for Managing Outsourced Product Development using Potentially Corrupt Data
Edward Anderson, University of Texas at Austin
Nitin Joglekar, Boston University

We develop a control theoretic model to capture management decisions within distributed outsourced product development projects and allow for corruption in the progress status data either by mis-estimation or information systems errors. Our analysis yields a framework that illustrates the balance between data quality improvement costs/delays and ongoing product development costs.

Session 34: SAT. 13:30 - Caesar 7
Environmental Management Systems Design

Cluster: Environment and International

Chair: **Axel Tuma**, University Augsburg

1. Sustainable Production Systems Evaluation Using the Analytic Hierarchy Process
Adrien Presley, Truman State University
Laura Meade, University of Dallas

Environmental issues are becoming increasingly important to companies as they come to realize that choices made about products and processes can have profound environmental impacts. An emerging area in these area is Sustainable Production, which looks at developing and manufacturing products in such a way as to be environmentally friendly and socially conscious to workers, consumers, and communities while ensuring a fair return and long term viability to the company. This paper describes the progress of a project that seeks to develop and validate a conceptual model to aid in decisions related to sustainable production using the Analytic Hierarchy Process (AHP) as a framework. The paper presents an AHP model which is intended to be a generic model applicable to a variety of decision areas. A case study in progress which seeks to validate the model will also be discussed.

2. A Theoretic Approach for a Green Supply Chain
Breno Nunes, Federal University of Rio Grande do Norte
Sergio Marques Junior, Federal University of Rio Grande do Norte
Rubens Ramos, Federal University of Rio Grande do Norte

This paper aims to describe what is a green supply chain (GSC), how it works and what are the benefits from it, making this analysis through a review of literature about this issue. It is shown basic steps to create the GSC, methods to manage it and the result of its implementation. GSC is usually started by an end producer, which has an environmental management system, and desires to pass good environmental practices to its suppliers. The implementation of GSC can be also done by market requirements. The results include cost reduction, resource conservation, public image improvement, and market competitiveness among others benefits that are describe in this work. Problems for greening the supply chain are the reduction of flexibility of suppliers and culture of organizations. This paper can help companies to meet global market

requirements and public administrator to understand the environmental performance through industrial clusters.

3. Business Models and Closed-Loop Supply Chains: An Analysis of the Automotive Industry

Peter Wells, Centre for Automotive Industry Research
Margarete Seitz, The Brass Centre - Cardiff University

Reverse logistics and remanufacturing are established concepts. Social, environmental and economic forces combine to make both concepts of growing importance. It cannot be assumed that either reverse logistics or remanufacturing can be added to business structures. In the automotive industry reverse logistics and remanufacturing are marginal and are undertaken for reasons other than profitability or sustainability. This is because industry structure and business models focus on the mainstream activity of manufacturing and selling new cars.

This paper presents the contention that reverse logistics and remanufacturing cannot be considered in isolation from the original manufacturing and supply business. Successful reverse logistics and remanufacturing may require a restructuring of the mainstream production business, and the introduction of different business models. The paper provides a theoretical account of possible structures in the automotive industry, along with the accompanying business models, and seeks to demonstrate the impact upon reverse logistics and remanufacturing strategy.

4. Analyzing Control Mechanisms for a Sustainable Supply Chain Planning

Juergen Friedl, University Augsburg
Axel Tuma, University Augsburg

Following current thoughts concerning modern production concepts, an increasing tendency to network organizations (supply networks) can be identified. On the enterprise level energy and material flows are mainly determined by the total amount and allocation of the workload between individual enterprises. In this context production coordination mechanisms are needed to coordinate these flows taking into account economical (e.g. maximization of marginal income) and ecological (e.g. minimization of emissions) goals. For this reason an enterprise strategy must be specified, that weights economical and ecological aims. On the factory level control mechanisms are required to implement the reference values (production program) considering the enterprise strategy. Due to the complexity of real production systems it is advisable to use heuristic approaches for this coordination process.

The coordination mechanisms are illustrated with the help of a virtual supply network of the textile industry.

Session 35: SAT. 13:30 - Caesar 8
Retail Operations

Cluster: Operations and Logistics

Chair: **Zeynep Ton**, Harvard Business School

1. Estimating Uncertainty Using Judgemental Forecasts

Ananth Raman, Harvard Business School
Vishal Gaur, New York University
Saravanan Kesavan, Harvard Business School

Stochastic planning models in management science rely on the estimation of the standard deviation of one or more random variables. We present a methodology for estimating standard deviations from expert forecasts and empirically validate it using retail sales and stock-market earnings data.

2. Drivers and Consequences of Defects in Retail Stores

Zeynep Ton, Harvard Business School
Ananth Raman, Harvard Business School

From a longitudinal study of 245 stores of a large retailer, we show that increasing variety and inventory increase the likelihood of a SKU being misplaced where a consumer cannot find it. Our analysis also suggests that increasing misplaced SKUs reduce store sales. Hence, we argue that the impact of greater product variety and inventory on store sales is often overstated in the literature that has failed to account for the impact of inventory and variety levels on misplaced SKUs and the effect of the latter on store sales. Our study also makes two contributions to quality literature. One, we provide empirical evidence to support earlier assertions that higher product variety and inventory lead to an increase in defect rates in manufacturing. Two, we show empirical support for studies that argue for the beneficial impact of increased quality on firm performance.

3. Empirical Evidence of Excess Shelf Space in Retail Stores and Impact on Supply Chain Execution Costs

Rob Broekmeulen, Technische Universiteit Eindhoven
Karel Van Donselaar, Technische Universiteit Eindhoven
Jan Fransoo, Technische Universiteit Eindhoven
Tom Van Woensel, Technische Universiteit Eindhoven

We gathered empirical marketing and operations data at a grocery retail chain. Combining this data into a single database provided us the opportunity to conduct a unique analysis on the

use of shelf space. We argue that the cost of replenishment dominates the inventory holding cost. Further, requirements on minimum display quantities dominate the safety stock level. These two insights can explain the existence of excess space on the shelf, which is shown to be existent in our data set. Thus, excess shelf space exists that is not required to carry out the current operations with respect to customer service and costs. Excess shelf space offers enormous opportunities for the development of new supply chain coordination mechanisms.

4. Logistics Processes of European Grocery Retailers: Fact and Fiction

Giulio Zotteri, Politecnico di Torino
Johanna Småros, Helsinki University of Technology

Although the grocery industry is known for its innovative supply chain management practices, many grocery companies have difficulties in implementing concepts such as information sharing and forecasting collaboration in their supply chains. In theory, these concepts should enable a significant increase in efficiency, but in practice implementation has been slower than expected. In order to better understand this slow development, we have conducted a series of in-depth interviews with leading grocery retailers in several European countries. Here, we present some preliminary findings concerning, among other things, European grocery retailers current logistics performance, their forecasting processes and resources, as well as their incentives to share information and participate in forecasting collaboration with suppliers. The findings offer opportunities for operations management researchers to validate the assumptions that different supply chain models are based on as well as to identify new research areas.

Session 36: SAT. 13:30 - Miramar 1
Operations Management in Non-Profit Services

Cluster: Service and Quality

Chair: **Uday Apte**, Southern Methodist University

1. The Performance of Universities in North Rhine-Westphalia - A DEA Comparison

Günter Fandel, FernUniversität in Hagen

In the last few years a variety of approaches have been developed for recording the efficiency of universities. The purpose of this is the distribution of funds among universities on the basis of performance and success.

The present concept of budget distribution among universities in North Rhine-Westphalia allots correspondingly more funds to universities with higher numbers of students in the first four semesters and a larger number of academic personnel, with otherwise the same number of graduates, and to those with higher outside funding expenditure with otherwise the same number of doctorates.

The redistribution criteria that are used can be interpreted as input or output variables and therefore be used as elements of a Data Envelopment Analysis. The results of the efficiency analysis can then be compared directly with those of the redistribution, to examine how far the redistribution was economically rational, i.e. was in harmony with the performance criteria.

2. Value of Higher Educational Service: Different Viewpoints and Managerial Implications

Nguyen Nguyen, Okayama University
Yanagawa Yoshinari, Okayama University
Miyazaki Shigeji, Okayama University

In order to satisfy the continuous increasing demands of customers, every organization should constantly create and add new value to its products and services. In higher education, the question of value identification and creation become more difficult, because there are different perspectives of value identification in its services. The aim of this research is to discuss the value of higher educational service from the different viewpoints: students, employers, and faculties; and propose the managerial implications for the academic institutions to close those gaps. In particular, this work discusses the value that is served by the educational teaching process in the engineering faculties of Japanese universities. It examines what and how the universities and faculties can improve its teaching processes to generate more value to their customers.

3. Impact of Satisfaction, Quality, Loyalty, Value and Expectations in Higher Education Institutions: An Empirical Study

Cid Gonçalves, Face-Fumec and Fead-Minas
Renata Guerra, Fumec
Alexandre Moura

The impact of customer satisfaction over the results and competitiveness of firms and countries has been the focus of studies. This paper attempts to test a model that measures satisfaction and the nomological net of this construct with loyalty, expectations, value and quality perceived in institutions for higher education. With a sample of 604 respondents, this research applies structural equation modeling, and shows that satisfaction has a significant impact on loyalty. The study also raises questions about the relation among expectation, satisfaction, quality and value.

4. Comparing Quality of Care in Non-Profit and For-Profit Nursing Homes: A Process Perspective

Susan Chesteen, University of Utah
Berit Helgheim, Molde University College
Taylor Randall, University of Utah
Don Wardell, University of Utah

Based on a hypothesis by Arrow (1963), this paper compares the quality of processes at non-profit nursing homes with that of processes at for-profit nursing homes. We argue that due to self-selection effects and the lack of sufficient controls for such effects, differences in outcome quality might never be detected between for-profit and non-profit nursing homes. Our approach is novel in that we assert differences in quality between these organizations are best detected by examining the quality of processes, not quality of outcomes. We report that in our sample of 42 nursing homes process quality is indeed higher at non-profit nursing homes than for-profit nursing homes even though outcome measures of quality exhibit no statistically significant differences. This provides strong support for Arrow's hypothesis and suggests that due to self-selection effects that may bias outcome measures, process measures of quality are best suited to evaluate quality in healthcare organizations.

5. Analysis and Improvement of Delivery Operations at the San Francisco Public Library

Uday Apte, Southern Methodist University
Florence Mason, F. Mason & Associates

The introduction of internet-based, online catalog systems at public libraries has allowed users to search the library's catalog, select and reserve a book or a video, and have it delivered to the branch of their choice. Consequently, the demand for delivery services is increasing at rapid rate at large urban public library systems. Having experienced a similar growth in its delivery operations, the San Francisco Public Library (SFPL) commissioned a study to improve its delivery operations. Using operations management concepts such as pre-sorting of material to avoid double handling, cross docking to reduce cycle time of delivery, and workload balancing among delivery routes to effectively increase delivery capacity, the delivery operations were restructured. We developed optimization models for vehicle routing that specifically accounted for pre-sorting, cross docking and route balancing. We also extended the generalized assignment heuristic and implemented it to redesign the delivery operations at SFPL.

Session 37: SAT. 13:30 - Miramar 2
Survey Research in Operations Management

Cluster: Environment and International

Chair: **Raffaella Cagliano**, Politecnico di Milano

1. Developing and Validating an Instrument for International Quality Management Research

Luis Solis, Instituto de Empresa
Subba Rao, University of Toledo
T. Ragu-Nathan, University of Toledo

It is important that instruments used in international research surveys are properly tested and validated across international borders because of its implications for theory building and testing in International Operations Management Research. During the last few years several research efforts had been conducted in the field of international quality management. Among them the initiative at The University of Toledo that launched an international survey on TQM practices that covered eight countries: USA, Canada, Mexico, Costa Rica, India, China, Taiwan, and Korea. One of the main results of this research was the development and publication of the first quality management measurement instrument empirically validated across international borders using an structural equation model approach. We will present the model and research methodology as well as lessons learned and recommendations for future research.

2. Two Case Studies on the Implementation of Team-Based Work Organization at Manufacturers in South Africa

Anton Grutter, University of the Western Cape

This paper reports two of twelve cases in a longitudinal study on firms that participated in the Workplace Challenge, a South African government initiative to introduce employee participation and process improvement programs at small manufacturing firms. Qualitative and quantitative data was collected over 36 months in order to fill in the gaps in the research identified by Rogelberg in Church (1998).

The cases are of two firms that made high and low efforts respectively to implement practices associated with team-based work organization and the resulting different performance outcomes. The findings are presented, interpreted in the context of the circumstances at each firm and conclusions are made. The effort made, in terms of both comprehensiveness and sustaining the initiative to implement new work organization, was found to impact on performance outcomes. The timing of the implementation of particular practices was also found to be noteworthy.

3. Outcome of the Early Adoption of Management Practices on Performance-Insights from High Performance Manufacturing Study

Frank Maier, International University in Germany
Andreas Hammer, International University in Germany

Over recent years the challenges for manufacturing companies to maintain competitiveness in the market place strongly increased due to complexity and dynamics of the more and more global competition. The early adoption and implementation of new management concepts like, quality improvement, Just-In-Time, employee involvement, manufacturing strategy, simultaneous engineering, and supplier involvement have been seen in the past as a means to continuously improve the competitiveness, in particular in manufacturing plants. This paper investigates the relationship between the early adoption of these practices and the success and competitiveness of manufacturing plants based on the empirical research project High Performance Manufacturing. The research uses causal modeling to investigate a set of hypotheses about the relationship between adoption and objective performance measures and then relates this to the perceived competitiveness of the plants. The results of the causal model confirm many of the initial hypotheses.

4. Worldwide, Longitudinal Surveys in Operations Management: The Case of International Manufacturing Strategy Survey

Raffaella Cagliano, Politecnico di Milano
Federico Caniato, Politecnico di Milano
Gianluca Spina, Politecnico di Milano

The relevance of research based on International Surveys in the Operations Management field is well recognized and proved by the high number of papers on relevant journals based on worldwide datasets. However, the contribution to theory and sustainability of research conducted through this instrument were not enough debated by the literature. In this paper we will present the International Manufacturing Strategy Survey network, a ten years lasting research collaboration among more than 20 universities around the world aimed at studying manufacturing and supply chain strategies of manufacturing companies in the metalworking industry. The paper will discuss the relevant issues about the research project, including the research model, the scope, the organization of the research across the network, the main publications and results. Through this discussion, this paper will give some insights about methodological aspects in conducting International Surveys and about their role in theory building in the OM filed.

Session 38: SAT. 13:30 - Miramar 3
Modeling in Process Industries

Cluster: Operations and Logistics

Chair: **Christopher Suerie**, TU Darmstadt

1. Production Planning and Control in the Food Processing Industries

Wout Van Wezel, University of Groningen
Dirk Pieter Van Donk, University of Groningen
Gerard Gaalman, University of Groningen

Within the process industries the food processing industry is a large and important type of industry with a number of specific characteristics. So far relatively little attention has been paid to this type. Our presentation has three related topics. First, we outline the characteristics of the market, products, and production processes in food processing industries. Second, we use the specific configuration of these characteristics to develop a production planning and control framework for the food processing industries. Third, we use the framework to analyze and redesign the planning processes at a cookie manufacturer in an ongoing case-study.

2. Business Modeling in Support of Innovative Process Development in the Specialty Chemical Industry

Thomas Burgess, Leeds University Business School
Nicky Shaw, Leeds University Business School

We report on research collaboration between industry and academia to improve manufacturing process development in the specialty chemical industry. Faculty drawn from Operations Management personnel in a Business School and from personnel in Chemical Engineering and Mechanical Engineering Departments have combined with industry practitioners to develop frameworks and tools to support an innovatory approach to designing and developing manufacturing processes within what can be characterized as a traditional, batch production environment. The background to the research is described and the major action research style initiatives outlined that culminated in industry-based case studies. The business aspects of the developed framework and tools will be presented from an Operations Management perspective.

3. The Impact of Product Variety on Performance Tradeoffs in Process Industries: An Empirical Examination

James Hill, Vanderbilt University

This study examines the impact of product variety on process industry plant performance using data from six different industries that produce multiple products on a single stage processor. We explore two dimensions of variety; (1) the number of product recipes produced on a single line and (2) the heterogeneity between product recipes. The empirical analyses indicate that the heterogeneity of product recipes and the number of product recipes are significant factors when measuring total changeover time and total earliness-tardiness. However, we do consider product heterogeneity to be slightly more important for production schedulers in process industries. Our empirical results show that there is no significant difference in total earliness-tardiness between

process industry environments and minimal difference in changeover time as long as product recipe heterogeneity is low. We conclude that broadening the product line will not impact performance as long as product recipes are fairly homogeneous.

4. Diffusing Digital Ink Jet Printing as a Production Innovation in the Printed Textiles Industry

Thomas Burgess, Leeds University Business School
S. Burkinshaw, Unversity of Leeds
Arun Vijayan, University of Leeds

We report on research into factors hindering and facilitating diffusion of digital ink jet printing as a full-scale production innovation in the printed textiles industry. Digital ink jet printing has gained substantial acceptance as a method for speedily producing small numbers of printed textiles as samples in the design and development phase. However, as a full-scale production method where high volumes are required at low cost, then the technology has still to gain acceptance. To examine factors constraining and facilitating acceptance, a qualitative approach is undertaken with semi-structured interviews with senior managers located in organizations comprising major stakeholders in the supply chain for printed textiles. The interviews concentrate on key themes of knowledge of the innovation, supply chain relationships, and potential interaction between the innovation, and existing products and processes.

5. New Modeling Approaches for Process Industries

Christopher Suerie, TU Darmstadt

Process industries differ from discrete manufacturing industries in many aspects. These aspects, e.g., campaign production, production in batches or long setup times have to be considered when planning for production. Mixed Integer Programming models are often used in process industries to derive mid-term as well as short-term production plans. In this paper a new modeling approach to the aforementioned aspects of production planning in process industries will be presented and discussed. It rests on some well-known lot-sizing models which are enhanced to take into account the special aspects from process industries.

Session 39: SAT. 13:30 - Miramar 4
OM in Emerging Economies: Challenges and Potential I

Cluster: Environment and International

Chair: **Michel Leseure**, Aston Business School

1. Operations Management as a Vehicle for Developing Production Competence in Emerging Economies

Ian Hipkin, University of Exeter
David Bennett, Aston University

Emerging economies wishing to counter competition from international firms entering their markets use technology and new management approaches as bases for development, but they are subject to internal constraints that do not confront competitors in the developed world. Purchasing equipment short-circuits the process of developing technology, and allows faster access to new expertise located beyond the boundaries and abilities of individual firms in developing countries, but does not guarantee transfer of the technology. This paper studies the impact of operations management concepts on production competence in a number of case studies in South Africa. Performance standards imposed by customers in terms of quality, delivery and flexibility require managers to apply operations management models that are widely in the industrialized world. The research analyses how quality, delivery and maintenance improvement programs have been managed, and how their disciplined approaches have provided valuable mechanisms for enhancing production competence.

2. The Impact of Operations and Human Resource Strategies on Firm Performance

Kwasi Amoako-Gyampah, University of North Carolina, Greensboro
Moses Acquaah, University of North Carolina, Greensboro

This paper examines the differential and combined effects of operations and human resources strategies on firm performance in an emerging economy. Using existing theories and findings from current empirical research, our study seeks answers to the following questions: 1). Do firms in an emerging economy with coherent operations strategies enjoy higher performance 2) Do firms in an emerging economy that emphasize high performance human resources practices perform better than those who do not have such practices; 3) What is the effect of the interaction between operations and human resource strategies on firm performance; 4) Are the results obtained from an emerging economy environment different from what has been obtained from more developed economies; 5).What underlying business environmental conditions help explain the results that are obtained in this setting? We examine these questions using the results of a survey from 180 firms in Ghana.

3. The Potential for Improved Competitiveness Through Innovation in a Mature Labor-Intensive Sector

Banu Bozkurt, Aston University
Kirit Vaidya, Aston University

The industrialization efforts of the sixties and seventies gave birth to the modern textile and clothing industry in Turkey. Currently, it is one of the most important manufacturing sectors in the Turkish economy in terms of shares of GDP, employment and exports and Turkey is one of the important textile and clothing producers and exporters in the world. The sector is currently transitioning from a volume oriented, cost-based contractor role in the world to assume more value-added activities such as design and product development. The goal of Turkish textile manufacturers in this transition is to capitalize on their experience, skilled labor, and technological advantages to establish new markets for high quality, Turkish-designed clothing. In addition to the issue of effective learning, a further question is whether such upgrading is possible in a sector in which high value added is strongly associated with market access and brand strength.

4. New Media, New Values – The Revolution and Perspectives in Brazilian Television's Market

Wagner Damiani, EAESP/Fundação Getúlio Vargas

This present research intended to evaluate how the digital technology will change the telecommunication sector. In Brazil, there are today approximately 54 million television sets for about 38 million residences. This work also contributes to the discussion of the decisions that the Brazilian broadcasters are facing about investment, standards and regulation, through an illustration of the current scenery and the perspectives of the digital media in Brazil. Despite the Japanese standard being considered the best (technologically), the research, based on the interviews of the heads of the digital television's projects of the five most important Brazilian broadcasters, concluded that Brazil is technologically prepared for digital TV and must focus on the improvement of its own digital television's business model.

5. Offshore Factories and Development

Michel Leseure, Aston Business School

In his seminal model of strategic roles for foreign factories, Kasra Ferdows introduced offshore factories as factories designed to produce specific items at a low cost - items are then exported either for further work or for sale. In the same model, he explains that offshore factories should seek to develop their strategic roles. This suggestion is consistent with the competences building rationale behind policies encouraging foreign direct investment. This paper reports the results of a qualitative research project based on multiple case studies of offshore factories in Morocco. Findings indicate (1) that only few surveyed factories match Ferdow's description of an offshore factory and (2) that for factories matching Ferdow's description the path to improved strategic roles is a leap of faith.

Session 40: SAT. 13:30 - Caribe

Cross Industry - Country Comparisons

Cluster: **Service and Quality**

Chair: **Clovis Netto**, University of São Paulo

1. Quality Management Implementation Across Different Scenarios of Competitive Structure: An Empirical Investigation

María del Mar Fuentes, University of Granada
Javier Llorens, Universidad de Granada
Daniel Arias-Aranda, Universidad de Granada
Luis Molina, University of Granada
Ignacio Tamayo, University of Granada

Scarce research has been devoted to understanding quality initiatives in different competitive environments. Furthermore, the limited number of studies considering a comprehensive range of quality management practices invariably concentrate on firms within a particular industry group, rather than comparing different industry groups within the same study. To fill this gap, this study seeks to contribute to the literature by providing insights into quality initiatives and identifying their association with a wide range of quality management practices for different competitive environments. In particular, this study aims to determine if there are differences in Quality Management (QM) implementation across competitive environments and if so, how and why they differ. With these objectives, we develop several propositions relating the competitive environment with QM implementation practices.

2. How Different is Sweden from Mexico? A Continuous Improvement Survey Comparison

Mats Winroth, Jönköping University
Luis Borges, Instituto Tecnológico y de Estudios Superiores de Monterrey

Continuous improvement techniques are important tools for enabling companies to improve their operations. The implementation of these techniques is however estimated to be quite different around the world. Continuous improvement is a thermometer that companies can use to feel their health in this hectic market. This paper compares two countries, Mexico and Sweden, which are considered to be quite different in culture and industrial structure, in terms of the use of continuous improvement tools and techniques, such as TQM, Kaizen, Six-Sigma, Lean Manufacturing. The surveys in the two countries are based on the same scale, sample size, and industrial sector. A definition of each of the key-words was included in the questionnaire. The results indicate both

similarities and differences in the strengths and weaknesses of the companies. The companies can work on the results to benchmark themselves and they can reinforce their strengths and to reduce their weaknesses.

3. The Role of External Consultancy in Quality Management: Results from an Empirical Study in Spain and Portugal

Arturo Fernández-González, University of Vigo
José-Carlos Prado Prado, University of Vigo

This paper analyzes the role of external consultancy in quality management. The authors' results come from an empirical study carried out on a sample of 305 Spanish and Portuguese companies (by means of personal interviews with quality managers). Several aspects are studied: the wide-spread use of quality consultants by the companies involved in the ISO 9000 implementation and certification process (about 90% of them, surpassing all the levels previously registered in empirical literature) and its utility; the consultancy use in the post-certification period and in the transition process to ISO 9001:2000; and the influence of consultancy use in the results of quality management practices within the ISO 9000 frame. Finally, some conclusions and recommendations about consultancy contracting, especially oriented to SME's, are presented.

4. The Relationship Between Quality and Performance in an Emerging Economy

Roberto Luchi, IAE Business School
Roberto Vassolo, IAE Business School
Nicolás Luzuriaga, IAE Business School

This paper analyzes the relationship between quality practices, quality performance and company performance in an emerging economy. To that aim, we addressed two broad questions: To what extent do quality practices impact on company's quality performance in a country with strong instable economic conditions like Argentina? Is overall company performance positively associated with quality performance in such an environment?

We test our hypotheses in Argentina's automotive industry, affected by strong changes in demand and regulations over the last ten years. Results, obtained using survey data from various companies in the sector, show that the hypotheses are not as strongly supported as in some developed countries. The particular circumstances that had an intervening effect are described.

5. Business Process Management Implementation: A Cultural Perspective

Clovis Netto, University of São Paulo
Pedro Luiz Costa Neto, University of São Paulo

The purpose of the study reported in this article is to explore and describe the influence of some organizational cultures on the way business process management (BPM) projects are implemented. According to Thèvenet (1990), for any strategic approach to be successful it must be consistent with the organizational culture. A research method (action research) is then selected and field research which encompassed 4 companies is described. The cases studied are in industrial, services, governmental and small business companies in Brazil. Some differences in focus have been found. These are related to cultural organizational theory. Morgan´s metaphors of organizations seen as machines, organisms and brains are relevant for understanding the variation. The managerial implications of the differences are also discussed, notably when reference to the way companies see themselves. Some different aspects to consider when BPM initiatives are taken in companies with the profile (or metaphor) in question are proposed.

Session 41: SAT. 13:30 - Coral
Operations Strategy III

Cluster: Strategy and Design

Chair: **Sidhartha Das**, George Mason University

1. Supporting the Balanced Scorecard from the Manufacturing System

Rafael Ruiz-Usano, University of Seville
Adolfo Crespo Márquez, University of Seville
Jose Manuel Framinan, University of Seville

The Balanced Scorecard introduced by Kaplan and Norton in the 90´s considers that a company should achieve its goal by using a systemic approach where different perspectives should be taken into account: financial, customer, process and learning. In a manufacturing system we may have distinct production scenarios: variable demand, backlogs, breakdowns,... which make the situation rather complex. Different production and control techniques, push, pull, hybrid, etc... can be applied to manage the system in an appropriate way using measures or indicators that tell us if the company behavior is the desired one. In this paper a framework (resembled the balance scorecard) is presented showing different scenarios by combining these with different production control techniques while recording the value of several key indicators: financial, non-financial, manufacturing, etc... A balanced choice of techniques and measures should be made to provide the firm with tools to improve its competitiveness.

2. Measuring Customization in Electronic B2C Operations

Sriram Thirumalai, University of Minnesota
Kingshuk Sinha, University of Minnesota

Increasingly firms today are investing in customization technologies with the belief that

tailoring their products and services to individual customer needs will lead to increased customer satisfaction and loyalty. While preliminary studies have shown the effectiveness of customization practices in improving customer satisfaction and loyalty, these exploratory studies rely on ad hoc measures that lack empirical validation. The lack of reliable and valid measurement scales for customization hampers a systematic investigation in this area. Our research attempts to address this issue by proposing three customization strategies – Service Customization, Experience Customization, and Product Customization, and systematically developing an instrument to measure them. The instrument development and validation is based on a multi-step methodology involving literature reviews, website content analysis, expert interviews, card sort process, pilot survey and a large-scale survey. The contributions of this research to both theory development and practice are discussed.

3. How Indian SME Manufacturers Can Become Preferred Suppliers in the Global Supply Chain

Tirthapura Nagabhushana, Indian Institute of Management, Bangalore

Indian SME manufacturers have good potential to be preferred suppliers in the global supply chain, in the context of increasing global outsourcing. However they are presently experiencing some constraints to achieve this potential advantage. This empirical study of about 35 Indian SMEs (supplying engineering and electronic components to MNCs in India and directly exporting to foreign countries) through in-depth interviews with these entrepreneurs and complemented by discussions with professional associations, and its detailed qualitative analysis has identified the various factors for the present situation. With the ideas of forward thinking entrepreneurs and the studies of successful SMEs in the changing global context in countries like Brazil, Italy and South Asian countries, in this paper a conceptual road map has been developed for the Indian manufacturing SMEs for the required paradigm shift from `comparative operational advantage' situation to a `competitive strategic advantage' position.

4. Business Strategy Development Meets ICT Strategy

Jukka Hemilä, VTT Industrial Systems

The business development today is more and more focused on co-operation and networking activities, while still continuing with internal development activities. But in many cases those development activities are not completed and something is missing at end results. The business developers are making more and more complicated ways of doing business, without taking care of the ICT point of view. On the other hand the ICT developers don't understand the business requirements and the business process point of views. There is seen to be a large gap between business and technology development and the knowledge about those activities. The ideas in this paper have risen in previous action research projects in VTT Industrial Systems. This paper defines the main aspects in the gap between technology and business development. In addition, the paper suggests some important research and development topics near future to fill that gap.

5. The Effect of Process Innovativeness on the Performance of High and Low Technology Service Companies

Sidhartha Das, George Mason University
Maheshkumar Joshi, George Mason University

Process innovativeness is a firm's tendency to engage in and support new ideas, experimentation, and creativity, for the development of new processes. This paper describes types of process innovativeness that service companies may follow. Then, it defines technological capabilities, and uses them to classify service companies into high and low technology categories. Next, the paper presents a model showing that the effect of process innovativeness on a service company's performance is moderated by the level of technology that the company has attained. Preliminary analysis indicates that service companies with high levels of technology and either high or low levels of process innovativeness perform better than service companies with low levels of technology and low levels of process innovativeness; and service companies with low levels of technology but high levels of process innovativeness perform better than service companies with low levels of technology and low levels of process innovativeness.

Session 42: SAT. 13:30 - Mediterráneo 1
The New Technologies of Service

Cluster: Service and Quality

Chair: **Cheryl Gaimon**, Georgia Institute of Technology

1. Security Issues in Service Operations Environments

William Figg, Dakota State University

When security is discussed in service environments different issues flash into the conversations. A new range of security issues has evolved with the new century. Data integrity and network security have become issues with all service organizations. Problems are now unexpected consumers of limited service budgets because they create devastating consequences for the service operations management. The more complex operating environment precludes in injection of the mythical "silver bullet" solution.

Service management now faces a security policy to establish effective perimeter security for the operation as well as internal and external network security. New operating concepts arise including firewall integration to establish an operational DMZ. It all sounds like futuristic rhetoric but the savvy service manager must be proficient in understanding and employing electronic security measures and must place similar emphasis on electronic security as on physical security.

2. New Multi-item Measurement Scales of the Antecedents and Consequences of B2B E-Service Capability: A Two-Stage Approach

Pedro Oliveira, Catholic University of Portugal
Aleda Roth, University of North Carolina

The following research questions are investigated: How can the B2B e-service capability construct be operationally defined? What are the operational antecedents that influence B2B e-service capability? We develop a theory-based model for describing the drivers and dimensions of e-service capability and propose a portfolio of multi-item measurement scales that are especially applicable to B2B e-services. Using data on 160 companies collected through a web-based survey, we empirically test the measurement models of service value and e-service capability. We find that service value is a second-order variable reflected by service culture, human capital, market orientation, ICT implementation, relationship management, and reward system. E-service capability is also a second-order variable reflected by the company's capabilities of e-service recovery, e-personalization, ease of navigation, and service portfolio comprehensiveness.

3. Predictors of Customer Dissatisfaction in Online Anonymous Markets

Byron Finch, Miami University

As online customers continue to expand the use of shopping robots and online auction environments, transactions in which the buyer is completely unfamiliar with the seller increase. Despite the frequency of these anonymous transactions and their high levels of risk, buyer expectations in these risky environments are largely unknown. This study presents the results of an analysis of negative feedback submitted by dissatisfied customers in this environment. Relationships between the content of that negative feedback and elements of buyers risk are identified to guide quality management efforts, service system design, and future research into quality management in these risky environments.

4. RFID-Based Operational Improvements for Grocery E-Supply Chains

Pedro Reyes, Baylor University
Gregory Frazier, University of Texas at Arlington
Edmund Prater, University of Texas at Arlington

Grocery retailing has become increasingly competitive in recent years, especially since superstores, such as Wal-Mart Supercenters and Super Target, have entered the market. Improving operating efficiencies and supply chain performance is a goal that traditional grocery store chains urgently desire. Radio frequency identification (RFID) is one technology that promises improved competitiveness for early adopters, by allowing real time inventory tracking.

In this paper we simulate a grocery supply chain and show how RFID capability allows supply chains to accomplish three key things. First, it allows inventory management and ordering to be done at the distribution center instead of the individual store level. Second, it can reduce overall inventory levels while maintaining high service levels. Finally, it allows for reduced shelf space requirements in the stores, thus allowing for a greater variety of products to be stocked in the same space.

5. Dynamic Investments in Knowledge for IT-Worker Systems

Cheryl Gaimon, Georgia Institute of Technology
Karen Napoleon, University of Georgia

We introduce a model for the long-term planning of a production system in which a worker operates information technology (e.g., service domains such as management consulting, engineering design, etc.). Attributes of the IT (functionality, ease of use, etc.) and attributes of the workforce (skill, rate of forgetting, etc.) determine the amount of output generated as well as the quality of that output. The firm determines the timing of a series of IT upgrades in an environment subject to technological improvement that enhances IT attributes over time. Moreover, the firm determines the rate and timing of investments in worker training. First, we examine how the level of worker knowledge (skill, training, and forgetting) impacts profit and the series of IT investment decisions. Second, we examine how the IT vendor decisions (price, functionality, etc.) impact the series of IT upgrades, workforce training, and firm performance.

Session 43: SAT. 13:30 - Mediterráneo 2
Supplier Selection

Cluster: Operations and Logistics

Chair: **Vidyaranya Gargeya**, University of North Carolina at Greensboro

1. Impact of Supply Base Heterogeneity in Electronic Markets

Jishnu Hazra, Indian Institute of Management
B. Mahadevan, Indian Institute of Management

Internet based marketplaces have enabled industrial buyers to locate suppliers from

geographically diverse locations. This has resulted in increased variations in certain supplier parameters such as capacity and cost among the participating suppliers. In this paper we consider three supplier parameters that can affect the price the buyer pays and the number of suppliers that the buyer will select for award of contract. These attributes are capacity, production cost and demand for supplier's capacity. We show how these parameters impact the price that a supplier quotes. We also show how the buyer will determine the optimum number of suppliers using a reverse auction mechanism when he does not have perfect knowledge of the suppliers' parameters. Our model suggests that buyers need to adjust some of the input parameters while procuring capacity from a heterogeneous supply base.

2. A Structural Analysis of the Impact of Purchasing Integration on Supplier Development, Purchasing and Business Performance

Cristobal Sanchez-Rodriguez, Wilfrid Laurier University
David Hemsworth, Nipissing University

Purchasing has the primary responsibility of linking suppliers' capabilities with the internal requirements specified by corporate strategy. Thus, a purchasing strategy aligned with corporate goals, referred to as purchasing integration, is expected to lead to new requirements in suppliers' performance and capabilities and, as a consequence, to the utilization of supplier development practices as a tool to correct deficiencies. The objective of this paper is to advance the literature by providing an empirically evaluated and comprehensive model that relates purchasing integration with supplier development and purchasing and business performance. Empirical results from a survey of 306 large Spanish manufacturers indicate that there is significant evidence to support the hypothesized model, in which purchasing integration has a direct positive impact on supplier development practices and an indirect positive effect on purchasing and business performance mediated through supplier development.

3. A Multiobjective Approach to Vendor Selection Taking into Account Transportation

Aguezzoul Aicha, Laboratoire Automatique de Grenoble
Ladet Pierre, Laboratoire Automatique de Grenoble

The analysis of the most researches related to the supplier selection show that very little attention is given to transportation although its cost may be significantly important to this selection. In this paper, we present a multiobjective approach of selecting suppliers and allocating the order quantity among them, taking into account transportation. The objectives to minimize in the model are the total cost and the lead-time. The total cost is the sum of transportation, inventory and ordering costs. The constraints related to suppliers, buyer and transportation are also considered in the model. An algorithm is proposed to solve the model and the model is implemented in MATLAB version 6.5, software specialized in optimization. An evaluation of the model is presented under various scenarios.

4. Strategic Sourcing and Supplier Selection: The State of Empirical Research

Vidyaranya Gargeya, University of North Carolina at Greensboro
Jin Su, University of North Carolina at Greensboro

Increasingly, supply chain integration and management are receiving a great deal of attention from researchers and practitioners alike. Supply chain/network management has been viewed as a viable initiative to enhance sustainable competitive advantage under the increased national and international competition. Strategic sourcing and supplier selection play vital role in managing the supply chain. Dozens of books and hundreds of articles have been written on this subject. This paper surveys the current state-of-the art of the empirical (case-based and survey-based) research on strategic sourcing and supplier selection. The findings based on an in-depth of more than twenty articles are discussed. An agenda for future research is also presented.

Session 44: SAT. 15:30 - Caesar 1
Continuous Improvement Applications

Cluster: Service and Quality

Chair: **Thomas Christiansen**, Technical University of Denmark

1. Introducing the Toyota Production System to a Hospice

Norman Faull, University of Cape Town
Olivier Dethier, University of Cape Town
Nikki Puttergill, University of Cape Town

Following the work of Spear and Bowen, specifically the Deaconess-Glover Hospital case study, the paper reports an action research (AR) project conducted at a hospice. The research questions were 'Can VSM (value stream mapping) and the TPS philosophy assist the hospice in improving drug ordering and delivery for domiciliary care? How can TPS be introduced to the hospice?' The paper reports the first stage of the research, which progressed in cycles and stages, consistent with an AR methodology, to a point where conclusions could be drawn. Tentative evidence in support of TPS in the hospice is offered, as is an approach to introducing TPS into a healthcare environment.

2. Potential of Technology-Integrated Mobile Maintenance for Total Productive Maintenance

Jörn-Henrik Thun, Mannheim University / Industrieseminar

In the last decade the potential of M-business for a great variety of areas within Production and Operations Management, for instance Supply Chain Management, has been widely discussed. The integration of M-business and Maintenance has been neglected so far. In this paper Technology-integrated Mobile Maintenance as a concept based on M-Business will be introduced. The five pillars of Total Productive Maintenance as elementary concept for improving maintenance are used as a basis for the application areas of mobile devices. The paper discusses the potential of mobile devices in the different pillars of Total Productive Maintenance. The paper shows that Technology-integrated Mobile Maintenance can raise the overall equipment effectiveness in different ways. Additionally, the wireless communication technologies Bluetooth and Wireless LAN are introduced as approaches for implementing Technology-integrated Mobile Maintenance. A comparative discussion of both technologies indicates, that Wireless LAN is advantageous for a successful implementation of Technology-integrated Mobile Maintenance.

3. Barriers to Continuous Improvement of the Quality in Service Operations: A Brazilian Case Study

Jose Augusto Araujo, University of São Paulo
Reinaldo Costa, University of São Paulo

The current world-wide competitive environment and the reduction of protectionistic barriers, specially in the developing countries, have enlarged the importance of the quality management in a way that companies can improve their competitiveness. Quality directly influences the economic performance of the companies, as it plays a fundamental role in the customer's decision; hence, investments in quality systems are carried out with an aim to reach competitiveness. In Brazil, the change started after the 90s through the vertiginous growth of ISO 9000 certification. However, it is possible to verify that a lot of certified service companies have not shown continuous quality improvement, presenting a number of failures. The purpose of this article is to investigate the existing barriers to the real continuous improvement of the quality in service operations. A case study lead in a service company in Brazil will be presented.

4. Performance Enhancement Through Continuous Improvement

Samir Srivastava, Indian Institute of Management, Lucknow
Pallavi Srivastava, Jaipuria Institute of Management, Lucknow

Organizations have to simultaneously meet various stakeholders' demands related to delivery times, supply chains (horizontal, vertical and cross integration), quality, production processes, equipment, safety, environmental concerns, workforce etc. They must be driven by both effective and efficient management approaches and strategies to do so. One approach to improving the performance is to develop and implement a Total Productive Maintenance (TPM) strategy. However, a number of organizations are failing to successfully implement such strategies. This paper describes successful TPM implementation in a continuous process firm in India and its effects, particularly on the firm's performance. We describe the TPM concept, analyze the Indian manufacturing scenario briefly and thereafter chronicle the success of the firm. The paper tests the applicability of theoretical concepts in the Indian context, derives some managerial implications and provides suggestions to firms who are or shall be in the process of implementing such initiatives.

5. Continuous Improvement Comparison between Danish and Mexican Companies

Thomas Christiansen, Technical University of Denmark
Luis Borges, Instituto Tecnológico y de Estudios Superiores de Monterrey

This article investigates the continuous improvement tools that are used in two countries on two continents. For that purpose two surveys were conducted in the metropolitan area of Mexico City and in Denmark using the same scales and about the same sample size. The continuous improvement tools comprise such concepts as TQM, Kaizen, Six Sigma and Lean Manufacturing. The paper shows the results of the analysis and comparison of how and to what degree such tools are used in different places, which allow us to address similarities and dissimilarities of the application. The results are discussed in the light of cultural, demographic and macro-economic differences, e.g. factors such as labor costs and role in global outsourcing are discussed.

Session 45: SAT. 15:30 - Caesar 2

Thematic Network for the Excellence in Operations and Supply Chain Management (THENEXOM)

EurOMA Sponsored Forum

Chair: **José Machuca**, University of Seville

(See Fora section for details)

Session 46: SAT. 15:30 - Caesar 3
Production System Design

Cluster: Strategy and Design

Chair: **Lawrence Fredendall**, Clemson University

1. An Integrated Process for Collaborative Design of Manufacturing Systems

Julio Macedo, Institut Strategies Industrielles/Univ of Quebec at Montreal

On one hand, reengineering and management of technology present approaches to design the structural improvements of a problematic manufacturing system. On the other hand, operations management presents models for optimizing the procedural parameters of partial working procedures. However, there is not an integrated process to design a manufacturing system. This paper presents a template that includes the activities for designing the structure and working procedures of a manufacturing system in a context of collaborative design. The template is a network of integrated activities that cover the life cycle of a manufacturing system design process. The main activities included are the design of the structural improvements and the design of the working procedures. These activities use neural networks and simulation models.

The activities of the suggested process design are planned and controlled using internet. In addition, the structural improvements and working procedures are designed by distributed people that communicate using internet.

2. Mapping Manufacturing Processes in a Firm, Using IDEF0 and Proposals for To-Be Processes

Esin Sayin Unlu, Dokuz Uylül University
Ali Sen, Dokuz Uylül University

In this application work, we used IDEF0 to mapping an industrial firm's manufacturing processes. IDEF0 is used because, it is useful for business process re-engineering. IDEF0 is worthwhile for business process reengineering in following steps (Feldman,1998:19).

- Develop strategic plan
- Document current processes
- Document the functional architecture
- Revise as-is activity models
- Develop to-be initiative package
- Develop to-be activity & data models
- Revise to-be package
- Develop detailed to-be.

Some of useful results from the use of IDEF0 are as follows (Feldman,1998: 41):

1- Identifies needs
2- Builds consensus
3- Enhances vision
4- Provides a basis for an open architecture
5- Broadens automation and commonality potential
6- Supports management control through metrics
7- Defines variants for broader support system use

At first we present as-is processes for the company's manufacturing. And than for the to-be processes some proposals are been made. Conclusions and suggestions presented.

3. Production System Design and Evaluation for Increased System Robustness

Monica Bellgran, Chalmers University of Technology
Kristina Safsten, Jönköping University

Effective and robust production systems are required in the competitive environment of today's manufacturing companies. Creating system robustness should be made during the design phase and not during operation when most system parameters already are set. Each production system is the result of a unique, context dependent development process, and its comprising design and evaluation activities are vital for system performance. The full-text paper is based upon results from more than ten years of theoretical and empirical research studies in the field of production system design and evaluation, and lately also in the field of robust production systems concerning e.g. manufacturing efficiency and disturbance handling. Industrial examples of how production systems are designed and evaluated will be shown, and its consequences discussed in terms of system robustness and performance in a life-cycle perspective. Issues of importance are e.g. the use of systematic procedures and methods and decisions concerning learning strategies.

4. Construction Office Design with Simplified Layout Planning

James Gilbert, Rollins College

Systematic Layout Planning (SLP) was developed by Richard Muther in 1961. This technique is illustrated in many POM textbooks. SLP is a relatively simple process that objectively handles a multi-criteria evaluation process. Recent literature has focused on the use of CORELAP and PLANET for office layouts with few recent examples of SLP. The case study reported here illustrates the values to the firm of using SLP. Systematic Layout Planning develops a feasible layout through a multi-step procedure. The author, working with the company owners and staff, developed a vastly improved office layout for this construction firm. The process of developing the layout proved invaluable to all employees as they discovered aspects of the job, areas of responsibility, and working relationships with others in the firm. This

proven tool for small office layouts is a viable approach for many layout or re-layout situations.

5. A Delphi Study of Manufacturing Complexity
Lawrence Fredendall, Clemson University
T. J. Gabriel, Clemson University

Manufacturing complexity is not easily defined, and it is difficult to measure manufacturing complexity. A clear definition of complexity, which allows a simple metric to be used in measurement will permit benchmarking of systems, and allow assessment of system design changes on complexity. A Delphi study of internal manufacturing complexity was conducted The Delphi panel consisted of 50 individuals with experience in a wide range of manufacturing positions (e.g., manufacturing engineer, operations manager).

Session 47: SAT. 15:30 - Caesar 4
Production and Supply Chain Design / Producción y Cadenas de Suministro

Cluster: Operations and Logistics

Chair: **Bernardo Villarreal**, Universidad de Monterrey

1. Management Model for the Design, Development and Control of Packaging in the Spanish Food Supply Chain
Jesus Garcia-Arca, University of Vigo
José-Carlos Prado Prado, University of Vigo

Traditionally, packaging has been designed to protect products. However, consolidation of new customer needs has favoured consideration of new requirements at the design and development stage of packaging, namely, commercial and logistics requirements. Packaging should be seen as a tool for communicating the product's differential advantages, for implementing cost reduction policies, for tackling the problem of packaging waste (Directive 94/62) and for facilitating the ECR implementation. In this context, the objective of this paper is to establish a management model for the design, development and control of packaging in the Spanish food supply chain which covers the diverse commercial, environmental and logistics factors mentioned previously. This model has been built up around a bibliographical revision of the topic, case studies and conclusions from research carried out by the authors in 307 companies in the Spanish food sector (209 food packers, 30 distributors and 68 packaging manufacturers).

2. Data Warehouse para la Gestión por Procesos en el Sistema Productivo
Andrés Boza García, Universidad Politécnica de Valencia
Angel Ortiz Bas, Universidad Politécnica de Valencia
Eduardo Vicéns Salort, Universidad Politécnica de Valencia
LLanos Cuenca Gonzalez, Universidad Politécnica de Valencia

El data warehouse proporciona información integrada que puede ser utilizada de forma directa o mediante herramientas analíticas para la toma de decisiones (operativas, tácticas o estratégicas) en el área de producción, y para ello precisa de un claro conjunto de objetivos que puedan reunir los factores críticos de éxito. La información se suele organizar por colección de temas de interés por áreas funcionales. Pero las empresas están cambiando su forma de gestión siguiendo el estilo de gestión por procesos. Dos estándares que permiten la descripción y el modelado de procesos de negocio son Workflow e IDEF3. Es posible utilizar las herramientas Datawarehouse como almacén de datos de los modelos de gestión por procesos que gestionan estos estándares para su posterior análisis. con un doble objetivo: 1. Análisis de diferentes modelos de proceso de gestión. 2. Análisis de los procesos de negocio instanciados.

3. A Diagnostic Analysis Tool for Supply Chain Improvement
Bernardo Villarreal, Universidad de Monterrey
Dulce Gonzalez, Universidad de Monterrey
Pamela Madero, Universidad de Monterrey

Supply chain continuous improvement has become a necessary strategy for businesses to attain the required performance level to compete worldwide. A fundamental phase to define the components and projects of the strategy is the diagnostic analysis phase. This project is concerned with a scheme for supply chain improvement developed for a Mexican company that fabricates and distributes aluminum profiles. The conceptual model is described and applied with particular emphasis in the diagnostic stage that includes a study of market structure, the analysis of the current chain physical structure and flows, and an analysis of the actual planning and control system infrastructure. Results of the project are also presented.

4. Gestión de la Cadena de Suministro Colaborativa. Un Modelo Decisional de Ingeniería e Integración Inter-Empresarial.
Francisco Lario, Universidad Politécnica de Valencia
Raúl Poler, Polytechnic University of Valencia
Angel Ortiz, Universidad Politécnica de Valencia

Definida una Empresa Extendida (EE) como “una compañía dominante que extiende sus límites construyendo acuerdos con otros miembros de su CS, para mejorar su proposición de valor y lograr una mejora sostenible de su ventaja competitiva”, la materialización operativa de las EE se realiza mediante el desarrollo de procesos colaborativos entre las empresas. Estos procesos han sido analizados en numerosos

trabajos, pero en la mayoría de ellos se aborda muy vagamente los aspectos decisionales. En la presente comunicación se analiza un Proceso de Negocio en una Cadena de Suministro (CS) Colaborativa, del Sector del Automóvil español, configurada como Empresa Extendida, utilizando la Arquitectura de Ingeniería e Integración Empresarial IE-GIP con sus niveles para generar mecanismos de cooperación y coordinación adecuados. En particular, el trabajo se centra, fundamentalmente, en el análisis decisional utilizando las Metodologías GRAI y DAROMS.

Session 48: SAT. 15:30 - Caesar 5
Decision Support Models and New Developments

Cluster: Operations and Logistics

Chair: **Michael Godfrey**, University of Wisconsin, Oshkosh

1. Optimized Resource Planning in Newspaper Subscription Sales

Willem Selen, Macquarie Graduate School of Management

A planning system was developed for optimizing the use of different marketing instruments/resources in new newspaper subscription sales at a Dutch newspaper. Various instruments and their daily application are described in relation to the yearly marketing plan, as well as the pertaining constraints. This resulted in a mixed-integer mathematical programming model which yielded an optimal solution that resulted in an improvement of 14% in new subscriptions, at a ten percent savings in annual sales budget. The analytical planning model not only yielded promising results, but also prompted direct marketers of the newspaper to express their reasoning more explicitly, making the annual marketing strategy setting more transparent and objective. The model was well received by management, and would be used as a support tool for sales planning in future years.

2. Integrating Neural Networks and Goal-Driven Simulation

Maria Clavijo, Florida International University
Martha Centeno, Florida International University

Goal-Driven Simulation (GDS) has been pursued in this study because of the great challenges that simulation optimization has presented. GDS has been practiced sporadically because it has to be automated, which means that the input parameter configuration that satisfies the goal set must be transparent to the user. Previous efforts at automated GDS have experienced difficulties in implementing it for more than 3 variables in the goal set and in having the heuristic work well across several domains. The present effort has used Neural Network (NN) technology to overcome some of these challenges, specifically to facilitate the handling of n variables (n>3) with ease. In this effort, simulation data is used to train the NN, in this process the goals established by the user are used as the input set of the NN, and the system's configuration as the output set of the NN.

3. Universal Scheduling by Object Oriented Optimization Technology

Kenji Muramatsu, Tokai University

Real time nature, high resolution, and global optimization are prerequisite for present-day production and operations management. However, ramifications and specifications of the conventional scheduling methods has been a big obstacle. We present a universal scheduling methodology that optimizes (near optimizes) all of decision features such as production lot sizing, lot sequencing, dispatching and so on simultaneously for either make-to-stock items or make-to-order items or both of them, for a flow line or job shop or both, for any product structure and for almost all processing conditions. This is based on a new principle denominated "object oriented optimization technology (O2O-technology)." The key concepts are (1) fine digital modeling of the problem by use of 0-1 variables with multiple suffixes that we call primitive objects, and (2) the Lagrangean decomposition coordination methods by taking advantage of the additively separable property inherent to the problem.

4. Innovation Incentives in Enterprise Networks: A Game Theoretic Approach

Toni Jarimo, VTT Technical Research Centre of Finland

This paper studies the determination of innovation incentives in enterprise networks through an application of game theoretic modeling. Here, game theory provides tools for the formal analysis of situations where multiple decision-makers may have partially conflicting interests, but cooperation between them is allowed. An example from the boat-building industry is presented to illustrate the relevance of innovation incentives in enterprise networks. Specifically, three different equilibrium concepts are applied to determine innovation incentives under different circumstances. The proposed model helps award innovations that improve the efficiency of the network. In addition, the efficiency-improving arrangements can be implemented so that none of the network companies has to suffer. Consequently, the enterprise network becomes innovative and the network companies need not fear their own losses when the efficiency-improving arrangements are implemented. The model also helps share the surplus utility gained through the innovation among the companies of the network.

5. Comparing the Accuracy of Neural Networks to an Algorithm for Determining Minimum Cost Purchase Lot Sizes

Michael Godfrey, University of Wisconsin, Oshkosh
Paul Schikora, Indiana State University

Previous purchase lot-sizing studies in the OM literature have acknowledged the importance of considering transportation costs. With a few notable exceptions, these purchasing lot-sizing studies have failed to account for actual pricing decisions in the motor carrier industry, where shipments are automatically over-declared to attain a lower total transportation charge. Alternatively, other recent studies have explored the use of neural networks for determining minimum cost production lot sizes. The current study will compare the accuracy of one recently developed algorithm, which realistically incorporates over-declared shipments, to a neural network model developed for this study. This accuracy will be based on how well either of these approaches minimizes annual logistics cost of purchase lot sizes. We will assume that all lot sizes are purchased FOB origin and the purchaser pays for shipment. Annual logistics cost will consist of annual ordering, carrying, and transportation costs incurred by the purchasing company.

Session 49: SAT. 15:30 - Caesar 6
Technology-Enabled Service Operations

Cluster: Service and Quality

Chair: **Craig Froehle**, University of Cincinnati

1. Pilot Testing of Access Controlled Drop Boxes for Consumer Home Delivery

Kenneth Boyer, Michigan State University

This study will present the results of an ongoing project with one of the largest package shippers in the world. This shipper is pilot testing a program to provide a controlled access drop box for packages shipped to customers who were not home to receive the delivery. The drop boxes are located in large grocery stores in a major metropolitan area and customers are left a notice telling them where their package can be retrieved and instructions on how to access the drop box by entering an ATM or Credit Card for identification purposes. Multiple delivery attempts are costly for the shipper and frustrating for the customer who wants their package as quickly as possible. This study will report on survey-based measures of consumer acceptance of this technology-mediated delivery service as well as operational measures used to assess improvements in the shipper's delivery efficiency.

2. Service Co-Production, Customer Efficiency and Market Competition

Mei Xue, Boston College
Patrick Harker, University of Pennsylvania

Recently, with the development of information technology and new business models, self-service has been increasingly used in service delivery. In those settings, a customer becomes both a consumer and a co-producer of the service product. However, little is known about the impact on service operations of increasing customer participation. In this paper, we develop a model to study self-service level, the key characteristic of a service operation featuring self-service. We examine firms' optimal choices of fee and self-service level with the model in both competitive and non-competitive market. We investigate how self-service level should be determined given firm and customer characteristics. We further explore how self-service level influences a firm's pricing policy and competitive strategy. Moreover, we examine how the change of self-service level affects market demand. The results show that self-service level plays a central role in firm's pricing and competitive strategy.

3. Using the Internet to Link Service Providers to Their Customers: Does it Affect Performance?

Nikos Tsikriktsis, London Business School
Mark Frohlich, Boston University

This paper investigates empirically the impact of implementing Internet-enabled processes between service providers and their customers. Specifically, we examine how the degree to which the Internet is used for electronic transactions (e-transactions) and/or to extend the online relationships between service providers and their customers (e-CRM) affects performance (operational, marketing and business) in service firms. Based on a sample of 226 service firms, we demonstrate that e-CRM has a direct impact on both operational and marketing performance and an indirect impact on overall business performance. On the other hand, the use of e-transactions affects directly only operational performance. Among low performers there was also a trade-off between the use of e-transactions and marketing performance, whereas high performers do not face this dilemma. The findings have important implications for service firms interested in improving their performance through the Internet.

4. Creating an Automated Triage System for Radiology

Craig Froehle, University of Cincinnati

A hospital's Radiology department wishes to more efficiently and
consistently prioritize its processing of patient cases. Based on various operational and medical attributes, a case should be assigned an urgency score. Each physician in the department interprets sets of attributes differently, resulting in inconsistent prioritization. The research presents

a methodology and case study for extracting and embedding the medical knowledge of the department's physicians in an IT-based automated case worklist system. The effects on workflow and the improvements to efficiency, patient care, and staff satisfaction are reviewed.

Session 50: SAT. 15:30 - Caesar 7
Implementation Methods and Quality Awards

Cluster: Service and Quality

Chair: **David Cooke**, University of Calgary

1. Comparison of Japanese Quality Awards: Principles, Criteria and Scoring Methods

Rita Arauz, University of Tsukuba
Hirofumi Matsuo, University of Tsukuba
Hideo Suzuki, University of Tsukuba

Criticism regarding the effectiveness of quality awards is an issue that has captured the attention of academics and industry practitioners over the last several decades. The purpose of this research is to identify the principles, criteria and scoring methods that encompass two major quality awards in Japan. Following the teachings of Dr W. Edwards Deming, the Deming Application Prize was established in 1951. In 1995, the Japan Quality Award was established as the Japanese adaptation of the Malcolm Baldrige National Quality Award. In order to conduct this research, the authors interviewed administrative members of the Deming Prize Committee and the Japan Quality Award Council. The objectives, examination criteria and concepts that compose the awards share some similarities in appearance; however their principles and scoring methods greatly differ. Critical issues such as executions of operation, top management and workers' commitment and recognition of business processes are approached from very different perspectives.

2. A Social Assessment Approach to Quality and Productivity Management

Petros Christofi, Duquesne University
Seleshi Sisaye, Duquesne University

Social anthropologists have developed social soundness analysis (SSA) in their field research to socially assess the impact of international donor programs for regional and community development purposes. We propose that quality and productivity programs could benefit from SSA's strategy of project design and implementation. We plan to document that the short lived successes of many TQM programs could be attributed to their shortcomings of not incorporating SSA to distribute the economic and social benefits among the various stakeholders.

3. Identifying Shifts in Correlated Manufacturing Processes Using a Neural Network

Deborah Cook, Virginia Tech
Christopher Zobel, Virginia Tech
Quinton Nottingham, Virginia Tech

Statistical process control (SPC) techniques have been used to identify when the mean or variance of a manufacturing process has shifted out of control. In situations where there is correlation among the observed outputs, the underlying assumptions of SPC are violated and alternative approaches are needed. A geometric preprocessing algorithm is combined with a neural network to develop an improved technique for identifying shifts in a correlated manufacturing process. The preprocessing algorithm geometrically classifies process data to identify shifted data, non-shifted data, and potential areas of overlap where identification of a shift will be difficult. Identification of this overlap area allows for improved classification by identifying the need for additional sampling in the overlap area. This approach has been shown to improve significantly upon the performance of previous neural network and statistical techniques for identifying process mean and/or variance shifts in the presence of correlation.

4. Critical Issues about the Theory of Constraints Thinking Process – A Theoretical and Practical Approach

José Antonio Antunes Júnior, Universidade do Vale do Rio dos Sinos
Marcelo Klippel, Universidade do Vale do Rio dos Sinos
André Koetz, Universidade do Vale do Rio dos Sinos
Daniel Lacerda, Universidade do Vale do Rio dos Sinos

This paper presents some critical considerations about the Thinking Process of the Theory of Constraints – TP of TOC – developed by Eliyahu Goldratt. The article makes evident that the central consideration of the TOC consists in concentrating all efforts in the so called core problems. Also, the paper describes the techniques involved in the TP of TOC, showing that these techniques and methods could be used as stand alone basis with sufficient results. Finally, the article makes evident the qualitative feature of the TP of TOC that uses the Scientific Method for seeking the systematics of Structuring, Identification, Analysis and Solution of Problems.

5. Towards a Conceptual Model of Operational Risk and a Framework for Risk Control

David Cooke, University of Calgary

This paper draws on information from prior literature and from case studies to develop a conceptual model and control framework for operational risk. The validity of the model is tested by how well it fits the parameters of operational risk failures and successes in a diverse range of situations in manufacturing, mining, financial services and government. The

paper explores the similarities between operational risk management and quality management and suggests that operational risk control can be integrated into a quality management framework.

Session 51: SAT. 15:30 - Caesar 8
New Cases in Supply Chain Management

Cluster: Operations and Logistics

Chair: **Eric Johnson**, Dartmouth College

1. Production Spackling at Timbuk2
Glen Schmidt, Georgetown University
Kyle Cattani, University of North Carolina
Ely Dahan, UCLA

At Timbuk2's web site, you can customize a messenger bag and receive shipment within several days. Given that daily order quantities vary widely, won't Timbuk2 have excess capacity on "slow" days? Students are introduced to the spackling strategy, whereby slack capacity is used to produce standard bags for retail stores.

2. Comparison of Efficiency, Productivity and Quality of Global Automotive Companies
Seetharama Narasimhan, University of Rhode Island
Mulong Wang, University of Rhode Island
Allan Graham, University of Rhode Island

This paper analyses the productivity and efficiency of Global Automobile Companies using Data Envelopment Analysis. We also analyze their performance in the light of Wickham Skinner's operations strategy dimensions: Cost, Quality/Reliability, support and Service. Our evidence suggests that the firms fall into three groups. Toyota excels in all categories; Audi, GM, Honda, Mazda, and Nissan perform somewhat less well while BMW, Daimler/Chrysler, Ford, Mitsubishi and Volkswagen lag further behind. This is consistent with Toyota's "Kaizen"

3. River.com
Glen Schmidt, Georgetown University
Ken Homa, Georgetown University

On-line book-seller River.com wonders whether it should hold inventory in its own warehouse or instead have book orders shipped from the publisher. This case illustrates how the profitability of firms such as Amazon.com hinges on sound operations practices. Data are provided to give students the opportunity to apply inventory-management principles.

4. Zara
Kasra Ferdows, Georgetwon Universtiy
Michael Lewis, Warwick Business School
José Machuca, University of Seville

The case describes how Zara, operating out of La Coruña in north-west Spain, has managed to become a benchmark for speed and flexibility in the garment industry. It offers an illustration of a fast-response global supply network. In 2002 Zara was the only retailer that could deliver garments to its stores worldwide in just fifteen days after they were designed. Its unique system for design, production, distribution and retailing and often unconventional approach provide interesting learning opportunities. We have found the case to be popular with executives, MBAs and undergraduate business students, both in core Operations Management courses to electives focused on international operations, operations strategy, global logistics, distribution, retailing. A teaching note is available, and it includes several photographs from Zara's operations in La Coruña, as well as a set of PowerPoint slides.

5. Quad Wants to be a Savi Player in Agribusiness
Eric Johnson, Dartmouth College

Set in the central valley of California, this case focuses on the fresh produce supply chain. The case introduces the concepts behind RFID technology and the role of such technologies to track supply chain assets. The objectives include: Examining the business case for RFID tracking in a closed loop supply chain; Understanding the major barriers to implementing networks in supply chains operated by partners with diverse incentives; Illustrating how tracking technologies couple with reusable containers require a new business model to be successful. The case also introduces the benefit of RFID in supply chain security (prevention of product tampering).

Session 52: SAT. 15:30 - Miramar 1
Variability Control in Supply Chains

Cluster: Operations and Logistics

Chair: **Marc Lambrecht**, Katholieke Universiteit Leuven

1. Reducing Service Variability in a Multi Plant Supply Chain
Nico Vandaele, University of Antwerp

In this paper we study a multi plant supply chain. The production facilities can exchange production orders in order to balance the overall service level to the customer. As the production facilities are similar but not identical, each plant has its own relationship between the load and capacity parameters on the one hand and the overall service level on the other hand. We show how this can be modeled in a multi product environment and illustrate the model's use with real life data from a prestressed concrete manufacturer.

2. Information Sharing: An Analysis with Jury's Inners

T Hosoda, Cardiff Business School
Steve Disney, Cardiff Business School

Lee, So and Tang (2000) analyzed a model of a supply chain with and without information sharing in order to identify the benefit of supply chain collaboration. Here, auto-regressive (AR(1)) end consumer demand was shared (and not shared) with the manufacturer in a dyadic two echelon supply chain. Lee et al (2000) used a difference equation approach to study the behavior of the policy with regard to the bullwhip and inventory variance produced by the ordering policy. We study the model of Lee et al, by an analysis based on z-transforms. This allows us to exploit the Inners approach of Jury (1974) to obtain exact analytical expressions for bullwhip and inventory variance. We are able to confirm and extend the results of Lee, So and Tang (2000).

3. Coordinating Supply Chains by Controlling Upstream Variability Propagation

Joseph Geunes, University of Florida
Anantaram Balakrishnan, University of Texas at Austin
Michael Pangburn, University of Oregon

Effective distribution using collaborative fulfillment networks requires coordination among the multiple firms at different stages of the supply chain. Acting independently, supply chain partners fail to weigh the cost burden they impose on upstream suppliers when their replenishment order quantities vary from period to period. We explore a new approach to coordinate multiple stages in the supply chain by controlling, through appropriate downstream inventory management, the demand variability that is propagated to upstream stages. We propose and analyze a coordinated inventory replenishment policy that uses order smoothing to reduce order-size variability and thus reduce overall system costs, including both inventory and transportation costs. Using a distribution network for specialty brand appliances, we demonstrate the potential cost savings that order-smoothing strategies can yield compared to the uncoordinated case when individual firms separately minimize their costs.

4. Mathematical Expression for the Newsvendor Profits

Miguel De Lascurain, Instituto Tecnologico Autonomo de Mexico

The Newsboy Problem or the more politically correct The Newsvendor Problem, is a classical OR problem pertaining to Inventory Theory. It arises in situations involving seasonal or perishable products that cannot be carried in inventory and sold in future periods. In this work, a closed expression for the profits expected by the newsvendor is obtained based on a formal mathematical scheme. Additional results for the Uniform, Normal and Exponential probability distributions are also derived and presented in this work.

5. The Golden Ratio in Production & Inventory Control

Steve Disney, Cardiff Business School
Marc Lambrecht, Katholieke Universiteit Leuven
I. Farasyn, Procter and Gamble Services Company
D. Towill, Cardiff Business School
W. Van de Velde, Procter and Gamble Services Company

The Golden Ratio is often found in optimal scenarios in the physical world. For example, the optimum ratio of male and female bees, the optimum placement of leaves to catch sunlight, or the optimal placement of petals to attract insects are all characterized by the Golden Ratio. We will show that the Golden Ratio also occurs in supply chains. For instance an optimal generalized Order-Up-To (OUT) policy is used to match supply with demand whilst maintaining minimal reasonable inventory levels. We have generalized the classical OUT policy by incorporating two independent proportional controllers into the Inventory and Work In Progress (WIP) feedback loops. To date we have found three instances where it occurs; in the Inventory and WIP feedback loops in order to minimize the sum of bullwhip and inventory variance and in the stability boundary of the system.

Session 53: SAT. 15:30 - Miramar 2
Algorithms for Production Scheduling

Cluster: Operations and Logistics

Chair: **Concepción Maroto**, Universidad Politécnica de Valencia

1. Project Scheduling Under Limited Resources with Advanced Genetic Algorithms

Javier Alcaraz, Universidad Politécnica de Valencia
Concepción Maroto, Universidad Politécnica de Valencia

The Resource-Constrained Project Scheduling Problem consists of scheduling activities of a given project, that are subject to precedence constraints and limited availability of resources, in order to minimize the project's makespan. We present a genetic algorithm which makes use of a new encoding for the solutions, new crossover and mutation operators and a local search procedure which tries to improve the quality of the solutions. This encoding is an extension of the representation previously designed by Alcaraz and Maroto (2001). It allows us to use alternative scheduling generation schemes to build up the schedules: forward-serial, forward-

parallel, backward-serial and backward-parallel. The local search procedure consists of reordering the list of activities taking into account their starting or finishing times on the schedule. After this reordering, activities are scheduled again. The computational results obtained by our algorithm show that it is one of the best metaheuristics developed to solve this problem so far.

2. Solving the Expected Makespan Open-Shop Scheduling Problem Subject to Random Machines Breakdowns and Repair Times

David Alcaide, Universidad de La Laguna
Joaquín Sicilia, Universidad de La Laguna
Andrés Rodriguez-Gonzalez, Universidad de La Laguna

There exist many real situations where job scheduling is required. Frequently, some machines/workers must execute jobs as soon as possible. It is possible that several machines are not available to perform their activities during some time periods due to different circumstances.

3. A Parallel Genetic Algorithm for the Flow Shop Problem

Eva Vallada, Universidad Politécnica de Valencia
Concepción Maroto, Universidad Politécnica de Valencia
Rubén Ruiz, Universidad Politécnica de Valencia

In this work, we present the parallelization of a Genetic Algorithm (GA) and a Hybrid Genetic Algorithm (HGA) for the flowshop scheduling problem. The structure used to parallelize follows the Island Model where the population is not shared among the different processors and there is no master to control the process. A migration operator is introduced allowing populations on the islands to exchange individuals synchronously. The performance of the Parallel Genetic Algorithm (PGA) and the Parallel Hybrid Genetic Algorithm (PHGA) have been evaluated with the 120 problems of Taillard. Test results show that the parallel versions improve the results achieved with the sequential GA and HGA. We also compare the results with some of the most well known and effective metaheuristics, showing very good results.

4. Genetic Algorithms for Hybrid Flowshops with Sequence Dependent Setup Times: An Application to the Ceramic Tile Industry

Concepción Maroto, Universidad Politécnica de Valencia
Ruben Ruiz, Universidad Politécnica de Valencia

In the field of flowshop scheduling problems the scientific community still observes a gap between the theory and the practice of scheduling. In this work we aim to provide a genetic algorithm for a complex flowshop scheduling problem resulting from the addition of unrelated parallel machines at each stage, sequence dependent setup times and machine eligibility. This problem is common in the fabric and ceramic sectors. The algorithm incorporates four new crossover operators. We show a calibration of the different parameters and operators by means of experimental designs. We also present adaptations of other metaheuristics to the problem and conduct several experiments with a set of 1,320 synthetic instances as well as with real data taken from companies of the ceramic tile manufacturing sector. The results indicate that the proposed algorithm is more effective than all other adaptations and constitutes a general method applicable in complex scheduling environments.

Session 54: SAT. 15:30 - Miramar 3
Supply Chain Decision Models

Cluster: Operations and Logistics

Chair: **Bernhard Fleischmann**, University of Augsburg

1. Optimal Inventory and Production Decisions for an ATO System with Uncertain Demand and Limited Assembly Capacity

Vernon Hsu, George Mason University
Ke Fu, The Hong Kong University of Science and Technology
Chung-Yee Lee, The Hong Kong University of Science and Technology

We consider an optimal inventory and production problem faced by a contract manufacturer who has to meet an one time order with uncertain demand quantity. Long component procurement lead times and limited assembly capacity post significant challenges in meeting the demand when a tight due date is imposed by the customer. We derive optimal inventory and production policies that maximizes the overall profit, and discuss managerial insights.

2. Supply Chain Design Model for Defense Industry: The Aeronautical Industry Case

Luiz Alberto Campos Filho, York University
João Amato Neto, University of São Paulo
Paulo Lourenção, UNIVAP – School of Business / Embraer

The defense business is such a distinctive arena that it requires specific treatment regarding almost all its aspects. There are more governmental interventions and interests than any other single industry. Our focus is the aeronautical defense industry. Here every program demands an intricate bid process not only for governments but also for the companies that will compete.
What are the frameworks that defense companies can use to maximize their chances to win a bid when analyzing potential supply chain arrangements? Given the particularities of this industry, we propose an adaptation of Charles H.

Fine's supply chain design model which incorporates political aspects. We present a complete framework for the design of a supply chain and its arrangements among the prime-contractor, suppliers, and distributors in order to maximize the chances of a winning bid.

3. Heuristics for the Modified All-Unit Discount Cost Function in Large-Scale Multi-Period Supply Chain Models

Michael Galbreth, Vanderbilt University
James Hill, Vanderbilt University

In practice, less-than-truckload (LTL) shipment costs often follow a modified all-unit discount (MAUD) cost function. However, when included in multi period supply chain optimization problems, the piecewise structure of the MAUD function requires a mixed integer formulation, which can be very time-consuming to solve, if not intractable. In this study, we show that a simple approximation technique can be used to represent MAUD functions with a reasonable degree of accuracy. We then present a new set of heuristics based on this approximation. The heuristics are evaluated using experiments designed to show their effectiveness in finding near-optimal solutions to large-scale supply chain problems.

4. The Impact of Pricing Policy on Demand Variability and Firm Performance

James Hamister, State University of New York
Nallan Suresh, State University at New York

This paper explores the impact of pricing policies on volume variations, bull whip effects, and firm performance utilizing a scanner data base of sales information for retail stores. This study attempts to reconcile assertions from microeconomic theory with those of supply chain notions relating to the bullwhip effect. This research supports the idea that pricing variation is indeed associated with volume variation, but for the case examined, it represents only a small part of the variation seen. Pricing variation was related to prior-period demand levels, with low demands associated with low prices. However in periods of known high demand, such as holidays, price reductions were exhibited. Finally, profit maximization suggests that profitability will be convex in price. This hypothesis was rejected for this dataset, suggesting that the firm in question did not maximize profits for the item under study.

5. Global Supply Chain Planning in the Automotive Industry

Bernhard Fleischmann, University of Augsburg

The strategic planning of the global production network is of vital importance in the automotive industry. Decisions on the production network take several years to be implemented and restrict the company for a long period of time, due to the rather long life cycle of the products. Given the product program, essential decisions concern the questions: How much capacity should be installed at which locations for which products? This concerns not only the complete supply chain from the material suppliers up to the customers in all sales markets around the world, but also the financial implications of the necessary investments. The presentation reports on a current research project at a German automotive manufacturer. The existing strategic 12-years planning is improved by using an optimization procedure based on a MIP model. Similar models in the literature are analyzed and some shortcomings are shown.

Session 55: SAT. 15:30 - Miramar 4
OM in Emerging Economies: Challenges and Potential II

Cluster: Environment and International

Chair: **Michel Leseure**, Aston Business School

1. Turkish Automotive Industry: Foreign Producers and Domestic Capabilities

Banu Bozkurt, Aston University
Kirit Vaidya, Aston University

The 1990s witnessed an increase in the number of automotive manufacturers operating in Turkey. Low labor costs and access to the domestic and regional international markets have made Turkey attractive to big car manufacturers. Ford, Toyota, Mitsubishi and Hyundai have established plants in the country. Fiat and Renault, have located sole production of popular models in Turkey, demonstrating the increasing importance of the country as a regional manufacturer. An important question for Turkey is the potential for industrial learning for Turkish automotive firms from foreign presence. In East Asia, the processes of technology diffusion and learning are generally held to follow two pathways, namely market-induced imitation, and organizationally induced technology transfer. A framework incorporating these pathways and setting out the stages of industrial capability development, based on the East Asian experience, has been used to assess the potential for technology transfer from foreign manufacturers to Turkish companies in the sector.

2. A Comparative Study of Technology Transfer Paths Between Developed and Developing Countries

Oktay Ozdenli, Aston University
David Bennett, Aston University

The transfer of technology can occur between developed and developing countries as well as between small & medium sized enterprises (SMEs) and large organizations. There are six common paths of transfer; two from SMEs in developed countries, three from large organizations in developed countries and one from large organizations in developing countries.

In this paper the paths of transfer will be illustrated and analyzed through existing published case studies and a longitudinal empirical case developed by the authors based on participative action research. The factors common to each case study, common features, differences, problems, needs, requirements and the methods used will be compared. The paper aims to highlight the differences between developed/developing and SME/large organization technology transfer. These show why SMEs and large organizations are obliged to adopt unique approaches to transfer due to their respective levels of resource availability and also their need to adopt appropriate transfer methodologies.

3. Dynamic Capabilities in a Transition Economy: A Case from Slovenia

Krsto Pandza, University of Maribor
Andrej Polajnar, Univerity of Maribor

This paper addresses the role and the relevance of dynamic capabilities within the context of a transitional economy. Exploring transformation of management approaches and practices in Central and Eastern Europe has been a fruitful research area for last fifteen years. The organizational science scholars have more likely used the transitional economy settings for exploring whether established managerial practices from capitalist world can prove valuable for transition economies. This research agenda, which intrinsically divides between a "superior and inferior" world largely prevent researchers to build fresh and challenging new theories.
This paper adopts following structure. Firstly, it discusses the dynamic capabilities approach and its relevance for operations strategy. The research methodology is briefly described. Within methodology section more emphasis is put on depicting a transition period in Slovenia. In a discussion section the impact of cognitive mechanisms such as interpretation, retrospective sensemaking and imagination on capability development process is addressed.

4. The Impact of Strategic Issue Classification on the Development of Operations Management Capabilities

Michel Leseure, Aston Business School

Although economic development programs often make reference to the development of competence and capabilities, modern development efforts highlight marketing and finance rather than operations capabilities. This pre-supposes that the acquisition of operations management capabilities follows logically. This paper uses a qualitative research design and case studies from Morocco to demonstrate that the perception of strategic issues by development officers and government officials can enhance or block the emergence of operations management best practices in emerging economies.

Session 56: SAT. 15:30 - Caribe
Operations Strategy IV

Cluster: Strategy and Design

Chair: **Robert Collins**, IMD

1. Resources and Capabilities in Operations Strategy

Jaime Fensterseifer, Federal University of Rio Grande do Sul / PPGA/EA and CEPAN
Eduardo Wilk, Federal University of Rio Grande do Sul/CEPAN

This paper deals with the role of resources and capabilities development in the formulation process and the content of operations strategies. The main concern is with the sustainability and the continuous upgrading of the competitive advantages derived from the operations strategy and its supporting capabilities. The focus is thus on the dynamic elements of resources and capabilities, viewed as the underlying sources of sustainable competitive advantages. The resource-based view perspective is used in conjunction with the dynamic capabilities approach and the concepts of static and dynamic flexibility in order to develop a framework for the analysis of the operations-based resources and capabilities. Implications of the framework are discussed in the context of the traditional operations strategy models and contributions towards a more dynamic model and future research needs are pointed out.

2. Economic/Financial Justification of AMT: A Model of Rationale Using a Resource-Based View

Lilian Borges, Pontifical Catholic University of Parana
Sergio Gouvea da Costa, Pontifical Catholic University of Parana
Edson Pinheiro de Lima, Pontifical Catholic University of Parana

This article presents a model of rationale beneath the economic/financial justification in the selection of Advanced Manufacturing Technologies (AMT), and the theoretical grounds used in the development of the model. One begin exploring the available techniques for the economic/financial justification of AMT and some existing "gaps" and difficulties, specially relating to the demonstration of intangible benefits of these technologies when justifying their acquisition. Than we examine the current models of AMT adoption and management and their treatment regarding the AMT as a resource. Finally, a rationale is proposed for the "measurement" of these benefits, based on the resource-based theory and its core concepts of competences and capabilities in the context of the Maslen-Platts "Manufacturing Vision" and the Manufacturing Strategy.

3. Analysis of Operational Managers' Strategic View of Hotels in Brazil about Opportunity Cost of Investment

Ana Beatriz Sousa, Federal University of Rio Grande do Norte
Rubens Ramos, Federal University of Rio Grande do Norte

This paper will present a research done with Operational Managers of international level Hotels in Brazil, in order to understand how is their strategic view to choose kind of investments. The results were gotten through a questionnaire, which simulated some investments, ever in increase the facility, or invest in other kind of business, widely their target. The Operational Managers' decision indicated a choice to invest in enlarge the physics structure to improve the service. These results are important because it's possible compare the difference between the operational managers' strategic view with majority managers' strategic view about opportunity costs.

4. Knowledge Sharing among Employees

Enno Siemsen, University of North Carolina
Aleda Roth, University of North Carolina
Sridhar Balasubramanian, University of North Carolina

Creating knowledge is a fundamental process to generate competitive advantage. Employees are major contributors to the generation of organizational knowledge. Through their daily experiences, they generate a vast body of understanding on their work. Besides being an asset for the company, this knowledge is also an asset for each individual employee. Employees gain value with expertise. However, employees do not always share what they know with fellow employees. We present a conceptual framework that addresses this phenomenon. We also develop scales for an empirical test of this framework. We test the validity and reliability of the scales using confirmatory factor analysis.

5. What Plant Management Does to Sustain High Performance in Manufacturing

Robert Collins, IMD
Roger Schmenner, Indiana University

Manufacturing companies operating a number of plants experience variability in plant performance. Some plants within the portfolio achieve and sustain consistently high levels of performance, while others report either fluctuating or inferior levels of performance. Best practice is not endemic despite benchmarking principles being well known. Interviews and a survey of 75 Divisional Manufacturing Managers with multi-plant responsibilities were undertaken to gain a better understanding of how plant management influences plant performance. The study reveals that in sustaining high performance it is the mentality of the plant's management and workforce that is critical. This mentality consists of five elements: style of the Plant Manager, prevailing philosophy about profit and performance, attitude towards the plant and invested capital, attitude to the external environment and how the plant is measured.

Session 57: SAT. 15:30 - Coral
Financial Services

Cluster: Service and Quality

Chair: **Joseph Ormsby**, Stephen F. Austin State University

1. Perceptions of Bank Services from the Personnel Point of View: Preliminary Findings

Musa Pinar, Pittsburg State University
Henry Crouch, Pittsburg State University
Jerry Rogers, Pittsburg State University

This study examined the perceptions of bank personnel regarding bank services offered to customers. The survey instrument was designed utilizing the traditional mystery shopper studies and was administered to all the personnel at the banks and/or branches that participated in the study in a small mid-western town. The results showed that while the bank personnel generally consider all the banking service factors fairly important in providing high quality, highly satisfying services, some services were considered more important than others. Various comparisons of personnel perceptions of bank services found significant differences based on individual bank and personnel characteristics. These findings might have significant implications for the satisfaction of bank customers, as well as the quality of performance and competitiveness of the banks.

2. Quality Management in Services Marketing - Levels of Acceptance of Financial Services in Mailing Agencies

Maria Gouvêa, University of São Paulo
Geraldo Toledo, University of São Paulo
Lino Rodrigues Filho, University of São Paulo

The identification of alternative products and services that suit the needs of the effective or potential customer is one of the main changing agents in order to improve customer service quality. In this context, the Postbank International Consultancy decided to investigate the receptivity of the Brazilian population referring to a proposal of a new channel to offer financial services. In Europe there is already a new alternative that is considered an adequate way of meeting the needs of the customers: the supplying of financial services in mailing agencies. A quantitative research was made with residents of Brazilian regions. The data collection technique used was survey with personal interviews. Some multivariate data analyses were carried out in order to achieve the

objectives of this study. Among many interesting results founded, we have identified some positive aspects of the proposal of supplying financial services in mailing agencies.

3. Applying the TOC Five-Step Focusing Process in the Service Sector: A Banking Subsystem
Richard Reid, University of New Mexico

Although the application of the TOC five-step focusing process in manufacturing firms is well-documented, there are relatively few descriptions of its application in managing service processes or organizations. This paper demonstrates the iterative use of the focusing process in a service sector organization and draws some conclusions relative to its application in the service industries. From a generic perspective, the five-step process is schematically presented as a structured, systemic-based, approach to constraint management. Next, each step in the five-step process is described and evaluated relative to its role in constraint management. Next, a detailed example is presented to illustrate several cycles of the process in a banking subsystem and to highlight some important nuances of each process step. Finally, some managerial implications relative to the application of the five-step process in service organizations will be discussed.

4. Efficiency Benchmarking of Branches of a Large Belgian Bank Using DEA
Paul Gemmel, Ghent University

Data envelopment analysis (DEA) is a linear programming based technique which has been used in service sectors to compare relative homogeneous 'service units' during the last 20 years. In this paper we show the results of the application of DEA in a large Belgian bank with 962 branches. We collected and validated data for 40 different variables over two years (2001 and 2002). We developed a model measuring operational efficiency of bank branches, relating inputs (such as number of staff and degree of automation) to outputs such as number of transactions and number of customers served. We further explored how several environmental variables had an impact on the DEA results of the branches (such as level of local competition for each branch and the kind of customer). Finally we looked at the evolution of the efficiency score in the two years using Malmquist DEA.

5. A Bank Staffing Plan: A Telling Situation
Joseph Ormsby, Stephen F. Austin State University
Joyce Hoffman, Stephen F. Austin State University

The national economy has forced many financial institutions into bankruptcy, others have significantly downsized while others have merged to avoid bankruptcy. These changes in financial institution leadership create problems in day to day operations, the focus of this paper. A small rural bank has been recently acquired by a large financial institution requiring a different teller staffing arrangement. This paper investigates customer demand patterns in order to construct a cost efficient work schedule for tellers who are involved in several different types of bank transactions throughout the day.

Session 58: SAT. 15:30 - Mediterráneo 1
Supplier Management

Cluster: Operations and Logistics

Chair: **Henk Akkermans**, TU Eindhoven

1. Managing Relationship in a Strategically Segmented Supplier Environment
Srinarayan Sharma, Oakland University

There is increasing recognition that strategic supplier segmentation is an important aspect of successful supply chain management. Managing relationship with supply partners also has been a hallmark of successful supply chain management. However strategic segmentation requires that different types of relationships be established for different segment of suppliers -- closer relationships with suppliers that provide strategic components than with them who provide commodity components. No guidelines exist in the literature as to how these relationships can be developed. This poses a big problem for companies, particularly with the globalization of the supply chain. This paper discusses approaches for addressing this problem.

2. Bullwhip Revisited: Root Causes for Oscillation in Supply Chains
Henk Akkermans, TU Eindhoven
Nico Dellaert, TU Eindhoven

The term "bullwhip effect" was first introduced by Lee et al. in 1997. By bullwhip effect in supply chains they meant that orders to suppliers tend to have larger variances than sales to buyers and that these distortions propagate upstream in amplified form. Most practitioners and academics since then have associated this term not just with amplification, but with oscillation as well. In this paper we investigate this assumption. The root causes for the bull-whip effect that Lee et al. discuss, do in themselves NOT generate oscillatory responses (nor do Lee et al. discuss, do in that they do). We illustrate this claim with system dynamics simulation. In fact, oscillatory behavior is caused by specific combinations of specific parameter values for response rates and response rates, which can lead to inherently unstable supply chains. We show this through Eigenvalue analysis of a simple supply chain model.

3. Achieving Both Fast Response and Low Cost via Global Supply
Roy Stratton, Nottingham Trent University
Roger Warburton, University of Massachusetts, Dartmouth

Markets are increasingly characterized by demand uncertainty and short product life cycles, while at the same time supply is shifting to remote low cost global sources. The importance of resolving the resultant cost versus response trade-off is clearly apparent, especially in the fashion apparel industry.
Various practical approaches to minimizing, postponing or otherwise managing the source of demand uncertainty have emerged in widely cited cases. However, even when the trade-off results from planned management action, as in the case of outsourcing, there is little evidence of the implications being acknowledged and actively addressed. This paper reports on three case studies from the USA and UK that demonstrate how outsourcing decisions are commonly made with little or no attempt to address the fast response requirements of the market. The paper explores the underlying reasons for this and offers means of making the trade-off implications and potential solutions more explicit

4. Safeguarding CSR in Global Supply Chains
Esben Pedersen, Copenhagen Business School

In the wake of globalization, companies are becoming increasingly aware of the social and environmental aspects of international production. In response to the increasing societal pressure, more companies are adopting the concept of corporate social responsibility (CSR) by introducing codes of conduct, which are expected to ensure socially responsible business practices throughout the chain. However, there are several challenges to the management and control of codes of conduct in global supply chains. It is difficult to enforce codes of conduct in global supply chains, because the involved companies are separated geographically, economically, legally, culturally and politically. In consequence, introducing codes of conduct in global supply chains raises a series of agency problems.

Realizing that non-compliance can have severe consequences for the initiator, the article want to discuss, how the interests of the actors in a supply chain are aligned with the terms of the codes.

5. Three is a Crowd: A System Dynamics Study of Indirect Control of Contract Manufacturers in 3-Echelon Supply Chain
Henk Akkermans, TU Eindhoven
Kim Van Oorschot, Minase

Using contract manufacturers for cheap and efficient assembly is a trend in several industries and especially in high-tech electronics (HTE). Effective control of such decentralized supply chains is very complex. This research investigates a system dynamics model of a real-world 3-echelon supply chain for the production of optical storage equipment such as CD-ROMS and DVDs. We show how the supplier upstream in the chain and the OEM downstream together can effectively manage supply chain dynamics and reduce bullwhip effects by way of collaborative planning and forecasting. In doing so, they can control the behavior of the contract manufacturer in the middle without requiring his active involvement in the collaborative planning process. The contract manufacturer retains entrepreneurial independence, but his local decision-making process is kept in line with the supply chain optimum through the collaboration of the other parties. When the contract manufacturer actively participates, even greater performance improvements become feasible.

Session 59: SAT. 15:30 - Mediterráneo 2
Measuring Corporate Performance

Cluster: Strategy and Design

Chair: **Heimo Adelsberger**, University of Duisburg-Essen

1. Framing and Re-Framing Performance Measurement Systems
Kim Sundtoft Hald, Copenhagen Business School

Performance Measurement Systems are usually studied as static. Only a few researchers has discussed how performance measurement systems are not simply designed and implemented, but evolve through extended periods of time. More work need to be done before we fully understand the dynamics of these systems. Based on a longitudinal case-study conducted in a major Danish production company, this study reports on how a Logistical Performance Measurement Systems was framed and re-framed during a period of three years.

2. Employees: Asset or Liability?
Gerald Barlow, University of Kent
Simon Raby, University of Kent

The paper reports on research into employment practices in the replacement window industry. It has been developed through a research program (TCS, DTI funded) in a UK manufacturer, where poor employment practices have led to a staff turnover of over 100%. The research investigated levels of both staff turnover, and absenteeism along with employment practices and management understanding of the problem within UK manufacturing in this industry. The results led to a benchmarking process for the sector, covering the entire UK, and looking at the size of the problem and ways to address it. The paper outlines the procedures and outcomes,

along with discussing the options to be addressed by the management involved in this industry. If the industry is to improve its levels of productivity it is essential it realizes how serious these problems are, what effect they can/are actually having and how they might be addressed.

3. Performance Measurement for SME Growth - A Business Profile Benchmarking Approach

John Dalrymple, Royal Melbourne Institute of Technology

This paper reports on research involving 15 sme sector companies in Melbourne Australia. The UK based Benchmarking Index has been used as a performance measurement instrument to identify company strengths. A business growth plan was developed for the companies based on acknowledged strengths identified by comparison with an international peer group. The business growth plans targeted market segments where the companies' strengths were valued. Weaknesses that would potentially impede growth were identified and action plans were developed to address the weaknesses and for implementation. A number of important issues emerged from the research program regarding the ability of companies to accurately cost their product/service packages. The paper reports on the outcomes for 15 companies.

4. Approach to Characterize Manufacturing Flexibility

Avaneesh Gupta, Hong Kong University of Science and Technology
Mitchell Tseng, Hong Kong University of Science and Technology

Flexibility is a key requirement for manufacturing companies to cope with the ever increasing turbulent environment. Though the ongoing discussion on flexibility has contributed much to the conceptual understanding of the nature of flexibility, it is still far from being characterized. We propose a systematic two-step approach to characterize flexibility. In the first step, conceptual frameworks are proposed to decouple flexibility from changes in the operating environment and from the performance criteria. This facilitates treating flexibility as an absolute concept. In the second step, the intrinsic properties of production system are extracted in the form of four flexibility descriptors namely: capacity range, capacity response, capability range, and capability response, to enable flexibility characterization. The focus is on volume and mix flexibility, as we believe these flexibility types are the most important ones from the operational perspective. A real case study is considered to demonstrate the proposed approach.

5. Electronic Performance Support Systems in Production and Operations Management – State of the Art and Future Development

Heimo Adelsberger, University of Duisburg-Essen
Markus Bick, University of Duisburg-Essen
Thomas Lodzinski, University of Duisburg-Essen
Jan Pawlowski, University of Duisburg-Essen

Managing production processes is no longer only a management issue – every actor in the process is required to efficiently use data, information, and knowledge. Thus, every actor in the process will become a knowledge worker to a certain extent. This article deals with the convergence of production processes and knowledge processes and corresponding systems. MRP-systems are widely used for handling data for production planning. Additionally, Electronic Performance Support Systems (EPSS) have emerged supporting corresponding knowledge management activities, such as distributing, preserving, and using knowledge. We describe and analyze knowledge management's and EPSS's evolution from the production and operations management perspective. The analysis leads to the conclusion that these systems need to be integrated in state-of-the-art production processes. We discuss strengths and weaknesses of current approaches and give insights into promising cases and applications. Finally, we present future developments, trends, and further research opportunities, especially enhancing EPSS by integrating multimedia components.

Session 60: SUN. 10:30 - Caesar 1
Adoption of e-Business Activities

Cluster: Operations and Logistics

Chair: **Alexandre Graeml**, EAESP/Fundação Getúlio Vargas - Brazil

1. The Launching of a New Car Model at General Motors Brazil Using the Internet : The Case of Celta

Silvia Zilber, Centro Universitário da FEI
Eduardo Vasconcellos, FEA/USP

A key to successful Internet strategies is the leadership shown by senior management. Many authors also reflect on the importance of the adoption of the e-business activities being incorporated in a company's global strategy. This paper deals with these aspects: the case of adoption of e-business activities by General Motors Brazil, more specifically, the case of the launching of Celta.

2. The Internet Procurement Decision: A Value Focused Adoption Model

Francesco Sandulli, UCM-DMR Consulting E-Business Research Center
Antonio Rodriguez Duarte, UCM-DMR Consulting E-Business Research Center

Beatriz Minguela Rata, UCM-DMR Consulting E-Business Research Center

Based on value focused thinking theory, the paper proposes a decision-making model to investigate what factors firms consider regarding Internet usage in the procurement process. According to our conceptual model the adoption of the Internet in corporate purchases is motivated by four factors: transaction costs, price, intermediation rents and product characteristics. The proposed model is tested on a data set of more than 1600 Spanish firms, based on computer-assisted telephonic interviews. Results show how price and the solution of the adverse selection problem are key to succeeding in B2B Internet commerce.

3. The Internet's Impact on Manufacturers: A Snap-Shot of the Industrial Sector in the State of Sao Paulo, Brazil

Alexandre Graeml, EAESP/Fundação Getúlio Vargas - Brazil
João Mário Csillag, EAESP/Fundação Getúlio Vargas

The e-business hype is over. Companies have become much more conservative in their evaluation of Internet investment and traditional financial targets are now associated with any new project from the start. But a silent, much deeper, revolution is under way. Now that companies have a clearer idea of the miracles the Internet can perform and of those that shouldn't be expected, they have grounds on which to redesign their processes, their structure and their value chains, in order to take better advantage of the Internet's capabilities.
This paper presents the preliminary results of a survey that was carried out with more than 600 Brazilian manufacturers, in which they pointed out ways the Internet and other IT are changing their businesses and the competitive environment. The authors discuss their findings, comparing the survey's results with their previous expectations, based on the literature and on prior research.

Session 61: SUN. 10:30 - Caesar 2
Preparing Tomorrow's Operations Managers Today Through State-of-the-Art Undergraduate OM Programs: The University of Dayton Initiative

Cluster: POM Pedagogy

Chair: **Sanjay Ahire**, University of Dayton

1. A Novel Approach to Linking the Survey Courses in Operations, Marketing, and Finance

Peter Wagner, University of Dayton
Leslie Douglas, University of Dayton
Rebecca Yates-Wells, University of Dayton

We describe a novel approach at the University of Dayton that focuses on junior (third year) business majors, integrating the introductory courses in finance, operations, and marketing into integrated course blocks. We present ways in which block sections differ from traditional individual sections to give students greater opportunities to think across disciplines. We present the results from the first implementation of this approach. We conclude the implications of this orientation to the core business functional courses for students' appreciation for the integrated nature of business management.

2. Taking Undergraduate Operations Management (OM) Competency to the Next Level: Actual Operations Consulting

Michael Gorman, University of Dayton
Sanjay Ahire, University of Dayton

We present the theme, the unique design and delivery structure, and significant outcomes of the capstone operations consulting initiative within the undergraduate Operations Management (OM) program at the University of Dayton. We highlight the resulting client organization benefits, student career opportunities, school recognition implications, and faculty professional outcomes. We also identify critical success factors for such an initiative. We discuss how this approach dispels some myths of the level of capabilities and skills that can be developed during an undergraduate OM program. We conclude with insights into how the experience can validate practical applicability of OM knowledge and create industry awareness about professional capabilities and opportunities for graduates from OM programs.

3. Demonstrating Operations Management Value to Other Business Careers Through the Operations Management Survey Course

Sanjay Ahire, University of Dayton
Peter Wagner, University of Dayton

Undergraduate business students usually start to appreciate the real value of the operations management (OM) competencies late in their four-year curricula. We present results from an innovative integrative research paper assignment in the survey OM course that helped students uncover the value of OM skills and concepts to other business careers in accounting, finance, marketing, and MIS. We present results from over 500 student research papers highlighting some of the major and interesting linkages identified by students, and the impact of the assignment on students' appreciation for OM professions and consequent pursuit of OM major/careers. We conclude with a discussion on the utility of this approach to shaping the perception of, and potential applications of, OM skills and competencies by budding business executives in any business career.

4. A Process Model of Successful Operations Management Program Development
Sanjay Ahire, University of Dayton
John Kanet, University of Dayton
Michael Gorman, University of Dayton
Peter Wagner, University of Dayton

We present a process model of the brand new undergraduate operations management (OM) program at the University of Dayton. Specifically, we present the goals, strategies and tactics, resources and inputs, and critical success factors. Finally, we highlight the process outcomes, including the unique program features, infrastructure, and benefits to students, faculty, school, and industry. We conclude with discussion of how our approach breaks the conventional wisdom about program orientation, content, and quality of domain knowledge covered in a typical undergraduate OM program, and how it could better prepare students for contemporary OM careers.

Session 62: SUN. 10:30 - Caesar 3
Product/Service Development and Design

Cluster: Strategy and Design

Chair: **Beatriz Minguela-Rata**, UCM-DMR Consulting E-Business Research Center

1. A Meta-Heuristic Approach to Dynamic Multi-Project Scheduling
Dwight Smith-Daniels, Arizona State University
Satheesh Ramakrishnan, Arizona State University

We describe a simulated annealing metaheuristic for dynamic multi-project scheduling, where performance objectives include average flowtime and tardiness. We compare a variety of implementation approaches for our approach, as well as compare these with previous methods. Appropriate environments for this approach include new product and process development environments with constrained resources.

2. Product Design Using the Seld-Organizing Map
George Hadjinicola, University of Cyprus
Christakis Charalambous, University of Cyprus
Eitan Muller, Tel Aviv University

This paper presents the application of neural networks, and more specifically Kohonen's self-organizing feature map, in identifying the position of a new product in the attribute space. An algorithm is presented that can be used in the product positioning problem for a number of objective functions. The advantages of the algorithm is that is easy to implement, is time efficient, can handle both discrete and continuous attributes, it can incorporate probabilistic choice models and competition, and allows managers to perform sensitivity analysis on various market environments.

3. The Improvement of Resin Core Making Process Based on Taguchi Method
Komson Jirapattarasilp, King Mongkut's University of Technology Thounburi

This study is aim to improve process and investigate the optimal condition of resin core making. This research used design of experiment that based on Taguchi method. The four important factors were selected on three levels to design for. The L9 orthogonal array was used for the design of experiment. The optimal condition was fined and the test of significant of any factors was performed. The result is found that the condition yields the highest compressive strength comprising the fineness of sand of 85, the baking temperature at 350 C and the resin of 3.5%. The percentage of resin and size of sand grain are found to be factors significantly influencing compressive strength. As for bending strength, percentage of resin and the number of wires are significant influencing factors. These optimal conditions for process of resin core making would be affected the best quality of resin core.

4. Product/Service Design in a Competitive Market
Weiyu Tsai, University of Utah
Rohit Verma, University of Utah
William Moore, University of Utah

Prior research on market-based Product/Service Design has primarily focused on factors related to the integration between marketing and operations management. Research shows that the Marketing/Operations factors such as customer preference, production cost, operating difficulty/capacity among others, play important roles on firms' product/service design decisions. However, earlier research on finding "optimal" product/service design decisions hasn't taken competition into consideration.

Given today's competitive market decisions made by one firm will generally influence the decisions made by the other firms. We extend prior research by considering the impact of competition on a firm's product/service design decisions. Using a game-theoretic model, we show that a firm's optimal design decision should also depend on its competitor's market dominance and operating capability. A numerical example illustrates other managerial implications for the product/service design process.

5. Influence of Concurrent Engineering on Development Time: An Empirical Study
Beatriz Minguela Rata, UCM-DMR Consulting E-Business Research Center
Antonio Rodriguez Duarte, UCM-DMR Consulting E-Business Research Center
Francesco Sandulli, UCM-DMR Consulting E-Business Research Center

This paper studies the influence of basic principles of concurrent engineering (autonomous multifunctional teamwork and execution of activities under an overlapping approach) on new product success (development time). A linear regression model was used to test all hypotheses. Such analysis is performed on a sample of Electronic Components Firms in Spain. Results seem to indicate that both autonomous multifunctional teams and execution of activities under an overlapping approach is related positively with shorter development times.

Session 63: SUN. 10:30 - Caesar 4
Innovations in Teaching I / Innovación en la Enseñanza I

Cluster: POM Pedagogy

Chair: **Francisco Arenas**, University of Seville

1. Propuesta de Metodología para el Proceso Enseñanza-Aprendizaje de la Disciplina de Administración de Producción

Luis Daniel Strumiello, Faculdade Adventista Paranaense
José Paulo Martini, Faculdade Adventista Paranaense
Edmar Oliveira, Faculdade Adventista Paranaense

El trabajo propone La Enseñanza como foco principal en el área de Administración de Producción, con el auxílio de una incubadora de empresas. Frente a la realidad competitiva mundial, la unión de la práctica a la teoria se torna fundamental para el proceso enseñanza-aprendizaje. La utilización de incubadoras de empresas en este proceso, ha traido resultados positivos al fomentar el emprendedorismo en los jovenes universitarios y también en el desarrollo tecnológico en la región. La incubadora pretende crear el ambiente necesario y dar el apoyo que los empresarios necesitan en el inicio de su aventura empresarial. Por el hecho de estar viviendo muchos de los asuntos discutidos en la clase, los alumnos tienen un mayor interés por el contenido de las materias, facilitando el aprendizaje. Tal propuesta viene siendo implementada en una Facultad en el Estado del Paraná en Brasil y ha traido resultados que justifican su desarrollo.

2. About POM Teaching and Research in Tourism Academic Degrees: An Analysis of Andalousian Universities / ¿Qué Se Enseña y Qué Se Investiga Sobre Dirección de Operaciones en Turismo? Un Análisis De las Universidades Andaluzas

Cristina Ceballos Hernández, University of Seville
Antonio Ruiz Jiménez, University of Seville
Carlos Arias Martín, University of Seville

In some countries and regions, such as Spain and Andalusia, the tourism sub-sector moves huge quantities of resources and acts as an excellent driver of the economy. Any research paper which leads to an improvement in the competitive advantages and efficiency of tourist companies is therefore worthy of special consideration. The authors of this paper have for some time been conducting empirical research that would reveal just what is taught at University about Operations Management in Tourism Companies, what research is being done there on the subject, and above all, whether said teaching and research are in line with the real needs of the sector in practice. Included here in are the first findings of this research, obtained from an analysis of the syllabuses for short Tourism degree courses at Andalusian universities and from a comparison with research conducted in recent years. / En algunos países o regiones, como España o Andalucía, el subsector turístico mueve ingentes cantidades de recursos, actuando como un excelente motor de desarrollo. En este sentido, cualquier trabajo de investigación que permita mejorar las ventajas competitivas y la eficiencia de las empresas turísticas merece una especial consideración. Los autores de este trabajo desarrollan desde hace algún tiempo una investigación empírica que permita poner de manifiesto qué se enseña en la Universidad sobre Dirección de Operaciones en empresas turísticas, qué se investiga en la misma sobre el tema en cuestión y, sobre todo, si dicha enseñanza e investigación son acordes o no con las prácticas y las necesidades reales del sector. Aquí presentamos los primeros resultados de dicha investigación, obtenidos tras el análisis de los planes de estudios de las Diplomaturas en Turismo impartidas en las universidades andaluzas y de su comparación con las investigaciones realizadas en los últimos años.

3. Stimulating Business Administration Student Interest in POM: A Survey / Fomentando El Interés de Los Estudiantes de Administración de Empresas en Dirección de Producción/Operaciones

Rafaela Alfalla-Luque, University of Seville
Carmen Medina-López, University of Seville

Traditionally, POM has not had a very appealing image for students of Business Administration who usually lean more towards professional areas such as Finance and Marketing. We therefore pose the questions: What kind of image of POM are we giving out? What do students perceive the function of POM to be? The answers to questions such as these would not only allow us to take the necessary measures to correct the situation and efficiently move the operations sub-system closer to the student, but also to train and guide the student in the subject and stimulate interest in an area in which the student could forge a professional career. To this end we have devised an empirical study based

on interviews of 901 Business Administration students taking required and elective POM courses. The results are revealing for working towards improved training and interest in the field, as will be seen in this study. / La Dirección de Operaciones (DO) ha tenido tradicionalmente una imagen poco atractiva para los alumnos de Administración de Empresas, los cuales suelen mostrarse más orientados profesionalmente hacia áreas como Finanzas o Marketing. Las asignaturas de DO no parecían captar la atención de los estudiantes, ni tan siquiera una vez cursadas. En consecuencia nos planteamos ¿qué imagen de POM estamos proyectando? ¿cómo percibe el alumno esta disciplina? La respuesta a estas cuestiones nos permitiría tomar las medidas correctoras oportunas para poder acercar de una manera eficiente el subsistema de operaciones al estudiante, formarlo y orientarlo en esta materia y fomentar (o crear, según el caso) el interés por un área en la que podría desarrollar su labor profesional, máxime considerando que ésta se muestra como una de las más activas en cuanto a demanda de profesionales cualificados. Para ello, hemos desarrollado un estudio empírico en el que se encuestaron a 901 alumnos de Administración de Empresas de la Universidad de Sevilla de asignaturas obligatorias y optativas de DO (al inicio y al final de curso). Los resultados se muestran reveladores para trabajar en la búsqueda de una mejora de la formación y el interés sobre esta disciplina, como mostraremos en el desarrollo del presente trabajo.

Session 64: SUN. 10:30 - Caesar 5
Global Operations II

Cluster: Environment and International

Chair: **Lalit Johri**, Asian Institute of Technology

1. Socially Responsible Restructuring of Operations to Achieve Sustainability: Lessons from India

Job De Haan, Tilburg University
Rejie George, Tilburg University
Gerard De Groot, Development Research Institute (IVO)

In this paper we elaborate on the restructuring process in a state owned enterprise. The liberalization process in India during the last decade confronted the firm with a number of external threats: e.g., withdrawal of soft budget restraints, subsidies and import restrictions. To increase flexibility and efficiency, it decided to downsize the workforce through delayering its hierarchical system by implementing lower management teams to control operations. However, cultural and institutional factors hamper such a policy. Nevertheless, the firm managed to undertake this exercise effectively. A two-fold research question thus emerges:

- How did the firm implement delayering?
- Why did the workers accept these measures, despite the cultural and institutional aspects involved?

We take a problem-driven approach by first describing the delayering process and exploring the accompanying (HRM) measures to enhance worker acceptability. Additionally, we survey the extant literature (comparative management, organization design) to improve our understanding of the process.

2. Multilingual Web Computing: Opportunities and Challenges in International Operations

Vipul Gupta, Saint Joseph's University
Mirza Murtaza, Middle Tennesse State University

Conducting international commerce by small and mid-sized enterprises (SMEs) before the advent of Internet was not an easy task. International commerce was mostly restricted to Fortune 500 companies. Today, SMEs have a huge opportunity for expanding their operations and making their supply-chains more efficient with the help of multilingual web technology. This paper discusses the benefits and challenges faced by an organization via implementation of multilingual web initiatives. In addition, we outline the key components of multilingual web site architecture; present strategy considerations involved in creating a successful multilingual site; and discuss how global content management systems play an important role in maintaining multilingual web infrastructure. A conceptual framework of global content management for launching a successful multilingual initiative is also proposed in this paper, following by two mini case studies. We conclude the paper with recommendations and managerial implications.

3. Off-Shoring within the Service Supply Chain: Risks and Benefits

Tonya Boone, College of William and Mary

The outsourcing of highly skilled service work, such as financial services, development and information technology, to off-shore providers has become a contentious topic within the political landscape. Businesses see offshoring as a way to reduce costs and extend working hours. Critics contend that the attendant job losses are unacceptable, organizational benefits of offshoring are limited, while the primary economic benefits accrue to stockholders. Nevertheless, some studies predict offshoring of highly skilled service work to quadruple over the next five years. This paper examines the arguments surrounding this off-shoring, identifies the salient issues and proposes research propositions for investigation.

4. Supply Chain Management Practices in Eastern Europe

Vidyaranya Gargeya, University of North Carolina at Greensboro

Katherine McIntyre, University of North Carolina at Greensboro

In the last decade, significant research has been executed in understanding Supply Chain Management (SCM) practices in the United States, Western European and Asian Countries. However, very little research on SCM practices is available from the former Soviet Bloc countries of Eastern Europe. This paper surveys the current state-of-the art of SCM practices in Eastern Europe. Based on the current literature a survey instrument has been developed to investigate the current SCM practices adopted by companies in the Czech Republic. Preliminary results from the survey on the SCM practices in the Czech Republic will be discussed in the paper. An agenda for future research is also presented.

5. Setting and Realizing Manufacturing Agenda For Global Competitiveness
Lalit Johri, Asian Institute of Technology
Sundar Venkatesh, Asian Institute of Technology

During consulting interventions in an international company the authors found that the new manufacturing agenda adopted by newly appointed VP of Global Manufacturing was established around ongoing activities in plants in Mexico and Asian countries. As a result the employee did not see how the new agenda was different from the activities they were carrying out in the past and secondly, the company was unable to integrate and leverage resources, knowledge and competences across the regions. Taking into account product-market, customer value and organizational imperatives the authors suggest a framework for developing the manufacturing agenda in a company which is trying to expand its operations globally

Session 65: SUN. 10:30 - Caesar 6
Behavioral Operations Dynamics in Supply Chain Management

Cluster: Operations and Logistics

Chair: **Noel Watson**, Harvard Business School

1. Defects in Inventory Replenishment
Zeynep Ton, Harvard Business School
Noel Watson, Harvard Business School

Research in inventory management has, to a large extent, focused on inventory planning and assumed flawless execution in physical handling of inventory. We present a typology of defects in the context of inventory replenishment processes and identify their sources by examining a generic process flow for inventory replenishment at a warehouse. We find that defects in the context of inventory replenishment result mainly from human errors. Using Reason's GEMS framework of human errors from cognitive psychology, we explain the causes of human errors in inventory replenishment and identify factors that could exacerbate and factors that could reduce the occurrence of these human errors.

2. Supply Line Instability: Further Evidence of Behavioral Causes of the Bullwhip Effect
Paulo Goncalves, University of Miami
Rogelio Oliva, Harvard Business School

This research contributes to the literature on experimental research on supply line instability by modeling managerial behavior recognizing bounded rationality. We explore the ordering patters of 148 players of the "Beer Distribution Game" assuming that individuals place orders to: replace expected losses, maintain stock at a desired level, and maintain an adequate supply-line of unfilled orders. By separating the stock management problem into "forecasting" (estimating expected losses) and "stock and supply-line adjustment," and structuring data as a panel, we estimate the behavior of a "typical player" for each position in the supply line. Our analysis suggests that that the ordering decisions vary by position and that players underestimate the supply-line even more heavily than previously estimated. More interestingly, we find that players' ability to account for the supply-line drops as the complexity of the stock management problem increases. We conclude by presenting managerial implications of our findings.

3. Order Stability in Supply Chains: The Impact of Coordination Stock
Karen Donohue, University of Minnesota
Rachel Croson, University of Pennsylvania
Elena Katok, Pennsylvania State University
John Sterman, Massachusetts Institute of Technology

We examine the impact of initial inventory levels on the bullwhip effect in a simple serial supply chain where demand is known and constant. We find that the bullwhip effect persists in this environment and that "coordination stock" serves the beneficial function of buffering ordering mistakes. We also find that coordination stock can serve as a substitute for other coordination mechanisms, such as training or instituting one's partners ordering behavior.

4. A Demand-Focused Decentralization Scheme for Serial Supply Chains
Noel Watson, Harvard Business School
Yu-Sheng Zheng, The Wharton School

The existing decentralization schemes for serial supply chains share a common characteristic: a stage's performance, immunized from possible stock shortages at its upstream stage, is dependent on its downstream stages' decisions. This dependency makes the task of stage managers hard in general, and harder when one or more of their downstream stages commit

errors by deviating from their expected optimal strategy. Even if the upstream stage knows how to optimally react to downstream errors, its rational reaction may or may not be good for the system. We propose a decentralization scheme that makes every stage's performance independent of all other stages' decisions. Our scheme measures stages' performance fully based on their respective echelon stocks. Stage managers no longer have to respond to downstream decisions but focus on meeting customer demand efficiently instead. Extensions are made to analyze and decentralize serial systems with order delays and demand information sharing.

Session 66: SUN. 10:30 - Caesar 7
Supplier Relations

Cluster: Operations and Logistics

Chair: **Rocky Newman**, Miami University

1. Supplier Evaluation Performance: A Case Study in the Electronic Manufacturing Industry in Brazil

Samuel Conceição, Federal University of Minas Gerais
Luiz Epaminondas, Federal University of Minas Gerais
Rafael Renno, Federal University of Minas Gerais

The contract manufacturing of electronic products is organized through an international production network involving basically three participants, the Original Equipment Manufacturer (OEM), the outsourcing companies that assembly boards and equipments (EMS), and the suppliers of electronic components. The sector is complex and dynamic, characterized by high demand fluctuation, short product life cycle, pressure for cost reduction, high products and components obsolescence. To reduce the outcome of these effects, the use of tools to monitor the performance of suppliers is required. This article presents the performance of 117 suppliers established in Asia, America and Europe, that supply electronic components and parts for one of the largest Contract Manufacturing companies located in Brazil. The suppliers were evaluated during 6 months and the methodology used was case study. The results show the performance of suppliers in many logistic indicators. The article also points out how suppliers can migrate to world class service.

2. Designing and implementing a supplier evaluation tool for a contract manufacturing industry

Samuel Conceição, Federal University of Minas Gerais
Rafael Renno, Federal University of Minas Gerais
Luiz Epaminondas, Federal University of Minas Gerais

The contract manufacturing scenario is characterized by high demand fluctuation, short product life cycle, pressure for cost reduction and high products and components obsolescence. Management Tools to guide enterprises in this competitive scenario are required and evidenced when worldwide suppliers are part of the chain. This article presents the development of a Supplier Performance Evaluation Tool for Contract manufacturing industries, or Electronic Manufacturer Services (EMS). The tool was developed in Brazil and implemented in the ERP system of one of the largest EMS companies. Action-Research methodology was used on the process of developing the tool. The tool is allowing the company to improve the overall results on its supply chain, reducing inventory costs, lead times and achieving many other benefits. The system is also allowing the supply chain participants to move into world class logistics.

3. Qualitative Exploration of SRM-Projects within the German Pharmaceutical Industry

Ines Alves de Queiroz, Universität Karlsruhe
Olaf Schwabe, Universität Karlsruhe
Dieter Hertweck, Universität Karlsruhe

SRM is a multifunctional discipline, which the business practices needed to establish the rules and the understanding needed for interacting with suppliers of varied criticality to the profitability of the enterprise. Based on different definitions, its common elements are: strategic supplier management, relationship management, and information management & control (Wagner 2001, Spencer & Reilly 2001, Riemer & Klein 2002). On this paper we will try to define the current situation of the SRM-Projects within the German pharmaceutical industry. We developed an empiric-qualitative exploration based on half-structured Interviews, where the (questions) theme was through a guideline fixed and the (questions) order was free. It allowed the Interviewer to run a flexible interview to reach an optimal result. As a result of this analysis we will try to explicate the trends of the pharmaceutical industry in Germany.

4. Linear Performance Pricing and Cost Regression Analysis: A SCM Case Study

Rocky Newman, Miami University
Thomas Gattiker, Miami University
Chris Hegele, Daimler Chryser

Managing complex relationships between supply chain partners is a growing area of concern. As the competencies necessary to support cross functional thinking within an organization are extrapolated outward toward those necessary to support cross organizational relationships, tools and activities used to approach yesterday and today's business problems must be revisited.

While coordination of material and information flow within exiting business relationships has been the focus of SCM to date, leveraging better understanding of supply partner capabilities and synergies in an attempt speed the develop of new and improved products has not developed as significantly. This presentation will examine an approach taken by a major auto manufacturer to use multiple regression analysis to competitively link purchased component performance attributes to cost drivers and subsequent supplier purchase price. Output of such analysis can be used to identify areas for competitive understanding and improvement in the purchasing relationship.

Session 67: SUN. 10:30 - Caesar 8

Creating Supply Chain Majors: Perspective on Four Schools

Supply Chain Management College Sponsored Panel I

Chair: **Edward Davis**, University of Virginia

Aleda Roth, University of North Carolina
Joseph Carter, Arizona State University
Steven Melnyk, Michigan State University
John Tyworth, Pennsylvania State University

This panel presentation/discussion session is jointly sponsored by the POMS College of Supply Chain Management and the POMS Vice President of Education.

A number of U.S. business schools now offer a concentration/major in supply chain management at the undergraduate or master's level. The academic structure, curriculum content, extent of involvement of Operations Management faculty and classroom pedagogy of these programs vary considerably from school to school. This session will feature presentations about three long-established programs (Carey School/Arizona State University, Eli Broad/Michigan State, and Smeal School/Pennsylvania State), and one recently-established program (Kenan Flagler/UNC-Chapel Hill), followed by a panel discussion. A major goal of the session is to highlight trends in program design and content.

Session 68: SUN. 10:30 - Caribe
Logistics Decision Models

Cluster: Operations and Logistics

Chair: **Veena Adlakha**, University of Baltimore

1. Optimal Layout Design for Class-Based Warehouses

René (M.) De Koster, Erasmus University Rotterdam
Tho Le Duc, Erasmus University Rotterdam

This paper deals with the zone and layout optimization problems for class-based warehouses. For the first problem, the warehouse dimensions are fixed and we have to find the best zone boundaries in each aisle. The second problem assumes that the dimensions are not fixed; we have to determine both the optimal number of storage aisles and the optimal zoning for the corresponding layout. For both problems, our objective is to minimize the average travel distance of a picking tour. We consider four types of rectangular warehouses (single and 2-block with open or closed-end aisles), and two common routing methods (the S-shape and return method). We estimate the average travel distance of a picking tour and use this estimate in a heuristic optimization. The method is rather simple, but of a very good quality and fast. It can therefore be applied to many practical warehouse-design or improvement situations.

2. Routing Optimization for Many-to-Many Freight Transportation Problems Using Ant Colonies Techniques

Lucía Barcos, Universidad Carlos III de Madrid
Victoria Rodriguez, University of Navarra
Mª Jesús Álvarez, University of Navarra
Francesc Robusté, Universidad Politécnica de Cataluña

One of the most important challenges for Less-Than-Truck-Load carriers consists of determining how to consolidate flows of small shipments to minimize costs while maintaining a certain level of service. For any origin-destination pair there are several strategies to consolidate flows, but the most usual ones are: peddling/collecting routes and shipping through one or more break-bulk terminals. Therefore, the target is determining a route for each origin-destination pair that minimizes the total transportation and handling cost guaranteeing a certain level of service.
Exact resolution is not viable for real size problems due to the excessive computational time required. This research studies different aspects of the problem and provides a metaheuristic algorithm (based on Ant Colonies Optimization techniques) capable of solving real problems in a reasonable computational time. The viability of the approach has been proved by means of the application of the algorithm to a real Spanish case, obtaining encouraging results.

3. An Analysis of the Assignment of Delivery Routes to Vehicle Drivers

Michael Haughton, Wilfrid Laurier University

Random day-to-day fluctuations in customer demands extend the range of decisions that managers of vehicle routing/dispatch operations must make. For one, they must determine the responsiveness of delivery routes to stochastic demands. But even with that decision settled –

typically by using daily route reoptimization to maximize responsiveness–assignment of drivers to the reoptimized routes must also be determined. For customer service reasons, managers may use assignment rules to maximize the likelihood that the driver who is historically most familiar with a given customer will continue serving the route that that customer is on. Using data from several vehicle routing scenarios, this paper presents a statistical analysis of one such decision rule, and uses the analysis to derive managerial implications of rules that seek to maximize customer-driver familiarity. The paper also provides some preliminary insights on the potential for Markov Chains in modeling driver-to-route assignment decisions

4. Heuristic Algorithms for the Fixed-Charge Transportation Problem

Veena Adlakha, University of Baltimore
Rao Vemuganti, University of Baltimore
Krzysztof Kowalski, Department of Transportation

The fixed-charge transportation problem is an extension of the classical transportation problem in which a fixed cost is incurred, independent of the amount transported, along with a variable cost that is proportional to the amount shipped. The introduction of the fixed costs in an addition to variable costs results in objective function being a step function. Therefore, fixed-charge problems are usually solved using sophisticated analytical or computer software. In a recent paper, Adlakha and Kowalski [Omega, 33, 205-211, 2003] present a heuristic algorithm for solving the problem. The method though simple is useful in solving small problems only and does not provide optimal solution in many instances as fixed costs increase. In this paper we present a series of robust heuristic algorithms to extend the applicability to larger size problems including those with large fixed costs.

Session 69: SUN. 10:30 - Coral
Operations Strategy V

Cluster: Strategy and Design

Chair: **Tim Laseter**, University of Virginia

1. Managing Flexibility Strategically: A Case Study on Repositioning

Thomas Friedli, University of St. Gallen
Stephan Billinger, University of St. Gallen
Michael Kickuth, University of St. Gallen

The fashion industry requires rapid reaction to changing market demands and therefore apparel manufacturers put a major emphasis on developing methodologies to enhance speed and flexibility on the operational level. However, existing studies suggest additional research of the strategic aspects of flexibility. In our paper we first describe challenges facing the apparel industry. Second, we develop a literature-based strategic flexibility framework to support the management of a manufacturing company. Third, we use findings of an action research project with a major European apparel manufacturer to show how the reconfiguration of the existing supply chain can lead to an organization with enhanced strategic flexibility. We conclude that strategic flexibility can be divided into market and resource flexibility, which are orchestrated through a company's coordination ability. Utilizing these dimensions along the supply chain allows apparel manufacturers to take advantage of increasing demand variability and reposition themselves as flexible service providers.

2. The WHY of Implementing Operations Strategy

Norman Faull, University of Cape Town

Taking the CEO's question 'How can we improve our track record in implementing operations strategy?' the paper argues two responses. Firstly that operations strategy should be presented in terms of a 'desired vs. (current) actual outcome.' Outcome should be defined in terms of average and variability of cost, quality, flexibility or delivery. The second is that the 'motivational force' (F) amongst the leadership should be brought to consciousness via 'WHY'; W represents clarity about What is to be achieved, H represents confidence in the plan as to How it will be achieved, and Y represents the conviction as to Why the outcome needs to be achieved. Hence F = WxHxY. When the leadership is sufficiently 'motivated' they will have to 'sell' the WHY to other stakeholders whose collaboration is needed for the outcome to be achieved via the plan of actions.

3. Further Evidence of Strategic Resonance in High Volume Manufacturing Firms

Steve Brown, CENTAIM, University of Bath

At POMS 2003, the Strategic Resonance framework was presented as part of the author's ongoing research into the strategic process of large multi-divisional firms. Strategic resonance builds upon the seminal work of Skinner and shows that world-class firms do not choose between resource-based and market driven strategies. Instead they craft strategy in a process best described as strategic resonance. Although manufacturing strategy was established as a core topic in operations management by the contributions of Skinner (1969; 1974; 1985), along with Hayes and Wheelwright (1984), and Hill (1985) its application and purpose still needs exploration. Operations strategy frameworks are important in identifying key manufacturing decisions to ensure consistency within business-level strategy, competitive priorities and manufacturing strategy and infrastructure. This paper develops from last year's POMS presentation by examining, via longitudinal case studies, capabilities at plant level and find links

between strategic resonance and subsequent plant level capabilities.

4. Manufcturing Strategy Linked to Product Life Cycle

Edna Ferro, Application Engineering - Performance
Ruth Savén, Linköping Institute of Technology

The article deals with decision problems faced when a firm is producing items with different life cycles, and/or in different cycle phases. Then, deciding on a Manufacturing Strategy becomes especially difficult, because usually different manufacturing processes are considered optimum for different products. An analysis of the suitable manufacturing process can result in that a coexistence of more than one should be implemented. The higher the quantity of suitable manufacturing processes required the more complex the definition of an adequate Manufacturing Strategy. The decision involved needs to be based on the analysis of all existing alternatives with clear criteria to choosing among them. There are some partial alternatives in the literature Nevertheless, no framework including these different alternatives was found, nor any proposal for deciding which one of them to use when. Therefore, a number of different alternatives are briefly presented, and compared; and a generic decision methodology and criteria proposed and explained.

5. Operations and Strategy: Literature Review and Synthesis

Timothy Laseter, University of Virginia

Thirty-five years ago Wickham Skinner highlighted the importance of linking “Operations” and “Strategy” in his seminal paper “Manufacturing - Missing Link in Corporate Strategy”. As the service sector gained importance in the developed economies, the concept of a manufacturing strategy matured and evolved into the broader idea of an “operations strategy”. Although operations management scholars embraced and improved the idea of an operations strategy, the general strategy scholars have shown limited interest and instead pursued their own lines of research. Today, Industrial Organizational Economics and the Resource-Based View of the firm compete for dominance in the general strategy field…but little effort has been made to link these constructs to operations. This paper reviews the literature in an effort to synthesize the competing perspectives and identify some common ground for future research drawing upon the best of both Operations and Strategy research.

Session 70: SUN. 10:30 - Mediterráneo 1
Culture, Simulation, and Math Modelings

Cluster: Service and Quality

Chair: **Scott Sampson**, Brigham Young University

1. A Comparison of Unconstraining Methods to Improve Revenue Management Systems

Carrie Crystal, Georgia Institute of Technology
Mark Ferguson, Georgia Institute of Technology

Accurate demand forecasts by customer class are the heart of a successful revenue management system. The forecasts are used to determine booking limits for lower fare customers to ensure an adequate supply for future arriving customers from higher fare classes. The very use of booking limits, however, constrains the historical demand data needed for an accurate forecast. We evaluate several of the common methods used to unconstrain historical demand data. Since most of these methods evolved from other disciplines, they do not take advantage of the inherent structure found in revenue management problems, i.e. that the time period the demand was constrained is often available. We propose a new method based on a common forecasting technique that utilizes this additional information. Our method outperforms the traditional methods on test performed on real data from a major hotel/casino.

2. An Evocative Methodology for Causal Mapping

Annibal José Scavarda, Pontifical Catholic University of Rio de Janeiro
Arthur Hill, University of Minnesota
Julie Hays, University of St. Thomas
Susan Meyer Goldstein, University of Minnesota

Causal maps, also known as cause and effect diagrams, Ishikawa diagrams, fishbone diagrams, and root-cause diagrams, are an essential tool for operations managers. Causal maps are found in cause and effect diagrams for Six Sigma programs, in Failure Mode and Effects Analysis for risk analysis, in issue tree analysis for guiding consulting projects, in strategy maps for developing strategy, and in research papers for theory building. Although causal maps are a widely accepted approach for analyzing critical relationships in a system, no widely accepted approach for capturing the information needed to build them is available. This paper develops a quasi-Delphi methodology for developing causal maps by evoking “if-then” statements from a group of experts. These statements are refined through an expert coding panel, cluster analysis, and factor analysis. The proposed methodology is illustrated with a research project that develops a causal map for service management.

3. The Impact of Simulation-Based Training on Call Center Agent Performance: An Empirical Study

Nagesh Murthy, University of Oregon

Goutam Challagalla, Georgia Institute of Technology
Leslie Harris, Georgia Institute of Technology

This study evaluates the effectiveness of simulation-based training as a behavior modeling technique relative to role-playing in a real-world call center environment. We use a state of the art simulation tool to assess the effectiveness of simulation-based training by involving customer service representatives in call centers at two Fortune 100 firms.

4. Perceived Waiting Time: Do Demographic and Situational Variables Matter?
Mirjeta Beqiri, Gonzaga University
Suresh Tadisna, Southern Illinois University at Carbondale

In an attempt to extend our earlier work on the impact of service design on perceived waiting time, we conducted a field study involving approximately 100 patients who visited the Emergency Department of one of the Medical Centers in the Northwest. The intent of this study is to present evidence of the influence of demographic variables, such as gender, age, and marital status on perceived waiting time. More important, the effects of such situational variables as service stages, level of uncertainty, level of criticality, solo vs. group waiting, and first visit vs. revisiting the medical facility on both subjective waiting time and psychological reactions to waiting are examined. Lastly, the impact of perceived waiting time on perceived service quality is explored. We expect the results of this study to have both theoretical and practical implications.

5. Taking a Mathematically Optimized Vacation
Scott Sampson, Brigham Young University

Timeshare vacations are popular, in that they provide a consistent vacation that can be cost effective. However, survey data shows that twice as many timeshare owners plan to exchange their timeshare weeks than plan to actually use them. But, there is no guarantee that the owner will be able to exchange for a more desirable resort week. This presentation will describe mathematical methods for increasing the likelihood that a timeshare exchange will result in increased owner satisfaction. This may include complex exchanges, such as for contiguous weeks at a given resort.

Session 71: SUN. 10:30 - Mediterráneo 2
Managing Supply Chain Risk

Cluster: Operations and Logistics

Chair: **Suresh Sethi**, University of Texas at Dallas

1. Optimal Contracts in a Collaborative Supply Chain
Mark Frascatore, Clarkson University / Massey University
Farzad Mahmoodi, Clarkson University

Recent applications of game-theoretic analysis to supply chain efficiency have focused on constructs between a buyer (the retailer or manufacturer) and a seller (the supplier) in successive stages of a supply chain. If demand for the final product is stochastic then the supplier has an incentive to keep its capacity relatively low, while the manufacturer prefers the supplier's capacity to be high. The manufacturer therefore constructs a contract to induce the supplier to increase its production capacity. Most research examines contracting when final demand is realized after the manufacturer places its order to the supplier. However, if final demand is realized before the manufacturer places its order to the supplier, these types of contracts can be ineffective. This paper examines two contracts under the latter timing scenario: long-term contracts in which the business relationship is repeated, and penalty contracts in which the supplier is penalized for too little capacity.

2. Determining the Optimal Size of Supply Base in the Presence of Risks
Amy Zeng, Worcester Polytechnic Institute
Paul Berger, Boston University

Today's supply chains are becoming not only more efficient, but also riskier due to the tight interconnectedness of numerous chain links that are prone to breakdowns, disruptions or disasters. However, research effort devoted to understanding and managing the risks associated with suppliers and the supply has been limited, especially from a quantitative point of view. In this talk, a study based on a decision-tree approach to aid a buying firm to determine the optimal size of its supply base in the presence of risks is presented. The risk under consideration refers to any unpredictable interruptions caused by all suppliers being unavailable to satisfy the buying firm’s demand. The relationship between the levels of risk and financial costs is captured by a decision-tree model, from which the expected cost function is formulated. The solutions for various scenarios, as well as their sensitivity, are obtained and discussed.

3. Supplier-Purchaser Relationships: Reducing Purchaser Uncertainty in the Global Trading Environment?
Juan Caldera-Noriega, Royal Melbourne Institute of Technology
John Dalrymple, Royal Melbourne Institute of Technology
Kosmas Smyrnios, Royal Melbourne Institute of Technology

Companies, especially those engaged in commercial trade across national boundaries, are increasingly susceptible to the impact of an uncertain global environment. This study aims to develop and test a model of the complex interaction between the vendor/purchaser relationship and culture affinity, quality reliability, country of origin effect, and perceptions of overseas ISO 9000 certification. Data were collected from 182 Australian purchasing managers buying from 27 countries. A model was developed and tested using structural equation modeling. Findings indicate that quality reliability implicitly includes a trust dimension. Further, the results suggest that the vendor/purchaser relationship plays a decisive role in the perception of quality reliability. Country of origin effect and ISO 9000 certification have a minor role within the context of a multivariable international environment. In contrast, culture affinity is a strong driver in the relationship with foreign suppliers. Implications for research and practice in the international supply chain are discussed.

4. An AHP-Based Study of Critical Success Factors in Supply Chain Management

Himangshu Paul, Auckland University of Technology
Tritos Laosirihongthong, Thamasat University
Sakun Boon-it, Asian Institute of Technology

Very few studies have been conducted on successful management practices in supply chain management, especially in the developing world. This article describes a study of critical success factors in the management of the Thai manufacturing sector supply chains. We identify six critical success factors, top management commitment, leadership, customer focus, education and training, information sharing, and involvement of suppliers. We then use the Analytical Hierarchy Process (AHP) model to determine the relative weights and priorities of these factors as judged by experts, who are managers and SCM information technology consultants, in the Thai manufacturing sector. This leads to rank-ordered prioritization of the critical success factors identified. The analysis presented in this article demonstrates a practical method for formulating effective strategies for successful management of supply chains in the Thai manufacturing sector.

5. Coordination of a Supply Chain with Risk-Averse Agents

Xianghua Gan, University of Texas at Dallas
Suresh Sethi, University of Texas at Dallas
Houmin Yan, University of Texas at Dallas

The extant supply chain management literature has not addressed the issue of coordination in supply chains involving risk-averse agents. We take up this issue and begin with defining a coordinating contract as one that results in a Pareto-optimal solution acceptable to each agent. Our definition generalizes the standard one in the risk-neutral case. We develop coordinating contracts in three specific cases: (i) the supplier is risk neutral and the retailer maximizes his expected profit subject to a downside risk constraint, (ii) the supplier and the retailer each maximizes his own mean-variance trade-off, and (iii) the supplier and the retailer each maximize his own expected utility. Moreover, in case (iii) we show that our contract yields the Nash Bargaining solution. In each case, we show how we can find the set of Pareto-optimal solutions, and then design a contract to achieve the solutions.

Session 72: SUN. 13:30 - Caesar 1
Knowledge Management and Decision Support Systems

Cluster: Operations and Logistics

Chair: **Adrian Done**, London Business School

1. Knowledge Management in Internet-Based Virtual Operations

Ashok Kochhar, Aston University

Recent years have witnessed significant interest in knowledge management in manufacturing organizations. There is an increasing recognition of knowledge as an important asset which must be managed effectively, as the shift to a knowledge based economy gathers strength. In this environment, knowledge is the key resource and critical to survival. In many organizations knowledge is now the major source of competitive advantage. The process of managing knowledge within an individual organization is complex in itself. Difficulties are compounded when dealing with a number of partners in a virtual organization. It is necessary to consider a number of related issues. Work with organizations at different stages of knowledge management has demonstrated that many of these issues are very different from the knowledge management issues within an organization. This paper outlines a framework for assessing the effectiveness of the knowledge management systems of partners in a virtual organization.

2. More than Performance Measurement?: Developing Performance Management Systems for the Public Sector

Zoe Radnor, Warwick Business School

There has been a ‘revolution’ in performance measurement and performance management over the past 20 years with the enormous interest reflecting itself in practitioner and academic conferences and publications (Neely, 1998). However, most research (Martins, 2000) in the field of performance management has been focused on the technicalities of its implementation, e.g. developing a Balanced

Scorecard (Kaplan and Norton, 1992), rather than on behavioral issues although its importance is recognized (DeWaal, 2002). This is particularly true in the public sector where internationally there has been a growing emphasis on evaluation, audits and performance measurement. This paper attempts to address this issue by suggesting 'how' public sector organizations could ensure that performance measurement extents itself towards performance management. The paper presents a model, supported with empirical examples, which highlights various aspects that need to be considered within organizations in allowing 'effective' Performance Management Systems.

3. The Impact on Performance of Upstream and Downstream Knowledge in the Supply Chain: An Empirical Study

Adrian Done, London Business School
Mark Frohlich, London Business School

This study investigated the flows of explicit knowledge in the external supply chain between a manufacturer's upstream suppliers and downstream customers, and resulting performance. The literature suggests that manufacturers rely on knowledge generated up and down the supply chain, and a set of hypotheses were evaluated using data from 338 European companies to test the predicted relationships. Findings show that while explicit knowledge inflows from both upstream and downstream directions were related to a manufacturer's performance, explicit knowledge derived from customers was especially important. Furthermore, the interaction between upstream and downstream explicit knowledge had the strongest link to performance. This paper extends both the existing knowledge management and supply chain management literature, and its theoretical contributions are discussed. The managerial implications of upstream and downstream sources of knowledge in the supply chain as well as further research are also discussed.

Session 73: SUN. 13:30 - Caesar 2
Modeling for Service Operations

Cluster: Operations and Logistics

Chair: **Shailesh Kulkarni**, University of North Texas

1. A Bayesian Approach for Inventory Management Using a Simulation-Based Decision Support System

David Muñoz, Instituto Tecnologico Autonomo De Mexico
Alejandro Terán, Instituto Tecnologico Autonomo De Mexico

In order to postpone production planning based on information obtained close to the time of sale, decision support systems for inventory management often include demand forecasts based on little historical data and/or subjective information. Particularly, when simulation models for analyzing decisions related to safety inventories, lot sizing or lead times are used, it is convenient to model daily demand by considering historical data, as well as information (often subjective) of the near future. We present an approach based on Bayesian estimation for modeling daily demand in a simulation-based decision support system for inventory management. An academic version of a decision support system developed under this approach is presented and experiments from this version are discussed.

2. A Model Focusing on Customer Time in Field Service Delivery

Aruna Apte, Southern Methodist University
Uday Apte, Southern Methodist University
Nandagopal Venugopal, MCI

Although customer convenience should rightfully be considered a central element in field services, experience suggests that many service enterprises rarely take customer's time into account in making the operational and scheduling decisions. In this paper we develop a model that explicitly considers the customer's time and costs in making operational and scheduling decisions in Field Services. Specifically, we propose a mixed integer programming model for the problem of vehicle routing for field service with time windows (VRFSTW), and develop a heuristic to solve the model. A numerical example closely patterned after real-life data is generated and used within a computational experiment to investigate policies for service time windows of different lengths, and gain managerial insight. Our experiment shows that the field service provider should ideally promise shorter time windows as they can minimize the total cost for the provider and the customers.

3. An Empirical Investigation of Process Structure and Delivery in Service Operations

Uday Apte, Southern Methodist University
Richard Cavaliere, St. Joseph's University
Shailesh Kulkarni, University of North Texas

The process of claims handling is a critical success factor in the insurance business and involves investigation, evaluation and payment of claims. This paper is aimed at identifying the drivers of performance indicators in insurance claims handling operations. The paper is based upon an empirical study of claims operations at one of the largest property and casualty insurance companies in the United States. We conducted elaborate statistical analysis on a sample of almost 1500 claims. This paper discusses results from the analysis. Our findings, which are synonymous with interviews with claims managers, suggest that coverage complexity, presence of an attorney, treatment

duration and presence of clear liability are significant drivers of key performance indicators such as average closing age, average hours of work performed to close a claim and the average loss payout. We discuss the strategic implications of our findings and suggest directions for future research.

Session 74: SUN. 13:30 - Caesar 3
Strategy and Flexibility

Cluster: Strategy and Design

Chair: **Stephen Lawrence**, University of Colorado

1. Operations Strategy and Flexibility in Engineering Consulting Firms
Daniel Arias-Aranda, Universidad de Granada
Javier Llorens, Universidad de Granada
María del Mar Fuentes, University of Granada
Luis Molina, University of Granada
Ignacio Tamayo, University of Granada

In this paper, the relationship between operations strategy and flexibility is analyzed within the service setting of engineering consulting firms in Spain. A framework for service strategy dimensions is suggested while manufacturing flexibility dimensions are applied to service operations considering necessary adaptations. A path analysis model is applied in order to enhance the understanding of interactions between both constructs. This research proves that service operations strategy has a significant positive and direct effect on service delivery flexibility. It is especially relevant the fact that flexibility on distribution of information behaves completely opposite to the rest of the flexibility dimensions.

2. Impact of Supply Chain Flexibility on Responsiveness
Soumen Ghosh, Georgia Institute of Technology
Patricia Swafford, University of Texas at Arlington

This paper first provides a conceptual framework for characterizing supply chain flexibility, and then empirically investigates the role of supply chain flexibility and information technology coordination on an organization's supply chain responsiveness. Here, responsiveness is viewed from the standpoint of the capability of the supply chain to effectively adapt to changing marketplace and environmental dynamics. A competence-capability approach is taken to show that flexibility and IT coordination within the supply chain function are antecedents of supply chain responsiveness.

3. Triangulating on the Sources and Impact of Volume Flexibility
Amitabh Raturi, University of Cincinnati
Eric Jack, University of Alabama at Birmingham

Our research demonstrates the use of methodological triangulation for developing a framework for volume flexibility. In our framework, we identify driver, sources, measures and performance impact of volume flexibility. We rely on three completed studies to synthesize ten lessons learned in order to provide insights to other researchers who are planning to use methodological triangulation. We triangulate our findings from three different methods to effectively demonstrate that theory development should use multiple methods. In exemplifying the use of triangulation we document alternative choices and tradeoffs that researchers face in any attempt at methodological triangulation. This includes outlining a triangulation strategy; assessing convergent, complimentary divergent and meta-inference; paying attention to operational, ecological and population transferability as well as errors of inference during the triangulation process.

4. Development of a Measurement Tool for Mass Customization
Vinay Puri, Florida International University
Chin-Sheng Chen, Florida International University

This paper presents the development of a measurement tool for mass customization. Mass customization is viewed as a business strategy and is classified into five operational strategies based on the timing of customer involvement in the product development process. Unique characteristics are identified and quantitative indices are established to distinguish and measure the effectiveness of mass customization strategy at a company. The tool enables a company to evaluate its mass customization strategy and identify the areas of improvement for its successful operation.

5. Flexible vs. Robust Process Design
Stephen Lawrence, University of Colorado
Timothy Smunt, Wake Forest University

In this paper we investigate the design and selection of production processes under conditions of stochastic market preferences. In response to an evolving marketplace, a producer can respond by selecting different degrees of process flexibility. We model the evolution of market preferences and policies for process selection as a Markov Decision Process and find optimal process adoption policies. In addition to optimal strategies, we define two alternative adoption strategies. A “perfectly flexible” policy is defined as instantly matching process capabilities to changes in market preferences, while a “robust” policy is defined as selecting and employing only a single invariant process technology. Simulation experiments and numerical examples demonstrate when a flexible process strategy is preferred to a robust strategy, and vice versa.

Session 75: SUN. 13:30 - Caesar 4
Quality II / Calidad II

Cluster: Service and Quality

Chair: **Elsa Benavides**, Instituto Tecnológico de Cd. Juárez

1. Gestión de Operaciones y Gestión del Conocimiento en Proyectos Constructivos

Josep Capó, Universidad Politécnica de Valencia
Guillermina Tormo, Universidad Politécnica de Valencia
Raúl Poler, Polytechnic University of Valencia

El sector de la Construcción tiene unas características peculiares que lo diferencian del resto de sectores productivos. En él, la cadena de suministro se configura para cada proyecto constructivo concreto, estando formada por diversas empresas, cada vez con mayor grado de especialización.
En el presente trabajo se analizan los métodos más utilizados para gestionar los proyectos constructivos, incidiendo en las relaciones entre los socios de la Cadena de Suministro correspondiente, así como los requerimientos necesarios para gestionar el conocimiento entre ellos.
Se analiza tanto la gestión del conocimiento ya existente en las empresas participantes, como el generado en cada nuevo proyecto. Se definen así las actuaciones necesarias para conseguir incrementar la eficiencia, reducir las pérdidas, aumentar el grado de innovación, etc., en cada proyecto constructivo.

2. La Evaluación de la Calidad de la Gestión Empresarial: Propuesta de un Sistema de Calificadores

Isidro De Pablo Lopez, Universidad Autonoma de Madrid
Yolanda Bueno Hernandez, Universidad Autonoma de Madrid
Begoña Santos Urda, Universidad Autonoma de Madrid
José Cabanelas Omil, Universidad de Vigo

Evaluar la gestión empresarial es una actividad compleja por la diversidad de aspectos y procesos que conlleva. Esta investigación propone un modelo de evaluación de la calidad de la gestión empresarial y de aplicación generalizable a cualquier tipo de empresa. Se basa en un amplio número de calificadores con diferente ponderación que abordan aspectos de diferentes dimensiones de la empresa. Es un modelo que considera los criterios de excelencia más representativos de la conducta de las organizaciones (eficiencia, innovación, crecimiento, internacionalización, calidad y sostenibilidad), y está basado en información cuantitativa o cuantificable mediante la utilización de escalas, y obtenible a partir de fuentes fiables, disponibles, estables y razonablemente actualizadas. Asímismo, este modelo permite evaluar la calidad, tanto a nivel global de la empresa, como de cada area de gestion empresarial, pudiéndose aplicar para hacer comparaciones a nivel sectorial, regional y nacional.

3. Sis Sigma and Design of Experiments: Strategies that Work in Mexican Maquiladora Firms

Elsa Benavides, Instituto Tecnológico de Cd. Juárez
Javier Avalos-Alvarez, Instituto Tecnológico de Cd. Juárez

This paper describes the Sis Sigma implementation process and the use of DOE in Mexican Maquiladora firms that produces automotive trim seat covers. The problems were the peeling and cracking of the airbag labels. The methodology of sis sigma's five steps: define, measure, analyze, improve and control (Pande, 2000; Eckes, 2001; Harry & Schroeder, 1992) was conducted. Also the methodical, efficient and cost-effective approach of the DOE was used to collect and analyze data related to the process output (Montgomery, 1991). By testing more than one factor at a time, DOE was able to identify all factors and combinations of factors that affected the stamping process. Both strategies were successfully implemented and the results showed that DOE helped to determine the effect of variables such as: environment temperature loss, air pressure and stamping time on the stamping process. Other results were the reduction of scrap, operation time and customer complaints.

Session 76: SUN. 13:30 - Caesar 5
Issues in Strategy Logistics and Distribution

Cluster: Operations and Logistics

Chair: **Angelisa Gillyard**, University of Maryland

1. A Model for Classifying Warehouse Management

René (M.) De Koster, Erasmus University Rotterdam

Warehousing has become a critical activity in many supply chains to outperform competitors on customer service, lead-time and costs. This leads to the question what planning and control structures are needed to achieve optimal performance. We have conducted survey research among 102 warehouses, including production, distribution and outsourced warehouses. We have analyzed the relation between warehouse management functionalities and information systems used as a function of warehouse external and internal characteristics. Based on the analysis we can classify warehouse

management systems and indicated which type of software systems are appropriate under which circumstances.

2. New Products Development Integrated to Environmental Demands: The Importance of Reverse Logistics

Paulino Francischini, University of São Paulo
Antonio Oliveira, Faculdade de Tecnologia de Botucatu - CEETPS

Reverse logistics is a new and emerging area that emphasizes environmental aspects. More and more industries are discovering that it pays to be proactive on environmental issues, as opposed to passively waiting to be regulated into action. They have found that it makes good business sense to recycle and reuse their products after the consumer is done with them. The interaction between product and the environment happens in the production phase, in the use and later in the reuse or recycling phases. This paper examines the potential of a reverse logistic process in a competitive context, and proposes a review of the bibliography on the subject. A case study analyses the procedure for sending useless vehicle batteries back to the manufacturer, for adapted final destination, facing the difficult challenges to integrate it into the development process of this product.

3. A Competency-Based Human Resources Architecture for Logistic Enterprises

Alejandro Domínguez Torres, UNITEC
Carmen De Nieves Nieto, Universidad Politécnica de Cartagena

Taking into account that logistics is a competitive advantage in business and that human resources are the main asset for an enterprise a Competency-Based Human Resources Architecture for Logistic Enterprises is build. In order to do that the need of having such an architecture is firstly exposed. As a second step the architecture and the relationship among its components are defined. Thirdly, in order to these components become competency components it is associated knowledge and a set of skill to them. The architecture so defined is then validated against real logistics enterprises. This validation shows that the architecture may be a useful and powerful tool for performing either engineering or reengineering of logistics enterprises.

4. The Concept of Packaging Logistics

Mazen Saghir, Lund University

Packaging has a significant impact on the efficiency and effectiveness of retail supply chains, where improvements can be achieved through the adaptation and development of the concept of packaging logistics. In order to enable these improvements, models are needed that facilitate evaluations along the supply chain and show the activities involved in the packaging logistics process. The knowledge and awareness of the importance and potential of the packaging logistics activities along the supply chain is low. Case studies involving companies from the Swedish retail industry were conducted to investigate existing models and the parameters needed for a general model. The concept of packaging logistics is explained, and identified packaging logistics parameters along the retail supply chain are presented. The paper discusses how existing tools, can be used to build a systematic evaluation model from a packaging logistics perspective. Finally, a conceptual analysis model for packaging logistics is presented.

5. An Examination of the Relationships Among Logistics Strategy, Supply Chain Characteristics and Firm Performance

Angelisa Gillyard, University of Maryland

Supply Chain Management (SCM) offers the possibility of increased customer service while minimizing costs. Before choosing what type of supply chain strategy to pursue, a firm must first the characteristics of the supply chain(s) in which it participates. The type of functional strategies chosen should complement the type of supply chain(s) in which the firm is a member. Certain logistics strategies are more appropriate given the characteristics of the supply chain. This paper explores the relationships among supply chain characteristics, logistics strategies, and firm performance. Multivariate analysis of variance (MANOVA) was used to test the hypotheses. Results indicate support for the notion that successful firms choose to emphasize different logistics strategies than less successful firms in the same types of supply chains.

Session 77: SUN. 13:30 - Caesar 6
Supply Chain Management in Finland

Cluster: Environment and International

Chair: **Katariina Kemppainen**, Helsinki School of Economics

1. IT in Supply Chain Management – Experiences from Finnish Companies

Jouni Kauremaa, Helsinki University of Technology
Jaana Auramo, Helsinki University of Technology
Kari Tanskanen, Helsinki University of Technology

We present a study about the use of Information technology (IT) in supply chain management (SCM) in selected Finnish companies. Main issues to be addressed are: how is IT utilized in SCM, what are the received benefits, and the main obstacles. The study, based on interviews and case studies, indicates that automation of transaction data has significantly increased

during the last five years due to new, more flexible technologies and improved availability of B2B application integration services. Collaborative planning among supply chain partners is common, but the utilization of IT in this area is still low. Benefits are mostly related to operational efficiency. Some companies in the study have reached strategic benefits by combining several IT solutions and by developing customized IT applications. Utilization of IT in SCM is not related to company size or industry sector. Business process re-design skills seem to be vital for benefiting from IT in SCM.

2. Supply Chain Integration in Nordic Firms
Tage Skjoett-Larsen, Copenhagen Business School
Prabir Bagchi, George Washington University

Supply chain management has been on the research agenda for more than 20 years. However, there is little evidence of research mapping the actual level of integration among the participants in the supply chain. Similarly, there is little evidence of how supply chain integration affects performance. This paper investigates supply chain integration in a sample of 72 manufacturing companies in the Nordic countries. We specifically study in what areas firms are involving their key suppliers and customers in decision-making and what are the underlying factors that define supply chain integration. Besides, we analyze the effect of supply chain integration on perceived performance improvements. The main findings confirm that supply chain integration in the Nordic countries is more a rhetoric than reality in most firms. However, we found a clear indication of the value placed by the respondents on collaboration with key suppliers for performance enhancement.

3. Differentiation and Integration of Supply Networks
Katariina Kemppainen, Helsinki School of Economics

While studying the obvious indicators of supply chain integration - the scope of interfacing, the extent of information sharing, and forms of collaborative planning - we may be overlooking some more significant aspects of supply networking. It is actually the differentiation of functions and reshuffling of roles of companies that drive the restructuring of processes in supply networks. In a longitudinal study we examine how operational specialization and increasing service intensity may explain many of the changes anticipated within supply chains such as customer focus, process management, outsourcing and partnerships. The results suggest that structural changes in supply networks may indeed enforce efficient supply chain practices and use of advanced technology. Case examples of Finnish companies are used to illustrate development patterns in supply chain structures and strategies.

Session 78: SUN. 13:30 - Caesar 7
Product/Process Development Management

Cluster: Strategy and Design

Chair: **Morgan Swink**, Michigan State University

1. Critical Decisions in Platform Based Product Development - a Mathematical Modeling Approach
Atanu Chaudhuri, Indian Institute of Management, Lucknow
Kashi Singh, Indian Institute of Management, Lucknow

Choice of a product line from set of platform based variants, determination of their launch sequences and pricing and finally allocating the products to multiple plants along with their capacity augmentations are critical decisions faced by many firms. In our present study an MILP model has been developed for choice of product line considering relevant costs. Similarly a launching sequences and pricing model is developed to analyze the impact of “boom” and recessionary conditions of the industry on the launch sequences of products. Finally a detailed MILP model is used to determine the allocation of products to the multiple plants, their production quantities for the products and the aggregates, the capacity expansions in discrete chunks required in individual facilities at the plants and their timings over a planning horizon. Representative data for commercial vehicles as a product has been used.

2. Project Management Methodology for New Product Development: The Flexible PERT Chart and its Application
Hideyasu Karasawa, Data CakeBaker Corporation

In a project of new product development, uncertainties accompany its development process and hence it is impossible to predict all activities in advance. Therefore, the conventional PERT and other methods such as CPM would have no effect of management. In this paper, we formulate Flexible PERT Chart method that Sony applied as a schedule managing method in developing the color TV of TRINITORON. This method is one part of the F-CAP (Flexible Control and Programming) System that aims at flexible and ideal planning and programming of a project. The method is the communication tool for project management that enables to pursue the ideal always while reflecting the real world going on changing. This feature lies in the flexibility of changing a plan according to the present project performance in quick. Therefore, in this method we have the view contrary to the conventional one on which we are going to control the current state so as to meet the schedule.

3. The Impact of Complexity on Strategic NPD Portfolio Management

Raul Chao, Georgia Institute of Technology
Stylianos Kavadias, Georgia Institute of Technology

We analyze how different innovation strategies succeed in complex environments. Following the lead of Kaufmann (1993) we view firms as "agents searching for the best outcome in a complex and unknown NK landscape". NK landscapes have recently been used as a methodology to approximate the behavior of partially informed agents in complex environments. In our setting, firms pursue differing innovation strategies, expressed as the mix of incremental vs. radical innovations in a portfolio of projects. We simulate and analyze the efficacy of these different portfolio strategies. Our results indicate that success is not an absolute measure and the widely discussed notion of optimal "balance" between radical and incremental innovation is heavily dependent on the environmental complexity and on the "industry lifecycle". Moreover, we show that the often promoted solution of benchmarking against the competition and learning from the industry leaders rarely leads to success.

4. Investment and Innovation Sharing in Multi-Firm New Product Development

Sreekumar Bhaskaran, University of Texas at Austin
Vish Krishnan, University of Texas at Austin

Due to the growing sophistication of component technologies and fragmentation of global markets, the development, introduction, and marketing of new products increasingly crosses firm boundaries. This presents a new set of challenges to the firms and introduces market uncertainties associated with partner opportunism that have to be managed alongside conventional performance and timing uncertainties of NPD. We conceptualize and formulate the co-development of products involving two firms, and propose two collaboration mechanisms that involve sharing of development cost and development effort. These mechanisms have varying effects on the level of investment and profits of individual firms, depending on the level of technological and market uncertainties, degree of concentration of power in one of the firms, and the extent to which firms can reap the benefits of specialization in product development. Conditions under which firms should consider one mechanism over the other are also developed.

5. Faster, Better, Cheaper: Exploring Performance Trade-Offs in NPD Projects

Morgan Swink, Michigan State University
Temyos Pandejpong, Michigan State University

Project management maxims maintain that time, cost, and quality (or scope) goals form constraints that lead to trade-offs in decisions regarding the selection and use of resources. We explore this proposition using data from completed new product development projects. Projects that failed or did well in only one performance dimension are contrasted against projects that did well in other areas or in multiple dimensions. The analysis points to project management factors that may explain why some projects seem to experience trade-offs while others do not.

Session 79: SUN. 13:30 - Caesar 8

Teaching The Supply Chain Concentration: Pedagogy Examples from Four Schools

Supply Chain Management College Sponsored Panel II

Chair: **Eric Johnson**, Dartmouth College

Wendell Gilland, University of North Carolina
Kyle Cattani, University of North Carolina
Vicki Smith-Daniels, Arizona State University
Dawn Russell, Pennsylvania State University
Steven Melnyk, Michigan State University

This panel presentation/discussion session is jointly sponsored by the POMS College of Supply Chain Management and the POMS Office of Vice President, Education.

The panel features presentations about selected supply chain management courses at four schools followed by a discussion of trends and major issues in pedagogy for supply chain management.

Quantitative Models (Gilland)
Simulations and Experiential Activities (Cattani)
Technology-Assisted Cases: The eSCOR Model (Smith-Daniels)
Strategic IT for Supply Chain Management (Russell)
Rethinking the Framework & Re-Orienting the Message (Melnyk)

Session 80: SUN. 13:30 - Miramar 1
Closed-Loop Supply Chains

Cluster: Environment and International

Chair: **Joseph Blackburn**, Vanderbilt University

1. Return Handling: Decision-Making and Quantitative Models

Marisa De Brito, Erasmus University Rotterdam
René (M.) De Koster, Erasmus University Rotterdam

Return handling is an emerging cluster of knowledge within Reverse Logistics. Since this cluster is in the looming phase, there are not

many models supporting decision-making. This motivates an investigation on the opportunities that quantitative models for forward material handling offer for return handling. To do so, we put together a decision-making framework for return handling and we proceed to a critical analysis of the literature. We review the main findings of general material handling literature, identify several research gaps that can be turned into a research agenda, and give suggestions to adapt such models for return handling.

2. Closed-Loop Supply Chains in Process Industries: What Do You Do if it Comes Back (or Won't Go Away!)?

Monique French, University of Colorado, Colorado Springs

Much of the research on closed-loop supply chains has focused on discrete products. In process industry studies, some work has been done on internal returns such as rework, but external returns tend to be studied in the context of return to a third-party recycler. This study explores product returns in process industries from the producer's viewpoint. A key finding is that process industry companies receive products from external as well as internal sources, indicating that addressing the reverse supply-chain issues in these companies is of research interest. Overall, three questions were explored through a large-scale survey. What are the sources of products requiring reuse? What are the reuse options available? What impacts the reuse decision? This paper highlights the key results addressing sources of products for reuse and reuse options common in process industries, then focuses on factors impacting the re-use decision.

3. Value of Installed Base Information and Planning and Pricing of Maintenance Services Incorporating Product Returns

Rob Zuidwijk, Erasmus University Rotterdam
Jo Van Nunen, Erasmus University Rotterdam
Roelof Kuik, Erasmus University Rotterdam

The installed base, which consists of products that are set out in the market, provides a rich source of information on product states and customer preferences. We discuss the use of this information for better planning of return service operations and appropriate pricing of these services. We focus on maintenance services that incorporate returns of parts and products. In particular, we quantify the cost benefits of synergy effects that can be achieved using this information. Furthermore, we elaborate on pricing services in a dynamic way based on expected synergy effects.

4. Closed-Loop Supply Chain Inhibitors: The Case of Automotive Remanufacturing

Margarete Seitz, The Brass Centre - Cardiff University
Peter Wells, Centre for Automotive Industry Research
Mohamed Naim, Logistics Systems Dynamics Group

Remanufacturing is not new to the automotive industry, neither is it to the academic debate of product take-back. However, since academic research has largely focused on theoretical models and problem solving, the underlying research has taken a business-oriented perspective on remanufacturing in the automotive sector. The management of remanufacturing operations is significantly different from managing 'conventional' manufacturing. The underlying research demonstrates these differences and identifies sources, which inhibit the creation of successful product recovery operations. A particular emphasis will be put on the impacts of mass customization on automotive remanufacturing. Mass customization contains two conflicting aims. On the one hand, designers create product platforms, which are applied to facilitate the manufacturing process and aim at broadening the application of the product. On the other hand, there is the need for product differentiation in order to address individual customers. The article shows how remanufacturing needs to address these two contrary aspects.

5. Designing the Reverse Supply Chain for Time-Sensitive Products

Joseph Blackburn, Vanderbilt University
Daniel Guide, Pennsylvania State University
Gilvan Souza, University of Maryland
Luk Van Wassenhove, INSEAD

We consider the design of the return stream process for products, such as PCs, whose value deteriorates rapidly with time. Products lose value in the return stream in two important ways: first, their value diminishes during time delays while awaiting evaluation, repair or refurbishing; second, losses can be incurred through erroneous disposition decisions due to incorrect assessments of the product's value over time. Using field data for several consumer electronics products, we build analytical models to capture the economic value of a time-sensitive product over its life cycle and then use these models to develop supply chain designs that maximize value recovered from the return steam. We show that the returned product's "time value" is a critical design parameter.

Session 81: SUN. 13:30 - Miramar 2
New Product Development

Cluster: Strategy and Design

Chair: **Debasish Mallick**, University of Minnesota

1. A Comparative Analysis on the Determinants of New Product Development Performance

Yoshiki Matsui, Yokohama National University
Roberto Filippini, University of Padova
Hideaki Kitanaka, Takushoku University
Osam Sato, Tokyo Keizai University

In this paper we comparatively analyzed the impact of practices, process, strategy, and capabilities of new product development on its performance results between Italian and Japanese companies in machinery and electrical & electronics industries. For each country sample, we established six reliable and valid measurement scales capturing architecture of new products, linkage with suppliers, linkage with customers, new product development process, strategic guide, and new product development capabilities, all of which have attracted great deal of attention from theoretical and empirical viewpoints. Then, their influence on eight performance indicators of new product development was evaluated, by using regression analysis. These performance indicators are concerned with overall success, profit, revenue, development time, innovativeness and quality level of new products. We could find significant differences in the determinants of new product development performance between two countries, and also demonstrate the universal importance of new product development capabilities to achieve the high performance.

2. Evaluating Commonality in Product Development

Thomas Roemer, Massachusetts Institute of Technology
Sebastian Fixson, University of Michigan

Existing research on parts commonality has mainly focused on tradeoffs between cost savings due to economies of scale in production and revenue decreases due to product cannibalization and brand erosion. In contrast, we study the impact of common parts across product platforms on product development lead times. We argue that commonality can induce coupling of otherwise independent development processes, and lead to additional design iterations and forced idle times. As a result, new product introduction can experience significant delays. Based on a simple model we identify principal drivers for such delays.

3. Mechanism Design to Promote Free Market and Open Source Software Innovation

Geoffrey Parker, Tulane University
Marshal Van Alstyne, University of Michigan

While open source licenses have the advantage of access freedom, proprietary licenses have the advantage of economic incentives. We analyze a balance of openness, measured by the proportion of software an author releases to the community, versus incentives, measured by the length of time software remains proprietary. Our principal finding is that open licenses can increase profits of self-interested firms who act more like a social planner. Conversely, a social planner using proprietary incentives can increase social welfare over that from current open source licenses. We also introduce a framing innovation that places current licenses in a space suggesting where unexplored but optimal licenses might exist.

4. Managing the Design Capacity Cushion: A Hierarchical Framework for Product Development Planning

Edward Anderson, University of Texas at Austin
Nitin Joglekar, Boston University

We develop a Hierarchical Product Development Planning (HPDP) framework for managing the capacity utilization of engineering (or other skilled) development personnel. The framework breaks the planning process into four levels: Project portfolio selection, aggregate design capacity maximization, project execution, and development of supporting assumptions. We use this framework to (1) propose an initial hierarchical product development tool; (2) integrate extant models from the portfolio selection, staffing planning, and project execution literatures; and (3) highlight potential future research paths in product decision-support models. The framework also allows us to place managerially relevant capacity utilization insights within a broader product development context.

5. Engineering Change Orders (ECO): Impact on Competitive Advantage and Firm Performance.

Debasish Mallick, University of Minnesota
Kingshuk Sinha, University of Minnesota

We focus on the comparative treatment given to two factors: knowledge and skill in managing engineering change orders (ECO) and capture insights obtained from the technology S-curve and manufacturing learning curve literature into a comprehensive framework. Using a survey of over one hundred manufacturing organizations, we explore how engineering changes affect competitive advantage and business performance of firms.

Session 82: SUN. 13:30 - Miramar 3
Contemporary Topics in Production Planning and Control

Cluster: Operations and Logistics

Chair: **Mary Meixell**, George Mason University

1. Order Management in a Two-Level Supply Chain

Elias Kirche, Florida Gulf Coast University
Rajesh Srivastava, Florida Gulf Coast University

Previous attempts to address effective demand management has relied on the traditional available-to-promise (ATP) logic, with limited capability to react to changes in the demand. In this study, we developed an effective decision support system (DSS) for demand management dynamically integrating end-to-end processes across the organization, key partners, suppliers and customers, to respond with speed to customer changes and market requirements. The DSS framework utilizes current process capabilities, order loads, and financial data to simultaneously optimize resource allocation for a two–level supply chain. The problem is solved through a mixed-integer program. The integration and enterprise visibility created by the demand management system will synchronize resources and balance workloads to maximize production efficiency and adapt to a dynamically changing environment.

2. Setting Production Card Levels and Planning Lead Times for a Multiproduct Jobshop

Rajan Suri, University of Wisconsin, Madison
Rahul Shinde, University of Wisconsin, Madison

We compare the operation of card-based material control strategies such as Kanban, CONWIP and POLCA in a multi-product job shop. The first step in the comparisons is to set the card counts for each of the strategies in order to achieve a specified throughput for each product in the job shop. We use approximate Mean Value Analysis (MVA) along with nonlinear optimization to set card levels for these strategies. We evaluate the results of using these card counts using detailed simulation. Next, the planned lead times for operating the strategies are also obtained using MVA. Safety lead times are added to the planned lead times to achieve a specified service level. The performance of the production control strategies is then compared in terms of three pairs of metrics: total inventory versus service level, total inventory versus backorder delay and finished goods inventory versus service level.

3. Lean Production System and Six Sigma: Different Faces of the Same Coin or Different Coins?

Rachna Shah, University of Minnesota
Kevin Linderman, University of Minnesota
Aravind Chandrasekaran, University of Minnesota

Lean production systems and six sigma approaches have gained considerable importance in recent years. While academicians are still unraveling the issues underlying the two concepts, popular press is replete with stories extolling the performance gains that can be achieved with the integration of the two approaches. We review the relevant literature to compare and contrast lean production and six sigma improvement approaches conceptually. We then use secondary data of US manufacturing plants that have implemented either one or both improvement approaches to empirically identify factors that impact the implementation of six sigma practices using methods of association and prediction. Lastly, we examine the enhanced performance that results from implementing both approaches in order to explain the recent managerial interest in their integration.

4. Supply Chain Production Planning in a Mass Customization Environment

Josefa Mula, Polytechnic University of Valencia
Raúl Poler, Polytechnic University of Valencia
Jose Garcia, Polytechnic University of Valencia

Mass customization consists of the design, production, marketing and delivery of customized products and services on a mass basis (Pine 1999). Some of the strategies of mass customization are: supply chain management, virtual enterprise, modular product design, the web, best-of-breed IT and agile manufacturing. In this context, the European Community Growth project called 'Virtual Enterprise for Supply Chain Management (V-Chain)' is trying to introduce the concept of extended enterprise and promote the collaboration between the automobile manufacturer and suppliers. Thus, data from this project are used in this paper to analyze and prescribe the main characteristics of an automobile industry supply chain required to mass customize from a production planning point of view.

5. A Scenario-Based Bayesian Forecasting Engine for a Stochastic Available-to-Promise System

Mary Meixell, George Mason University
Chien-Yu Chen, George Mason University

To be competitive in an e-business era, it is important to make not only responsive but also profitable order promises with a company's Available-to-Promise (ATP) system. Being able to project future customer demand greatly enhances ATP system performance, as it improves the allocation of critical resources between current and future time periods. In this research, we develop a method to efficiently incorporate the complexity and uncertainty about future demand into a stochastic ATP system, so that probabilities for the relevant order categories may be initially established and then continually revised. Specifically, we propose a mechanism for building a scenario tree with a Bayesian update structure that incorporates both observed realizations as well as expert judgment into the scenario generation. We illustrate with an example, and close with a discussion of managerial implications and future research directions.

Session 83: SUN. 13:30 - Miramar 4
Empirical Research Using Secondary Data

Cluster: Strategy and Design

Chair: **Vinod Singhal**, Georgia Institute of Technology

1. The Financial Impact of ISO 9000 Certification

Charles Corbett, UCLA
Maria Montes, Bren School of Environmental Sciences and Management, UC Santa Barbara
David Kirsch, University of Maryland

We track financial performance from 1988 to 1997 of all publicly traded ISO 9000 certified manufacturing firms in the US with SIC codes 20-39, and test whether ISO 9000 certification leads to productivity improvements, market benefits, and improved financial performance. We employ event study methods, matching each certified firm to a non-certified firm in the same industry with similar pre-certification size and return on assets. We find that firms' decision to seek their first ISO 9000 certification was indeed followed by significant abnormal improvements in financial performance, though the extent to which these are driven by productivity or market effects varies across sectors. We also find that matching only by pre-certification ROA leads to slightly stronger results, while failing to match by pre-certification ROA causes the abnormal financial performance to disappear, consistent with Barber and Lyon's (1996) finding that performance-matching increases the power of the study.

2. Implementing the Balanced Scorecard: Performance Metric Portfolio Selection Using an Operations Strategy Lens

Jeff Stratman, Georgia Institute of Technology
Eve Rosenzweig, Emory University
Elliot Bendoly, Emory University

The widespread adoption of ERP systems and supply chain management principles suggests that managers recognize the importance of evaluating operational decisions holistically. The Balanced Scorecard literature provides a general framework for linking operational metrics to enterprise-wide financial performance. However, this framework is often difficult to implement in practice because the actual portfolio of metrics utilized by a firm is likely to be unique. Our research indicates that it is possible to provide more detailed guidelines for metric selection based on the operations strategy pursued by the adopting firm. In particular, we extend the balanced scorecard framework by specifying a portfolio of metric types based on the firm's strategic configuration. We present theoretically grounded portfolios of metrics drawn from the literature and from the Supply Chain Council's supply-chain operations reference (SCOR) model and related design-chain and customer-chain models. A process for metric selection is also suggested.

3. The Impact of Sales Surprise on Inventory Turnover

Vishal Gaur, New York University
Ananth Raman, Harvard Business School

We use public financial data on U.S. retailers to investigate how sales surprise, defined by us as the deviation of annual sales from forecast, impacts realized inventory turnover. We compare the correlation of inventory turnover with sales surprise across firms as well as examine time trends.

4. The Effect of Supply Chain Disruptions on Operating Performance

Kevin Hendricks, University of Western Ontario
Vinod Singhal, Georgia Institute of technology

This paper documents the impact of supply chain disruptions on operating performance. Based on a sample of 885 disruptions announced by publicly traded firms, we estimate that in the year leading to the announcement, firms on average experience a 107% drop in their operating income, 114% drop in return on sales and 93% drop in return on assets. During this time period the level of return on sales drops by 13.78% and return on assets by 2.32%. More importantly, firms that experience disruptions face on average 6.92% lower sales growth and 10.66% growth in cost, and 13.88% growth in inventories. Firms do not quickly recover from the negative economic consequences of disruptions. During the two-year time period after the disruption announcement, the changes in operating performance are insignificantly different from zero.

Session 84: SUN. 13:30 - Caribe
Society and Economic Development

Cluster: Environment and International

Chair: **Alexandre Graeml**, EAESP/Fundação Getúlio Vargas - Brazil

1. Strategic Dimensions of Environmental Issues in Operations Management

André Koetz, Universidade do Vale do Rio dos Sinos
Marcelo Klippel, Universidade do Vale do Rio dos Sinos

This paper conducts a discussion about environmental issues in the Brazilian automotive industry, presenting a framework that shows relations among the supply chain of this sector. Starting at the legal statements that came from Europe up to the big automakers voluntary initiatives, like the IMDS (International Material Data System), authors intend to explain how the environmental issues influence strategic decisions to the automotive firms and the consequences of these decisions to the

operations management of different kinds and sizes of firms, including environmental solutions providers. Authors conclude with questions about competitive advantages obtained in adoption of these new green practices by Brazilian companies against foreigner firms and in relation to the big automakers.

2. Plant Utilities Optimization Through Environmental Management System in an ISO 14000 Environment

Matteo Savino, University of Sannio
Marcello Lando, University of Naples Federico II

In an ISO 14000 environment the entire management organization and production processe are analyzed and re-organized according to a set of rules and procedure well known as Environmental Management System (EMS). In this context we have defined a methodology able to select the best intervention(s) able to reduce air pollution caused by a wrong energies management. The approach followed is based on three parameters able to highlight the capability that a corrective measure can have in order to reduce the air pollution
- The re-establishment of environmental conditions R;
- The factor of timeliness Ft;
- The factor of economic convenience Fc.
To validate our approach we have analyzed the plant utilities of a firm operating in the telecommunication equipment with the objective to realize an EMS with the two main tasks of minimizing the environmental impacts and maximizing global performance of those utilities in terms of energy saving and maintenance activities.

3. Urbanization Solutions of a Third World Country's Metropolis to Its Social/Environmental Challenges

Karin Graeml, Universidade Federal do Paraná
Alexandre Graeml, EAESP/Fundação Getúlio Vargas - Brazil

The process of urbanization has increased pace along the last 40 years and almost the whole population growth until 2030 is expected to happen in developing countries' urban areas. In Brazil, the largest country in South America, 80% of the population already lives in the cities, a figure that may rise to more than 88% before 2010. Infrastructure problems, as well as urbanization and environmental concerns are becoming central issues to local as well as central authorities. This paper will present the case of Curitiba, one of the most prosperous, organized and successful Brazilian large cities. The city has been able to balance its growth with the preservation of the environment, by means of innovative urbanization, education and environmental efforts.

4. The Internet as a Tool to Help Balance Urbanization and Environmental Concerns

Karin Graeml, Universidade Federal do Paraná
Alexandre Graeml, EAESP/Fundação Getúlio Vargas - Brazil

The world is facing serious challenges as a result of non-planned urbanization, which is not an exclusive problem to large cities. Urban populations spread to areas that should be preserved, disturbing the balance between the environment and the population's quality of life. This is a concern to ecologists, public authorities and scientists, who struggle to find ways to minimize environmental degradation, ensuring an acceptable level of quality of life for those living in the cities. Technology may have an important role in providing solutions to reduce environmental damage and improve quality of life in the cities, as well as providing people with the chance of living away from the large centers, being less exposed to the consequences of the excess of human concentration. This paper discusses the Internet's impacts on people, the way they organize in social groups and the way the world's population spread around the globe.

Session 85: SUN. 13:30 - Coral
Capacity Planning and Scheduling for Manufacturing

Cluster: Operations and Logistics

Chair: **Brian Neureuther**, Indiana State University

1. A Computer Tool for Supporting Global Capacity Planning. Application in a Baby Shoes Company

Alemany Díaz, Universidad Politécnica de Valencia
Alarcón Valero, Universidad Politécnica de Valencia
Ortiz Bas, Universidad Politécnica de Valencia

Baby shoes companies are characterized by a high manual labor component. Therefore, in order to be efficient the management of human resources plays a crucial role. This paper presents an agile computer tool for aggregated capacity planning within the above mentioned sector. The tool comprises two mathematical models that deal with the assignment of workers based on the polyvalence of labor. The first model aims at loading workers to different work sections considering order due dates, workers skills capacity and other system constrains. This model based on mixed integer linear programming minimizes mobility of workers and includes the possibility of different scenarios analysis. When this model results in a no feasible solution, a second model is used to minimize this infeasibility. The second model provides very useful information about bottlenecks and conflictive orders

2. A Finite Scheduling Approach for the Production Planning and Scheduling in Manufacturing Systems

Marcelo Klippel, Universidade do Vale do Rio dos Sinos
José Antonio Antunes Júnior, Universidade do Vale do Rio dos Sinos
André Koetz, Universidade do Vale do Rio dos Sinos
Altair Klippel, KLIPPEL Consultores Associados

This article proposes a critical analysis for evaluating the relationship between Gross Capacity and Aggregate Demand and Finite Production Scheduling. It initiates from the basic notion divulged by the Toyota Production System concern to Capacity and Demand and from the concepts and techniques related to the approach for the production scheduling derived from Theory Of Constraints. On one side – Offer – it proposes that the calculus of the capacity may be done considering the clear definition of the factory in terms of capacity of the critical resources (bottlenecks). On the other hand – Demand – it proposes that the calculus would be done considering the required quantities by the market and the consumed time at the several resources. The confrontation between these consists in a discussion inside of Production Planning. It approximates of the fundamental question in terms of making operational the aggregate plan, the discussion related to Production Scheduling.

3. The Process Management Triangle: An Empirical Investigation of Capacity, Variability, and Inventory Trade-Offs

Robert Klassen, University of Western Ontario
Larry Menor, University of Western Ontario

This paper is predicated on the view that the advancement of operations management (OM) understanding is rooted in both the "theoretical" and "real-world." Recognizing the importance of replication research to ongoing OM knowledge accumulation and theory development, this paper offers a generalization and extension of the fundamental process management trade-offs between capacity, variability, and inventory. Specifically, we offer an empirical analysis of the Process Management Triangle that extends what has been posited previously through the analytic modeling of queues (e.g., the M / G / 1 Pollaczek-Khinchin Formula, and Kingman's approximation for the G / G / 1 case). First, we report a site-level analysis based upon simulation and data gathered as part of a field case. Second, we perform an industry-level analysis using archival manufacturing data to demonstrate the extent to which the fundamental principles underlying the analytic models can be applied.

4. Modeling Customization in Production-Inventory Systems

Zhiping Wang, Linkoping University
Birger Rapp, Linkoping University

With the implementation of e-business, customization is more and more becoming a competitive strategy for manufacturing companies. However, knowledge of the influence of customization on the operational level is, from both theoretical and practical perspective, missing. In this paper, we model two different production systems, i.e. the single machine production system with cyclical production policy and the serial production system with decoupling point, where customization is considered. These models provide a theoretical framework for designing a production-inventory system in practice. Among the solutions from the models, the most interesting finding is that capacity requirements increases with customer order lead time in the serial production system in one of the cases' solutions, which is counterintuitive. This result is due to the complexity of the relationship between the variables decoupling point position, capacity requirements and the parameter customer order lead time in the mathematical formulation.

5. Aggregate Planning in Make-to-Order Environments

Brian Neureuther, Indiana State University

An aggregate plan for a make-to-order steel fabrication plant for a set of product archetypes is developed. An aggregate linear programming model is used to develop the aggregate plan, taking into account the difficulties that arise in planning in a make-to-order environment. A description of the facility modeled, the aggregate plan, and implications are discussed. Significantly cost savings for the implementation of the aggregate plan results. Further analysis will be conducted to then create a production schedule for the facility.

Session 86: SUN. 13:30 - Mediterráneo 1
Operations Strategy VI

Cluster: Strategy and Design

Chair: **Mats Winroth**, Jönköping University

1. Conceptual Model and Procedures for the Analysis and Competitive Projection of Strategic Manufacturing Units (SMU)

Santiago Ibarra-Mirón, Central University of Las Villas
Roberto Cespón, Central University of Las Villas
Gilberto Hernández-Pérez, Central University of Las Villas

During the last years an notable interest has been observed about the production function, fundamentally for its solid contribution to the success and managerial competitiveness. In this context, it is necessary to develop the strategic dimension of this function. In consequence, the objective of this work consisted on developing a

conceptual model, as well as a group of procedures for the analysis and competitive projection of strategic manufacturing units (SMU) in manufacturing companies (external strategic audit of the SMU, internal strategic audit of the capabilities and competences, and strategic-competitive projection of the SMU), that allows to strengthen, in an effective way, the strategic-competitive management of the production systems. The work shows the experiences obtained in the implementation of the general procedure proposed in a small representative sample of domestic industrial plants, all that which allowed, by means of the cases study, to validate the general hypothesis of investigation.

2. Network Operations Strategy: A Strategic View of Business, Value and Supply Networks

José Gobbo, Jr., EAESP/Fundação Getúlio Vargas and UNESP
Marcos Vasconcellos, EAESP/Fundação Getúlio Vargas
Jose Paulo Fusco, UNIP - Universidade Paulista

The formation and the development of enterprise networks and the Supply Chain Management (SCM) studies gained relevance. In this context, the operations strategy field evolved and enclosed the broader field of supply networks, as the works of Slack (2001) and Rudberg & Olhager (2003) demonstrate. This paper proposes to categorize and present a methodologic approach, and a qualitative and exploratory research of the business, value and supply networks in the operations strategy field. The value network (Parolini, 1999) considers the key elements (physically or not) in a supply system that determine the received value by final customers. The business network involves the actors that play a key role in provide the conditions and requirements needed by specific consumers to make viable the business in the attended market. This set of networks intends offer to academics and practitioners a management tool, under a holistic perspective.

3. Innovation Stickiness: Investigating a Complex Supply Network

Nicky Shaw, Leeds University Business School
Adrian Peel, Kellog Brown and Root Ltd

This paper presents research carried out with a UK utility provider whose supply chain performance indicators include innovation generation and sharing. The research investigated the innovations and how successfully they were shared. The work had two phases: innovation categorization and evaluation of sharing. A number of innovation types are identified in the literature, which combined with supplier consultation led to the development of an innovation taxonomy. From this, a frequency chart was identified for each innovation type. Interesting issues were identified, such as whether second tier suppliers were involved and errors in preconceived ideas of dominant innovation types. The research continues by investigating whether certain innovation types are more easily shared and adopted than others. A questionnaire has been developed to explore the relative "stickiness" of innovations. It is expected that preferred innovation types will be identified and understanding of those types increased.

4. The Impacts of Financial Performance of an Outsourcing Strategy

Y. Helio Yang, San Diego State University

Outsourcing has been emerged as an important strategy in today's competitive global business environment. In United States the outsourcing market is growing faster than the general U.S. economy and the worldwide outsourcing market is growing at an even faster rate. Many researchers have suggested that outsourcing provides companies with benefits such as cost advantages, flexibilities in operations and services, managing and sharing risk, obtaining complementary capabilities, and allowing a focus of core competencies. However there are also new challenges to manage the outsourcing relationships, which have often been overlooked. This research analyzed a sample of outsourcing contracts announced in the United Sates to explore the impacts of this strategy at the firm level using shot-term and long-term financial performance measurements.

5. Outsourcing vs. Collaboration in Manufacturing Networks – From a Manufacturing Strategy Perspective

Mats Winroth, Jönköping University

One of the most important issues in manufacturing strategy is quality, which in fact has become more or less a matter of course. Purchased material is subject to inspection upon reception. The degree of outsourcing is however steadily in-creasing in the manufacturing industry. The underlying motive for outsourcing is often to reduce cost. The dimension of interaction, concerning e.g. product design, is often lost on the way, which can cause problems in manufacturing. The company is thus forced to keep a certain competence in manufacturing in order to be able of discussing with the suppliers. One way of getting the advantages of outsourcing and still keep a climate of continuous learning between the companies is to cooperate in manufacturing networks. This paper elaborates on different views on manufacturing strategies among Swedish manufacturing companies and the suggestion that collaborating networks can give certain competitive advantages.

Session 87: SUN. 13:30 - Mediterráneo 2
Service Work Force Scheduling/Outsourcing

Cluster: Service and Oualitv

Chair: **Michael Lapré**, Vanderbilt University

1. An Examination of Server Flexibility and Non-Linear Delay Costs

Donald Simmons, Ithaca College

A previous study incorporated empirical data into a simulation model of field service operations to compare the use of dedicated vs. flexible maintenance technicians (servers). In that study, total delay cost was assumed to be a linear function of the mean delay time. This paper will proceed in a similar manner, but will consider delay cost per time unit as constant up to a given threshold and then strictly convex beyond that point. This change is being done to more accurately reflect customer opportunity costs associated with longer than expected delays.

2. Workforce Scheduling with Employee Preferences

Ignacio Castillo, University of Alberta
Tarja Joro, University of Alberta
Yongyue Li, University of Alberta

A workforce scheduling approach that takes into account various measures for service quality as well as employees' preferences over various shifts is proposed. The approach combines the traditional scheduling with employee rostering. The approach uses a novel simulation and efficiency analysis procedure to avoid strong assumptions.

3. Antecedents of Outsourcing Decisions in Manufacturing

John Gray, University of North Carolina
Aleda Roth, University of North Carolina

The outsourcing of significant manufacturing tasks is becoming more common. While there can be benefits of this practice (focus, cost savings), there are also significant risks, including the loss of the competitive capability of the firm itself. It is important to understand the drivers of outsourcing decisions. Basing our hypotheses on the existing literature (including case studies, empirical studies, strategy theories, and analytic models), we propose a model of important contingencies affecting a firm's propensity to outsource. The model is empirically tested in a structural equation framework using a large international database of manufacturing companies. The results shed light on the key factors that influence the outsourcing decision.

4. Improving Customer Service Operations @Amazon.com

Matthew Keblis, Texas A&M University
Maomao Chen, Amazon.com

At Amazon.com a collection of internally managed and outsourced contact centers underpins the provision of high quality customer service. We investigate the problem of determining staff levels for the internally managed centers and the amount of work to push to outsourcers when faced with growing sales and strong seasonality. A solution approach is presented to this problem.

5. Exploring Learning Curves for Service Quality: Customer Dissatisfaction with Airlines

Michael Lapré, Vanderbilt University
Nikos Tsikriktsis, London Business School

Scholars have extensively researched learning curves in manufacturing, yet research on learning curves in services remains sparse. Moreover, learning-curve research has ignored customers' evaluation of service firm performance. We explore whether customer dissatisfaction with U.S. airlines follows a learning-curve pattern. Unlike typical learning curves in manufacturing, most airlines reduced complaints as a function of elapsed time as opposed to cumulative experience. Contrary to prior learning-curve studies at the industry level, we find that learning curves differ from firm to firm in terms of (i) experience variable (elapsed time vs. cumulative experience), (ii) starting point of experience (including or omitting prior experience), as well as (iii) learning rates. Southwest Airlines' learning curve, for example, started at the inception of the airline, whereas most other airlines' learning curves were triggered by the U.S. Department of Transportation's increased monitoring of customer dissatisfaction with airlines in 1987.

Session 88: SUN. 15:30 - Caesar 1
Teaching Techniques and Curriculum Design

Cluster: POM Pedagogy

Chair: **Seetharama Narasimhan**, University of Rhode Island

1. Total Cost Modeling: A Key Skill for Supply Chain Management

Timothy Laseter, University of Virginia

Leading practitioners use cost modeling of the entire supply chain for a variety of purposes. Total cost models guarantee optimal tradeoffs between transportation, inventory and facility costs across the extended enterprise. Global outsourcing decisions are made based upon an understanding of key cost drivers. Cost-based negotiations ensure equitable but competitive pricing. Such analyses often require models of external operations of suppliers and sometimes competitors and accordingly can not simply reply upon internal financial reports. More importantly, a good cost model identifies the key drivers often not readily apparent in traditional financial statements.

This presentation shares a perspective on the importance of total cost modeling based upon prior research by the author and also presents a number of pedagogical tools, including articles, cases and class room exercises developed for use in teaching Supply Chain Management in MBA and Executive Education.

2. Technology and Innovation in Teaching and Learning Production and Operations Management

Mehryar Nooriafshar, University of Southern Queensland
Omar Romero-Hernandez, Instituto Tecnologico Autonomo De Mexico

This paper explores the use of innovative and technology aided teaching methods, which utilize different modes and senses for the purpose of learning enhancement. The study was undertaken by analyzing two groups of students from the English and non-English speaking universities. The objective is to compare the teaching effectiveness of the same multimedia system on these two groups. The English-speaking students were chosen from two universities in Australia and the United States. A similar sample of students was also chosen from a Mexican university. The paper provides recommendations with regard to practical ways of internationalizing the language of education by choosing and incorporating different media in a balanced manner so that teaching materials become less language-dependent. Hence, students from different language and cultural backgrounds in different parts of the world will be able to benefit from the same multimedia system.

3. A Tutorial on Control Charts in Excel for Online Education

Paul Schikora, Indiana State University
Daniel Heiser, DePaul University

The development of a quantitative curriculum for online delivery presents challenges for most instructors. This is often compounded by the need to select a software program that meets the course needs, and is readily available to geographically diverse students. We present a tutorial developed to teach control charts using Excel in a web-delivered senior-level quality control course. While there are special purpose software packages that can create control charts, they are not readily available to most distance students. We also wanted the students to have a better understanding of the development of control charts. We chose Microsoft Excel as the software package for the course, because of its suitability and ubiquity. There already exist some basic tutorials on creating control charts with spreadsheets, but we present a more detailed tutorial, demonstrating the concept of reusing and recycling such spreadsheets for application to differing problem situations.

4. Use of a Non-Zero-Sum Game as a Teaching Tool About Organizational Indicators: Optimum Local X Nash Equilibrium

Luiz Pantaleão, UNISINOS – Universidade do Vale do Rio dos Sinos
Márcia Azevedo, Panda Consulting
José Antonio Antunes Júnior, Universidade do Vale do Rio dos Sinos

This work describes the use of a specific game as a teaching tool about organizational indicators, seen as tools used to verify if the decisions adopted by the people in an organization lead it to reach its goal. It is a non-zero-sum game with a situation of Nash Equilibrium, that is, a collective combination of strategies that establish a situation in which all win. A little time after the beginning of the game the participants perceive the Equilibrium. In spite of that, almost always, the players behave in disagreement with the Equilibrium. To adopt or not to adopt strategies that search for the Balance depends on the indicators displayed to the participants of the game. Whenever the indicators allow a local optimum, decisions adopted for the players break the logic of the Nash Equilibrium. That seems to be in agreement with some theories of management, like Theory of Constraints.

5. Teaching Data Envelopment Analysis in the MBA Curriculum

Seetharama Narasimhan, University of Rhode Island
Allan Graham, University of Rhode Island
Mulong Wang, University of Rhode Island

Our MBA curriculum encompasses several case studies and projects. We as a faculty are always searching for good cases and projects. HBS cases and Darden cases are prevalent along with several other mini cases contained in textbooks. We propose that we can add another project assignment titled: Data Envelopment Analysis in the MBA curriculum. The objective of this project assignment is to teach students how to download various internet resources, perform the analysis using Premium EXCEL and interpret the results. Using Premium EXCEL, we demonstrate step by step how Data Envelopment Analysis can be taught in an MBA curriculum, including an example. The example consists of comparing the efficiency and productivity of global automotive companies.

Session 89: SUN. 15:30 - Caesar 2
Supply Chains for Product Design

Cluster: Operations and Logistics

Chair: **Glen Schmidt**, Georgetown University

1. Defining the Elements for the Success of Call Center Outsourcing

Roberto Rotondaro, University of São Paulo

Luis Ricardo Assad, University of São Paulo

Market maturing, defined as the acquisition of a higher level of information by the customers and the resulting increase in their demands, led call centers to a rapid growth and the establishment of companies specialized in providing the infrastructure and human and technological resources required for customer service activities. When customer service outsourcing is discussed, controversy on the subject arises, that is, considerations on the service quality (either at objective and subjective dimensions) as well as on relationship strategy are approached. This paper aims to identify the elements of the outsourced service perceived by the contracting companies as critical for the success of call centers and to build a closer relationship with final customers. For this purpose, it was used the Heys Critical Incident technique. The critical issues detected were compared to call center final customer demands reported in literature.

2. Implications of Supplier Strategies for Time-to-Market and Time-Back-to-Market After a Supply Disruption

Janice Carrillo, University of Florida

Most firms recognize the importance of decreasing time-to-market for new products. However, many of the supplier related activities undertaken by firms to decrease time-to-market also expose them to potential supply related risks later in the product life cycle. In the event of a disruption due to supplier related problems, the time it takes for a firm to overcome the supplier problem and return to the market (i.e. time-back-to-market) can be an equally important measure of firm performance. We present a model which considers the explicit trade-off between time-to-market and time-back-to-market in determining an appropriate supplier related strategy.

3. Component Modularity, External Economies of Scale, and Outsourcing Decisions in the Supply Chain

Jovan Grahovac, Tulane University
Geoffrey Parker, Tulane University

The trend toward outsourcing manufacturing as well as product design and other service activities is accelerating. Within this trend, there are examples that are not well-explained by existing theory. In particular, we observe firms outsourcing to suppliers that enjoy no external economies of scale, upstream concentration in ownership, or access to significantly cheaper labor. We develop a game theoretic model that can explain these seemingly perverse outsourcing decisions. We show that competing vertically integrated firms may have incentives to over invest and face the losing outcome of a prisoners dilemma when both development costs and the importance of a product or process module is high. Unexpectedly, we also find that unimportant modules are never outsourced even in the presence of large specialized suppliers that serve multiple markets for the module.

4. Matching Product Architecture with Supply Chain Configuration

Glen Schmidt, Georgetown University
Sezer Ulku, Georgetown University

We explore how the optimal level of product modularity might be influenced by configuration of the supply chain (that is, by where the design and production responsibilities reside). Some of the trade-offs are that modularity allows component design to be more independent, but requires well-defined interface specifications; modularity reduces costs of iterating during the product design stage, but may result in higher production cost (it may not minimize part-count, for example); and modularity allows a component supplier to specialize and continually upgrade component performance, but may result in the manufacturer's loss of feature exclusivity and over-design of components for a given application. We examine some of these trade-offs to ultimately gain insight into how the firm might jointly optimize supply chain design and product design.

Session 90: SUN. 15:30 - Caesar 3
OM Education I

Cluster: POM Pedagogy

Chair: **Thomas Christiansen**, Technical University of Denmark

1. Distance Education Methodologies Used by Brazilian Universities

Marta Maia, EAESP/Fundação Getúlio Vargas - SP
Fernando Meirelles, EAESP/Fundação Getúlio Vargas

The study of different models used in distance education in the main Brazilian Higher Education Institutions (HEI) can encourage analysis of the professionals involved in Distance Education who are faced with choosing a methodology that best meets the needs of students who are unable or unwilling to come to the HEI campus. For these universities that are introducing courses in the distance education, one of the main challenges is to determine the appropriate pedagogical language of learning associated with the various media available.

The main purpose of this study is to determine how information and communication technologies (ICTs) are being applied to educational processes in distance education in Brazil's HEIs.

2. Interdisciplinary Application of Operations Management: An Educational Center

Dana Johnson, Michigan Technological University

Paul Nelson, Michigan Technological University

The Center for Technological Innovation, Leadership and Entrepreneurship (CenTILE) is a recently established Center at Michigan Tech (MTU). It is a joint initiative of the School of Business and Economics, College of Engineering, and College of Sciences and Arts. CenTILE is charged with the responsibility of promoting interdisciplinary education and research at MTU. In addition, it has developed cooperative initiatives across the campus aiming at advances in technological innovation, leadership, and entrepreneurship. CenTILE Mission Statement: Integrate multi-disciplinary undergraduate and graduate education with research in business, engineering, and the sciences to advance innovation, leadership and entrepreneurship. The discussion will primarily focus on interdisciplinary activities through the CenTILE Projects course. Secondly, the presentation will describe the interrelationships between operations management and entrepreneurial activities. Finally, the unique attributes of this program will be described and how they contribute to an experiential learning perspective for students and faculty participants.

3. Computerized Adaptive Testing in Higher Education: An Empirical Study
Mariana Lilley, University of Hertfordshire
Trevor Barker, University of Hertfordshire
Marta Maia, EAESP/Fundação Getúlio Vargas - SP

The use of computer-assisted assessments in Higher Education has been growing, not only to facilitate the provision of timely feedback to ever-increasing student numbers, but also as a means of facilitating test administration, scoring and reporting of student performance. Our research aimed to identify how computational resources could be exploited more effectively to provide higher levels of individualization and interaction than those provided by traditional computer-based tests. Findings from two empirical studies indicate that there are sufficient benefits to make the use of computer-adaptive tests based on Item Response Theory worthwhile, such as improved feedback on student performance. In this paper, we present an overview of our prototype's adaptive algorithm followed by the benefits of the computerized-adaptive testing approach. This paper is concluded with our views on how this work can be developed further, such as providing students with more control over the application.

4. Tacit and Explicit Knowledge: Developing a Theory of Management Education
Michael Puddicombe, Norwich University
Stephen Buckley, Norwich University

Business educators are challenged to develop future managers who have both the quantitative and qualitative skills necessary to succeed in a dynamic business environment. Our ability to address this challenge is aided and complicated by a new method for the 'delivery' of course content, the virtual classroom. We believe that different delivery methods vary in their ability to efficiently and effectively achieve our goals. In order to understand this variation we develop a theoretical framework based on Polanyi's work on the nature of personal knowledge and Nonaka's extension of these ideas into the realm of organizational knowledge creation. We use this framework to explore the efficacy of these delivery methods in the development of managers who not only command a mastery of the facts of management but also have developed a mastery of the process of managing.

5. What Grading Can Tell About a Course
Thomas Christiansen, Technical University of Denmark

The purpose of this article is to illustrate how the results of grading students in a course can give valuable feedback to 1) the effectiveness of the exam and 2) if there are aspects of the learning process that need attention. Before investigating three propositions, the article briefly describes a newly-developed course in Operations Management at the Technical University of Denmark. Since the introduction it has increased the number of students by more than 20% annually. The findings are that male students get significantly higher grades than females, and that a certain part of the exam is not sufficiently difficult. These findings suggest that improvements should be made. A final purpose of the article is to describe how an introductionary course in Operations Management is taught in a small European country and to encourage discussion on how Operations Management best is taught.

Session 91: SUN. 15:30 - Caesar 4
Innovations in Teaching II / Innovación en la Enseñanza II

Cluster: POM Pedagogy

Chair: **Carmen Medina-López**, University of Seville

1. Introducing ICT Innovations in POM Higher Education: Design and Development Process of Interactive Applications / Introducción de Innovaciones Basadas en las Tic Dentro de la Enseñanza Universitaria de Dirección de Operaciones: Proceso de Diseño y Desarrollo de Aplicaciones Interactivas
Francisco Arenas, University of Seville
José Carlos Ruiz del Castillo, University of Seville
José Machuca, University of Seville

Although the new Information and Communication technologies (ICT) provide

standard tools that can be used to improve higher education POM teaching, the specific design of quality interactive applications in the subject is still limited. On the basis of our experience with software development for the self-learning of MRP techniques we will go over the different aspects of a process that, time-wise, can be quite costly. Amongst other issues, we will analyse the main difficulties surrounding this process, the crucial importance that content selection for the application has, the development of a multimedia storyboard before commencing programming, the advantages afforded by a hybrid platform (local - web-server) and the cooperation that is required between teachers, programmers and students for the design and evaluation of the software that is developed. / Aunque las nuevas tecnologías de la información y las comunicaciones (TIC) proporcionan herramientas estándares que pueden ser utilizadas para mejorar la enseñanza superior de Dirección y Gestión de la Producción / Operaciones, el diseño específico de aplicaciones interactivas de calidad es aún reducido en esta disciplina. A partir de nuestra experiencia con el desarrollo de software para el autoaprendizaje de las técnicas MRP, repasaremos diferentes aspectos de un proceso que puede ser bastante costoso en términos de tiempo. Entre otras cuestiones, analizaremos las principales dificultades de este proceso, la importancia crítica de la selección de los contenidos de la aplicación, el desarrollo del guión multimedia previo a la programación, las ventajas de un soporte híbrido (local – servidor web) o la necesaria cooperación de profesores, programadores y alumnos en el diseño y evaluación del software desarrollado.

2. Computer Based Self-Learning of Material Requirements Planning Techniques / Autoformación Asistida por Ordenador en las Técnicas de Planificación de Necesidades de Materiales

Francisco Arenas, University of Seville
José Machuca, University of Seville
José Carlos Ruiz del Castillo, University of Seville

Although in POM Higher Education traditional methods still seem to prevail (lectures, case method, etc), the tools that Information and Communication Technologies (ICT) provide open up a wide range of possibilities which give rise to a learning model that is more active and student centred. This paper aims to set out some of the results of the Seville University GIDEAO Research Group in the field of devising self-learning interactive software. To be precise, we focus on an application for learning MRP techniques, touching on a number of this software's distinctive features, such as content taught and main interactions, programming and interface design, navigation systems and the logging of information on student software use. This description will be accompanied by some of the findings of an experiment in which a significant sample of University of Seville Business Administration students studied with the application within a controlled work environment. / Aunque en la Enseñanza Universitaria de Dirección de Operaciones los métodos tradicionales (lección magistral, método del caso, etc.) parecen ser aún muy predominantes, las herramientas proporcionadas por las nuevas Tecnologías de la Información y las Comunicaciones (TIC) abren un amplio abanico de posibilidades que sugieren un modelo de aprendizaje más activo y centrado en el alumno. Este trabajo pretende mostrar parte de los resultados de la investigación desarrollada por el Grupo GIDEAO de la Universidad de Sevilla en el campo de la elaboración de software interactivo de autoformación. Concretamente, nos centraremos en una aplicación para el aprendizaje de las técnicas M.R.P., tratando algunas de sus principales características, como los contenidos impartidos, la programación y el diseño de la interfaz, las principales interacciones incorporadas, los sistemas de navegación o el registro de información sobre el uso del software por parte de los alumnos. Esta descripción será acompañada por algunos de los resultados de un experimento en el que una muestra significativa de alumnos de Administración de Empresas de la Universidad de Sevilla estudió con la aplicación en un entorno de trabajo controlado.

3. Design of Multimedia Teaching Material: Empirical Research into POM / Diseño de Material Didáctico Multimedia: Una Investigación Empírica en POM

Carmen Medina-López, University of Seville
José Carlos Ruiz del Castillo, University of Seville
José Machuca, University of Seville

In an environment that is constantly changing, the need for life-long training and distance learning stands out as one of the main consequences. Given our interest in further education in POM, we have developed a self-learning interactive multimedia application directed at the teaching of Just in Time (JIT). This application hopes to take the greatest advantage possible of the inclusion of ICT (Information and Communication Technologies), with special emphasis placed on the multimedia aspect, and interactivity and hypertextuality. To test the validity and suitability of the developed application we have conducted empirical research with a group of Business Administration students at the University of Seville. This paper describes the assessment the students made of the application's design aspects. This analysis is fundamental to determining the suitability of the teaching material, that is, whether there is any improvement in the learner's acquisition of knowledge. / En un entorno en continuo cambio, destaca la necesidad de la formación continua y la educación a distancia. Dado nuestro interés por la educación superior en POM, hemos

desarrollado una aplicación multimedia interactiva de autoformación en la filosofía Justo a Tiempo (JIT). Dicha aplicación aspira a obtener las máximas ventajas de la incorporación de las TIC (Tecnología de la Información y las Comunicaciones), poniendo especial énfasis en la multimedia, la interactividad y la hipertextualidad. Para experimentar la validez y adecuación de la aplicación desarrollada hemos llevado a cabo una investigación empírica con un grupo de estudiantes de Administración y Dirección de Empresas de la Universidad de Sevilla. Este trabajo describe la evaluación que los discentes han realizado sobre los aspectos de diseño de la aplicación. Este análisis es fundamental para determinar la adecuación del material didáctico desarrollado, es decir, si existe una mejora en la adquisición de conocimiento por parte del discente.

4. The Effect of the Use of Multimedia Applications on the Motivation of POM Students / Incidencia de las Aplicaciones Multimedia en la Motivación de los Estudiantes de POM

Carmen Medina-López, University of Seville
José Machuca, University of Seville
José Carlos Ruiz del Castillo, University of Seville

Students are not always motivated to learn and on occasion their goal is simply to pass examinations. The POM teacher must therefore attempt to increase student motivation for the study of POM. In our opinion, ICT (Information and Communication Technologies) -based teaching tools (e.g. multimedia training applications) boost interest and strengthen the motivation to learn to the extent they are adapted to the user's needs and demonstrate the use and practical application of POM. With a view to contrasting this hypothesis we have conducted empirical research with Business Administration students at the University of Seville. The research compares two distance learning scenarios: a self-learning multimedia application (that we have designed as teaching material) and traditional written materials. In this paper, the effects on motivation are presented along with the students' perception of the degree to which the method adapts to their needs. / Los estudiantes no siempre están motivados para aprender y en ocasiones su meta se centra frecuentemente en superar los exámenes. Es por ello que el docente de POM debe intentar aumentar el interés del estudiante por aprender POM. En este sentido, consideramos que los instrumentos didácticos basados en las ICT (Information and Communication Technologies) (e.g. las aplicaciones multimedia de formación), estimulan dicho interés y refuerzan su motivación por aprender, en la medida en que éstas se adaptan a las necesidades del usuario y muestran la utilidad y aplicación de POM. Con objeto de contrastar esta hipótesis hemos desarrollado una investigación empírica con estudiantes de Business Administration de la Universidad de Sevilla. En ella, comparamos two distance learning scenarios: a self-learning multimedia application (that we have designed as teaching material) and traditional wrote materials. En este trabajo presentamos los resultados obtenidos respecto a la motivación, así como en relación a la percepción del estudiante sobre el grado de adaptación del método a sus necesidades.

Session 92: SUN. 15:30 - Caesar 5
Managing Risk in Logistics

Cluster: Operations and Logistics

Chair: **Muhong Zhang**, University of California at Berkeley

1. A Hierarchical Model for Profit-Driven Reverse Logistics Network Design

Samir Srivastava, Indian Institute of Management, Lucknow
Rajiv Srivastava, Indian Institute of Management, Lucknow

This paper examines the feasibility and desirability of reverse logistics in profit-motivated contexts. It attempts to determine implications for various stakeholders in India for selected categories of products from "low volumes and growing markets" to "high volumes and declining markets". We develop a hierarchical model that captures real life scenarios and provides near optimal solutions related to various aspects of Reverse Logistics Network Design. These include disposition decisions; opening and locations/capacities of facilities at various points of time; and flows across them during a given time horizon under various strategic, operational and customer service related constraints. The research methodology consists of review of literature and practices; informal interviews with various stakeholders; an integrated model development that combines both descriptive modeling and optimization; and strategic and operational insights. Our findings indicate that reverse logistics activities are profitable for the considered categories of products beyond a certain minimum quantity of returns.

2. Optimal Consolidation of Single Echelon Inventories

Rosa Birjandi, Air Force Institute of Technology

In today's business environment where superior customer service at lower cost is expected, effective management of inventory is vital in firm's survival. Reducing the number of stocking locations and consolidation of inventory might help. Assuming that the consolidation locations are known, previous studies have focused on the allocation of centralized inventory. This paper will extend these studies to include the selection of consolidation locations. We analyze the impact of

order cost, inbound and outbound transportation costs, lead time variation and demand correlation on the overall cost. We provide an optimization model for the selection of locations and consolidation of inventory. As changes in demand might impact the delivery lead times, our model also captures the correlation between demand and lead-time at each centralized location. Computational experiments will be presented to verify the sensitivity of the selection and allocation decisions to changes in key parameters.

3. A Transaction Cost Approach to Risk and Uncertainty - Subcontractor's Perspective
Jörgen Dernroth, Jönköping School of Engineering

Many organizations cooperate with customers and integrate in various ways to create further operational synergy and to reduce uncertainty in demand. Supply chain integration offers the opportunity to capture synergies and there are many advantages for organizations that integrate into networks of customers (and suppliers). Sharing of information between organizations makes it possible for a supplier to obtain early signals about changing market conditions and thereby reduce their reliance on uncertain forecasts on the demand side to get a higher utilization of production facilities. However, there are also opposite drivers of risk and uncertainties seen from a subcontractor's perspective, e.g. smaller customer structure that increases dependency. The optimal strategy is to balance these drivers. The aim of this paper is to observe risk and uncertainties inside the transactional environment from a subcontractor's perspective. The paper gives a theoretical framework and observations from industry.

4. Supply Chain Supernetworks with Random Demands
June Dong, State University of New York
Ding Zhang, State University of New York
Anna Nagurney, University of Massachusetts

A multi-tiered supply chain supernetwork model is developed in which both physical and electronic transactions are allowed. We provide qualitative properties of the equilibrium product flow and price pattern and computational results.

5. A Robust Optimization Approach for Logistics Demand Uncertainty
Alper Atamturk, University of California at Berkeley
Muhong Zhang, University of California at Berkeley

We describe a robust optimization approach for solving the logistics network flow and design problems with polyhedral demand uncertainty. We give efficiently solvable cases for budget demand uncertainty. Applications to facility location, production/distribution problems are given.

Session 93: SUN. 15:30 - Caesar 6

Meet the Department Editors of *Production and Operations Management*

POMS Sponsored Panel

Chair: **Kalyan Singhal**, University of Baltimore

The Department Editors of *Production and Operations Management* will be happy to answer your questions regarding their departments' mission, review process, and the criteria for acceptance of manuscripts for publication.

Session 94: SUN. 15:30 - Caesar 7
Case Studies in Product/Process Design

Cluster: Strategy and Design

Chair: **Toru Higuchi**, Sakushin Gakuin University

1. Customer System Orientation on the New Product Development Process
Junichi Tomita, Tokyo University

In this paper the author examine theoretically and through a case study customer system orientation on the product development process. To date, as customer needs become increasingly sophisticated and diversified, in many industries new product development game has been intensified. For firms to provide a new value to customers, how to understand the customers is one of the most important tasks. For example, customer relationship of industrial goods firms has been much complicated. Although "customer" is one word, customers of them are generally consumer goods firms and retailers and final consumers. In short, the customers have organized a hierarchical structure. Further each customer often has a different need and is dependent one another. The author calls this structure "customer system" and to produce successful new product development firms should understand not only a close customer but also a customer's customer.

2. Learning Dynamics During Process Innovation: A Longitudinal Case Study
Juan Ramis-Pujol, University Ramon Llull

From the detached "cognitivist" learner (Simon, 1947) to the contextually embedded learner (Daft and Weick, 1984) (Pettigrew, 1987), we find a variety of learning approaches. Concerning innovation, approaches range from an economics positivist tradition (Utterback and Abernathy, 1975) where process innovation ought to simply follow product innovation to a social constructivist

tradition where working, learning and innovating are seen as different faces of the same phenomenon (Cook and Brown, 1999) (Gherardi, 1999). Our research is based on a "processual" perspective (Van de Ven and Poole, 1990, 1995) (Pettigrew, 1997). We study how learning occurs throughout the stages of process innovation. We gathered empirical data in a pharmaceutical company. We find that a clash between two different learning processes was evident during the validation phase. Social and political dynamics hinder the learning processes during this implementation stage. Finally, the explicit learning effort declines and may simply be absent during the follow-up phase.

3. Evaluation of Technological Innovations in Manufacturing Research and Development

Shekhar Jayanthi, Rensselaer Polytechnic Institute
Edwin Witt, National Renewable Energy Laboratory

The effective management of technological innovations is an important aspect of gaining competitive advantage through technology strategy of governmental organizations. Central to management of innovation in an industry is the dynamic, nonlinear, iterative, and complex nature of the transition between research and development (R&D) to high-volume manufacturing activities. We examine 22 manufacturing R&D projects – representing various technological innovations – in the US photovoltaic systems manufacturing industry. Using capacity expansion and knowledge utilization as inputs, and cost reduction as output, from each of the projects in our sample, we estimated the technological potential of each of the innovations. The results from our analysis are consistent with the evaluation of technological innovations by a panel of industrial experts. Further, we identified the amounts and sources, and the organizational and technological determinants of exploiting the potential of innovations. We use these findings to develop a dynamic, integrated framework for conducting further research.

4. Product Technology Transfer in HDTV Development

Mohan Tatikonda, Indiana University

This paper reports the results of an in-depth case- and survey-based analysis of a product development project for a high-definition television set. The HDTV set, which contains a number of novel technologies and took two years to develop, recently entered the North American consumer marketplace retailing at $4,000. Twenty-five significant product technology transfers conducted as part of the HDTV set development are analyzed in terms of their technology risk, interfirm relationships and development outcomes. Product technology partners differed in geographic location and collaborative capability. A variety of transfer approaches were employed. The paper concludes with observations regarding the effectiveness of specific technology transfer processes for product technologies having differing technology risk levels.

5. Miniaturization as a Source of Competitive Advantage in the Advanced Economies

Toru Higuchi, Sakushin Gakuin University

Nowadays, the competition, a supply chain against another, is very severe beyond the national boarders. R&D and the quality products have been the source of competitive advantage of the advanced economies. However, developing economies have accumulate the know-how and infrastructure. Hence I review the effects of miniaturization which stimulate the customers and changes the size of module. As a case study, the development of VCR case is used.

Session 95: SUN. 15:30 - Caesar 8
Retail Operational Processes and Technologies

Cluster: Operations and Logistics

Chair: **Nicole DeHoratius**, University of Chicago

1. Process Robustness in CPG Retail Supply Chains: Lessons for Controlling Losses

Paul Chapman, Cranfield University
Adrian Beck, Scarman Centre

Supply chains provide a key mechanism for the grocery industry to satisfy the demands of shoppers. A survey of European CPG manufacturers and grocery retailers found losses amounting to 2.3% of turnover, which equates to €17 billion per annum for Europe's grocery industry. Fieldwork across twelve CPG supply chains, from the manufacturer through to point of sale in grocery stores, identified that the effectiveness with which these supply chains operate becomes compromised when process control fails. Such failures not only lead to items being accidentally lost and damaged, they also present the opportunity for theft by employees and non-employees and inter-organizational fraud. This research identified a rich opportunity for addressing these losses through employing operations management methods, particularly those associated with process robustness, within a context of a supply chain management approach to remove the opportunity for losses to occur and thus restrict criminal activity.

2. The Advantages of Self-Organization in Logistics Systems

Don Eisenstein, The University of Chicago

Some logistics systems can be configured to be self-organizing so that they spontaneously adjust

themselves to achieve optimal productivity. We will discuss implications based on our experience with such systems for warehouse order picking.

3. Effect of Misplaced Inventory on the Supply Chain

Zeynep Ton, Harvard Business School
Noel Watson, Harvard Business School

Recent research showed that items in a store are often misplaced in areas where customers cannot find them. Consequently, customers may experience stockouts even when the item that they wish to purchase is physically available in the store. One specialty retailer found that 58% of stockouts at their stores were due to misplaced inventory, while another found that one in six customers who approached a salesperson for help failed to find items that were physically present at the store. Very recent work has examined the effect of misplaced inventory on inventory policies. We complement this work by providing further insight into effects of misplaced inventory on the supply chain, e.g., the bullwhip effect, inventory management policies such as frequency of audits and managing in-store variety.

4. Item-Level Tagging: Issues and Opportunities in Retail Supply Chain Management

Gary Gaukler, Stanford University
Ralf Seifert, IMD
Warren Hausman, Stanford University

Various qualitative studies have predicted that conflict will arise, in particular in decentralized supply chains, from the fact that the benefits and costs resulting from item-level RFID are not symmetrically distributed among supply chain partners. We consider a supply chain with one manufacturer and one retailer. Within this context, we present an analytic model of the benefits of item-level RFID to both supply chain partners. We find that an uncoordinated introduction of item-level RFID will generate vastly sub optimal benefits for the supply chain. We demonstrate that due to the independent profit maximization agendas of the players in a decentralized supply chain, an introduction of item-level RFID to a decentralized supply chain will frequently result in deteriorating supply chain efficiency. We show how the cost of item-level RFID should be allocated among supply chain partners and we derive a contract mechanism that ensures positive net benefits for all supply chain partners.

Session 96: SUN. 15:30 - Miramar 1
Supplier Negotiations, Pricing and Incentives

Cluster: Operations and Logistics

Chair: **Srinivas Talluri**, Michigan State University

1. An Inventory and Pricing Game

Metin Cakanyildirim, University of Texas at Dallas
Sirong Luo, University of Texas at Dallas

Vendor managed inventory systems can lead to games where inventory is determined by the supplier and the price by the retailer. For such a game that splits revenues between the supplier and the retailer, we discuss the existence and uniqueness of Nash Equilibrium in 1-period game, subgame perfect equilibrium in a 2-period game with perfect information in the second period, and a myopic equilibrium in finitely repeated games. We show that revenue sharing game is Pareto improving over a wholesale price based game. We also establish that with revenue sharing both the supplier and the retailer benefit from information updating.

2. The Contingent Nature of Supplier Trust on Performance in Highly Cooperative Relationships

David Johnston, York University
David McCutcheon, University of Victoria

The examination of 164 customer-supplier dyads revealed that, in general, higher levels of inter-organizational activities such as shared planning and flexibly coordinating activities were found to be strongly linked to the supplier's trust in the buyer firm. However, not all of the types of cooperative activities, such as joint responsibility for problem solving, had significant impacts on the buyer's perceptions of the relationship's performance. Under specific conditions, such as rapid product change in manufacturing , the pattern of trust to significant cooperative activities leading to performance varied significantly. For this contingency, joint responsibility had a more prominent role in performance outcomes.

3. Electronically Mediated versus Conventional Negotiations

Thomas Gattiker, Miami University
Joshua Schwarz, Miami University

Internet reverse auctions are growing rapidly. Once reverse auction technology is deployed in a buyer firm, individual buyers must chose between using the technology and using conventional modes of price discovery (e.g. face-to-face negotiation) to source a particular commodity. We present a model investigating factors influencing this choice—the choice between an electronically mediated forum and a traditional one. Model considers task characteristics and individual difference factors. Task factors include characteristics of the commodity being sourced (number of potential suppliers, specificity, etc.) (Beal, Carter et al. 2003; Smeltzer & Carr 2003). Individual differences include buyer's conflict management style (Pruitt & Rubin 1986) and his/her personal information systems proactiveness (Agarwal & Prasad 1998). We

hypothesize that auction outcomes are more positive when task characteristics and individual difference factors are consistent with conflict management mode. A lab experiment is used to test the model.

4. Inverse Optimization Models for Buyer-Seller Negotiations

Srinivas Talluri, Michigan State University
Shawnee Vickery, Michigan State University

Buyer-seller negotiations are an important element of the procurement process. The goal of these negotiations is to meet a variety of objectives, which include obtaining acceptable levels of price, quality, delivery, and to build successful long-term relationships between buyers and sellers. While the importance of buyer-seller negotiations is well established in the purchasing literature and numerous empirical studies have been conducted in this area, few formal quantitative decision models have been developed for effective negotiation. This paper suggests a set of multi-criteria inverse optimization models for assisting buyers in negotiating with suppliers by considering a variety of factors. We apply these models to an actual dataset of suppliers from a previously published study. The results provide interesting managerial implications for both buyers and suppliers.

Session 97: SUN. 15:30 - Miramar 2
Modeling Quality in Business and Academia

Cluster: Service and Quality

Chair: **Michael Gorman**, University of Dayton

1. A Systemic Approach to Process Improvement as a Way to Accelerate TQM Systems Maturity

Humberto Cantu, Tecnologico de Monterrey - Campus Monterrey

The linearity of TQM models and how the continuous improvement is usually undertaken (improving systems individually) are an obstacle for QM systems to contribute to business performance, since it takes a long time for an organization to get TQM to make solid contributions. This paper analyses TQ award models and their assessment tools to prove that the lack of a systemic approach is answer to this hypothesis. The paper suggests how to introduce systems thinking in TQM modeling.

2. Macroprocess Map: A Systematic View of Business Processes

Clovis Netto, University of São Paulo
Pedro Luiz Costa Neto, University of São Paulo

Although previous studies have identified a variety of tools to represent a process approach to business (Kettinger et al. 1997), users still have difficulties in mapping their macroprocess, from buyers or suppliers. The purpose of this study has been to propose, apply and explore a technique to map business process. Based on an IDEF technique, the model including the 3 processes of Product Realization, Resources Management and System Management is elaborated. The macroprocess map is compared to ISO 9001:2000 requirements and National Prize Quality Award criteria, resulting in general help to improve the system management. Based on this technique, an action research method was conducted and described. The 6 cases studied are in industrial, services, governmental and small business companies. From these, 4 were certified ISO 9001:2000, one was the beginning of a wider project and one has stopped for having exposed inefficiencies of the internal management.

3. Integrated Design and Optimization Models for the Six Sigma Process

Kailash Kapur, University of Washington
Qianmei Feng, University of Washington

A general six sigma process has the following six phases: Define, Measure, Analyze, Improve, Control and Technology Transfer. The purpose of this paper is to present an integrated approach which combines the design and optimization models that can be used throughout all the phases of the six sigma process. These models include the development of optimum specifications of the output quality characteristic from the viewpoint of the whole system consisting of producers and consumers. Based on the development of system transfer functions which relate inputs and outputs, we propose optimization models to determine the optimal values of the input variables in terms of their means and variances to minimize total system cost. These models can be useful to integrate all the phases of the six sigma process.

4. The Author Affiliation Index Method to Ranking Journals in MS and OM

Michael Gorman, University of Dayton
John Kanet, University of Dayton

We evaluate journals based on a novel method of quality measurement – the Author Affiliation Index (AAI). We explain the philosophy behind the measure and discuss some of the advantages of this measure of journal quality. We then demonstrate its calculation and apply the measure to 30 major journals in MS and OM. We test the measure for sensitivity to its inputs, and compare the journal rankings resulting from this measure to recent studies of journal quality. We suggest that the AAI is an objective, transparent, easily calculated, and stable measure of journal quality that is largely consistent with previous studies. It carries with it additional advantages of being a bounded measure, and comparable across disciplines. We

recommend its use as an alternative measure of journal quality.

Session 98: SUN. 15:30 - Miramar 3
Operations Strategy VII

Cluster: Strategy and Design

Chair: **Ernani Santos**, Federal University of Bahia - EA/NPGA

1. A Strategic Approach for AMT Selection
Sergio Gouvea da Costa, Pontifical Catholic University of Parana
Ken Platts, University of Cambridge
Afonso Fleury, University of São Paulo

Advanced manufacturing technologies (AMT) may improve the competitiveness of companies. In fact, AMT are typically selected according to operational criteria that aim to solve for instance problems in product quality. However, in order for AMT to improve companies' competitive advantage, it is necessary that these technologies be selected with regard to strategic criteria. This work presents a strategic approach for the AMT selection, through a framework that establishes the core of the decision-making process with its key variables. The developed framework was based on previous literature and field research data. AMT are viewed as resources that support a number of organizational competencies. The needed competences are those identified in the Maslen-Platts 'manufacturing vision.' It also takes into consideration the appropriate performance measurement and control process that are adjusted to suit the new technologies. Each given AMT is analyzed according to its impact and its adherence to the company's manufacturing strategy.

2. Business Strategy Alignment as a Determinant Factor of Information Technology Adoption
Ernani Santos, Federal University of Bahia - EA/NPGA

Many authors have argued the need of alignment between business and information technology (IT) strategies in the organizations as a natural way of reaching productivity. According to this view, managers must adopt not only the more suitable Information Technology to their business but also to redesign their business processes to fit them to the adopted IT potential. The objective of this work is to identify how the decision makers perceive the IT and business alignment as a determinant factor of their IT adoptions. To reach this objective a survey was conducted for organizations from both public and private sectors, using self-applied questionnaires. The survey showed that, even though decision makers say that the alignment is highly important, there are some others factors that determine the IT adoption process by organizations.

3. Information Technology Adoption in Presence of Switching Costs
Ernani Santos, Federal University of Bahia - EA/NPGA

The objective of this work is to identify the factors that determine the decision making about which Information Technologies (IT) must be chosen. Consideration should be given to the switching costs especially with the never ending development of the IT technology and the desire to switch to the new .To reach this objective, a survey was conducted for twelve organizations, from both private and public sectors. The maturity level of the technology, the users installed base size, the reputation from the supply and/or producer, the costs of new acquisition, for example, were factors considered highly important by decision makers. It was also verified that these decision makers aren't conscious about the strategies used by suppliers that lead them to adopt their products or services based on standards with low or none compatibility with that of others suppliers, increasing consequently the switching costs to a new technology in a later moment.

4. Technological Capital and Diversification Strategy in the Spanish Manufacturing Firms
Antonio Rodriguez Duarte, UCM-DMR Consulting E-Business Research Center
Francesco Sandulli, UCM-DMR Consulting E-Business Research Center
Beatriz Minguela Rata, UCM-DMR Consulting E-Business Research Center

This work analyzes how the accumulation of technological intangible resources (technological capital) affects to the selection of the industries where the firm is diversified. This work offers a crucial contribution to the existing literature: a measurement form of the technological resources is presented, with a higher level of detail of the estimation of the depreciation rate of knowledge capital, allowing a more precise analysis of the diversification decision. The results, obtained for a sample of 983 industrial Spanish companies, show that the accumulation of intangible technological resources influences positively the decision and the degree of diversification.

5. Determinant Factors of Information Technology Adoption
Ernani Santos, Federal University of Bahia - EA/NPGA

The objective of this work is to identify the factors that determine the decision making about Information Technology adoption by organizations. This analysis was made based on technological diffusion theory, focusing mainly on network externalities, positive feedbacks and path dependence. Besides, the switching costs

theory also was considered. Based on these concepts, a framework analysis was purposed ant then, tested through a survey conducted for thirteen organizations, from both public and private sectors, using self-applied questionnaires. As a result, operational cost reduction, standards compatibility, alignment to organization strategies, the maturity level of the analyzed technology and the related costs of the new technology, for example, were pointed out as highly important by decision makers.

Session 99: SUN. 15:30 - Miramar 4
Health Care/Quality of Life

Cluster: Service and Quality

Chair: **William Borders**, Troy State University Dothan

1. Using Soft Systems Methodology to Analyze Quality of Life and Continuous Urban Development

Felipe Graeml, Universidade Federal de Santa Catarina
Karin Graeml, Universidade Federal do Paraná
Rolf Erdmann, Universidade Federal de Santa Catarina

Popular pressure over municipal administrations has increased in most cities in the world, stimulated by citizen's wishes for better quality of life. People seem to have improved their standards and demands with respect to quality of life when compared to the past. Citizens begin to understand the economic and social benefits of preserving their cultural heritage and, consequently, try to slow down the politicians enthusiasm to refurbish and frantically spread the cities. The culture background, problems, and possibilities are different from city to city. Consequently, the needs and wishes also are widely different. Trying to find out which variables are the most important for strategic analysis is a different task for each different place. This paper describes a possible application of Soft Systems Methodology (SSM) to analyze quality of life and continuous urban development.

2. Experiences from the Application of Business Process Management Techniques for Health Services

Jose Manuel Framinan, University of Seville
Carlos Parra, Public Hospitals
Jose María De la Higuera, Public Hospitals
Rafael Ruiz-Usano, University of Seville
Manuel Melero, Public Hospitals

In this paper, we present our experience in a Business Process Management (BPM) project for public hospitals. This project is supported by a research network whose overall goal is to develop new health services based on telemedicine. In order to do so, different decision-support and planning methodologies and tools in order to produce new organizational models for efficiently support health services are supported. Among these, we focus on the process-oriented approach rather than the traditional function-oriented approach to health services. According to this approach, health processes must first be identified and modeled in order to simulate the resulting models and seek for alternatives in a BPM context. Since it is more than likely that the new processes to be implemented may imply the redesign of (at least) part of the current information and communication system, a formal description model suitable for software development (i.e. UML diagrams) should be also produced.

3. Waiting at Pharmacies and the New Economics of Queuing

Willard Price, University of the Pacific

Waiting for service delivery appears too often, queuing at health care facilities is too common and waiting at pharmacies is all too often acceptable to customers and pharmacy management alike. This research is based on field data gathered by graduate students pursuing coursework in Operations Management and Quality/Productivity Management. The data were collected at a clinical pharmacy and several retail sites. Analyses establish waiting distributions and suggest the tolerance for wait. Service resources are explained and strategies are demonstrated or proposed to significantly reduce prescription drop-off and pickup delays. Field results are packaged as a curriculum module for a joint Doctor of Pharmacy-MBA program, presenting the analytical method, field study design and detailing continuing research to test a theory of the New Economics of Queuing.

4. No More Queues - A Prescription to Cure UK NHS Outpatient Clinic Queueing Problems?

Gerald Barlow, University of Kent

This paper reports on 4 years of detailed research into patients waiting experiences in U.K. NHS outpatient clinics. Covering over 1,000 interviews and observations in a number of NHS outpatient eye clinics over a 4 year period. The paper outlines the findings, which for the first time, contradict one of the basic propositions put forward by David Miaster (1985) in his work on queueing psychology. Operational Researchers have investigated this problem on many occasions for over fifty years since Bailey (1952), often specifically in the hospital waiting situation, mainly using mathematical approaches. But, to date the problem has not been resolved, nor has it really improved, perhaps a new fresh look is needed. The paper goes on to discus the management approach, both clinical and non clinical, found in all clinics observed, and suggests some different approaches to possibly improving/solving the problem.

5. Nurse Scheduling: Linking Theory to Practice

William Borders, Troy State University Dothan

Nurse scheduling is a combinatorial optimization problem that has received considerable attention from academic analysts. Consequently, a variety of mathematical optimization and heuristic models that provide solutions to this problem can be found in the published literature. A criticism often made of such theoretical models is that they have limited impact on actual practice. This is the focus of this paper: to explore the influence these analytical models have had on the actual practice of nurse scheduling. To accomplish this, a brief summary of nurse scheduling mathematical optimization and heuristic models is presented. Nurse scheduling commercial software products and nursing administration practitioner literature are then surveyed for evidence of these models. A brief case study on the author's attempt to implement a tour scheduling heuristic in a large hospital is used to illustrate the challenges of moving from theory to practice in this area.

Session 100: SUN. 15:30 - Caribe
Supply Chain Issues in Brazilian Industries

Cluster: Environment and International

Chair: **Susana Pereira**, EAESP/Fundação Getúlio Vargas

1. Automotive Cluster in Brazil

Luiz Diserio, EAESP/Fundação Getulio Vargas
Carlos Sakuramoto, EAESP/Fundação Getúlio Vargas
Mauro Pereira, EAESP/Fundação Getulio Vargas
Marcelo Goldstein, EAESP/Fundação Getulio Vargas

The Automotive Sector is regarded as one of the modern sectors of Brazilian economy. This sector holds an important share of the country's IGP. This article analyzes the automotive chain, under Porter's cluster theory, considering factors of the "diamond" model: factor conditions, support and related industries, demand conditions, context for firm strategy, and rivalry and government role. We begin with the automotive history, then analyze the configuration of sector players up to the "turning point" in the end of the 90´s when it instituted a new automotive legislation in both Brazil and Argentina.
The analysis consists of identifying and mapping those factors according to the "diamond" model and to presenting the structure, the characteristics of the automotive "cluster" and its competitiveness.

2. Evaluation of Logistics Performance in the Brazilian Beverage Supply Chain

Samuel Conceição, Federal University of Minas Gerais
Ronan Quintão, Federal University of Minas Gerais
Leonardo Gomes, Federal University of Minas Gerais
Tomas Grandchamp, Federal University of Minas Gerais
Tatiana Oliveira, Federal University of Minas Gerais
Josiane Rodrigues, Federal University of Minas Gerais

This article presents a study of logistics indicators on the Brazilian Soft Drink Supply Chain (BSDSC). The Soft Drink segment in Brazil has a complex material flow, high level of product replacement, and variable demand pattern. Our results were attained through a survey methodology and analyzed using CART (Classification and Regression Tree). The main goals were to (1) identify the Bullwhip effect; (2) measure the use of remediation strategies for this effect; and (3) determine logistic indicators, both internal and external, used among these companies. The results reveal the main causes of the bullwhip effect and the logistic indicators used in BSDSC. This article also presents how a JIT philosophy can minimize the bullwhip behavior and help integrate the entire supply chain.

3. The Possibility of Insertion of the Brazilian Semiconductor Industry in the Electronic Global Chain

João Amato Neto, University of São Paulo
Cristiano Fontes de Vasconcelos, University of São Paulo

Among the several dynamic and modern global productive chains in the digital economy, our research focuses on ones related to the electronic complex, that involves a lot of highly intensive segments in technological knowledge, such as telecommunications, computer science, consumption electronics, embarked electronics, industrial automation, etc. One of the most strategic segment of this industrial complex is the manufacturing of semiconductor components (represented by the chips). The aim of this work is to present and discusses the main results of a research study of 5 manufacturing companies of semiconductor components operating in Brazil. We analyze some special aspects of the strategy and technological competence of these companies based on a survey.

4. The Competitive Factors of Brazilian Fresh Fruit Exports

Roberta Souza, University of São Paulo
João Amato Neto, University of São Paulo

The aim of this article is to discuss the main factors which could be responsible for the increase of efficiency of Brazilian mango and grapes productive chains. Despite its natural

vocation for producing agricultural goods in general and fresh fruits specially, the Brazilian market share of fresh fruits in foreign trade is very small (less than 1% of total). Among the main obstacles for the expansion of fresh fruit exports are the tariff and sanitary barriers imposed by the most important importers. Concerning internal difficulties, the main barriers are: low quality of fruit, inadequate manipulation of the product, and lack of coordination between producers and distributors. The methodological framework adopted is the case study.

5. Supply Chain Metrics: A Case Study in an Agrifood Chain In Brazil

Susana Pereira, EAESP/Fundação Getúlio Vargas
João Mário Csillag, EAESP/Fundação Getúlio Vargas

The purpose of this project is to further our understanding of supply chain metrics in the agro-industry, using the managerial perspectives and concepts presented in the literature about supply chain management. We consider the small accumulated and systemized knowledge about the appraisal of supply chain performance, especially in Brazil. This forms the foundation of our exploratory case study, which is based in qualitative research. The supply chain of a focal company was mapped and delimited. After elaborating the protocol of the case study, semi-structured interviews were conducted with directors, managers, and technicians of the focal company. A total of 38 semi-structured interviews were tape-recorded, adding up to a total of 30 hours of recordings.

Session 101: SUN. 15:30 - Coral
Supply Chain Performance Measurement

Cluster: Strategy and Design

Chair: **Byron Finch**, Miami University

1. Issues in Supplier Performance Evaluation

Kim Sundtoft Hald, Copenhagen Business School

As supply chains transforms and firms outsource increasing parts of their operations to suppliers, control transforms from intra- to inter-organizational. Management can no longer be based on direct ownership and as a consequence, new management philosophies must be developed. Supplier performance evaluation is one such philosophy designed to increase the “performance visibility” in buyer-supplier relationships. However, both practitioners and research scientists have noted a number of problems regarding measurement activities during the past decade. Supplier performance evaluation activities are often fragmented, randomly constructed and not adjusted to the specific buyer-supplier relationship which is assessed. The object of this paper is to discus issues in supplier performance evaluation. A framework which is used to reflect the elements of supplier performance evaluation is introduced and suggested as the focus of future research initiatives within this increasing important field of inter-organizational relationships and supply chain management.

2. Analytic Hierarchy Process Helps Measure Performance of Hospitals

Prasanta Dey, University of the West Indies
Seetaraman Hariharan, Queen Elizabeth Hospital

This study develops a tool for the process-based performance measurement of multispecialty tertiary care hospitals using Analytic Hierarchy Process with the involvement of the clinicians and managers. The steps for measuring performance of hospital consist of 1. Identification of the critical success factors for the performance of a hospital, 2. Identification of sub-factors which influence the critical factors, 3. Pair-wise comparison of these factors, 4. Derivation of their respective ratings and weights 5. Calculation of the cumulative performance according to the attributes of a given hospital and gap analysis. This tool was applied to a 600-bed tertiary care teaching hospital affiliated to University of West Indies in Barbados and another similar bed-strength tertiary care teaching hospital in South India. This study shows that the Indian hospital performed 71% with respect to Barbados hospital and suggests a few enablers for improved performance.

3. Development of a Performance Measurement Tool with Moving Targets: An Application to Projects

Nicky Shaw, Leeds University Business School
Adrian Peel, Kellog Brown and Root Ltd

The performance measurement literature documents clearly the myopia of relying upon financial measures. Numerous frameworks have been designed to address this, yet organizations struggle to identify meaningful metrics within those frameworks. This paper reports the development of a multicriteria performance measurement tool using a polar plot. The tool was developed to aid engineering consultancy activities within the design and construction industry and has been piloted. The work is unusual in that it encounters difficulties peculiar to projects. Considerable time was spent identifying the performance criteria, recognizing that project targets often change over time. Any slippage and subsequent targets are always renegotiated with the client as the scope of emergent work becomes more definable. Here, the resulting performance measurement activity was more complex than merely integrating new targets into the measurement system. Some interesting gaps were identified regarding client and supplier perceptions of performance.

4. Enterprise Performance Indicators: Quantity, Shape and Content

Wagner Damiani, EAESP/Fundação Getúlio Vargas

This research which has covered 63,7% of all Brazilian banks (174 listed by the Central Bank of Brazil) has evaluated performance indicators, essential for enterprises in which decision-making has to be based on performance analysis, applied by these financial institutions, through three key aspects: quantity received, contents and presentation shapes. Objecting a greater generalization of the data, a quantitative questionnaire has been designed, and the answers have been collected by telephone; 100 different banks have filled a total of 151 questionnaires. Eight banks were visited and the respective executives were interviewed, with the intention of specific answers. Everyone who had answered the survey was invited to fill in an electronic test aiming to bring more consistency to the interviewed opinions, and 18 people have done it. Conclusion: many executives proof to receive a huge quantity of informations through reports, which sometimes are misleading, and/or contain redundant data.

5. Incorporating Probablistic Variable Costs in Breakeven Analysis

Byron Finch, Miami University
Srinagesh Gavirneni, Indiana University
F. Robert Jacobs, Indiana University

Traditional breakeven analyses assume that the per-unit costs associated with production are certain. In many cases variable costs are not known with certainty and when predicted, error is frequently encountered. The affect of this uncertainty is to create a potential for what is thought to be a low-cost alternative to actually not be the low-cost alternative. This paper provides a detailed analysis of the traditional breakeven problem when uncertainty exists and provides a mechanism for determining levels of confidence for the low-cost alternative given normally distributed variable costs. Knowledge of the probability of each alternative being the low-cost alternative allows for a better understanding of the breakeven solution and allows the user to better manage risks associated with the decision.

Session 102: SUN. 15:30 - Mediterráneo 1
Breaking the Hold on Bottlenecks: A World View

Cluster: Operations and Logistics

Chair: **Yasuhiko Hosono**, Musashi Institute of Technology

1. Using Bottleneck Predictors Computable in Polynomial Time for the Shifting Bottleneck Heuristic

Saral Mukherjee, Indian Institute of Management, Ahmedabad
Ashis Chatterjee, Indian Institute of Management, Calcutta

The Shifting Bottleneck (SB) heuristic developed by Adams et al. (1988) has been one of the most prominent approximation methods for solving the Job Shop problem. It iteratively chooses a bottleneck machine by setting up and solving a series of one-machine sequencing problems (OMSPs). The objective of these OMSPs is minimization of maximum job lateness (Lmax) and the machine with the highest Lmax value is identified as the bottleneck. We examine this procedure for identifying the bottleneck and provide an example to illustrate the problem with the same. Since the OMSP has been shown to be NP-hard, significant savings in computation times can be obtained if we choose polynomial procedures for identifying the bottleneck. We examine how the existing SB procedure of Adams et al. (1988) compares with an approach where bottleneck identification is a simple polynomial procedure.

2. A Novel Approach for Bottleneck Identification

Qinli Zhang, Hong Kong University of Science and Technology
Avaneesh Gupta, Hong Kong University of Science and Technology
Mitchell Tseng, Hong Kong University of Science and Technology

In a production system, the overall performance is usually determined by the bottleneck resources. Detecting and monitoring bottlenecks is of prime importance in production management. We present an approach for bottleneck identification based on throughput diagrams. These diagrams depict the accumulated input and output work content of each work center, along the time, in the form of input and output curve. The horizontal distance between the two curves, referred as “range”, is an indicator of workload. The plot of range versus time facilitates continuous monitoring changes in the workload. An appropriate lower and upper bound on the range values could be set. The variation in range beyond the bounds is an indicator of excess workload or bottleneck. Based on these range fluctuations short term as well as the long term bottlenecks could be determined. Industry examples are given to demonstrate the effectiveness of the proposed approach.

3. Benefits of a Critical Chain – a System Dynamics Based Study

Jan Juerging, University of Mannheim

Introducing the “Theory of Constrains” (TOC) Goldratt established a management philosophy for production systems and later transferred this approach to project management. This resulted in scheduling and management techniques,

which are explicitly aware of uncertainty and address the increasingly importance of completion time itself and its reliability. Other concepts, like simultaneous engineering, have been developed for a time reduction in projects, but shorter project durations are accompanied by higher risks and a rising complexity. Similar to "The Goal" the TOC's solutions for project management follow common sense and their value seems obvious. System Dynamics is used as simulation methodology, because it has proven its applicability to project management. It takes a systemic view on the problem, incorporates hard and soft variables, and handles complexity, non-linearity, uncertainty, and feedback. A System Dynamics model will be presented that validates the TOC's benefits concerning time, costs, and quality comparing it with simultaneous engineering.

4. Optimal Solution for a Bottleneck Machine Scheduling Problem

Yasuhiko Hosono, Musashi Institute of Technology

Optimal solution is presented basing upon a branch and bound algorithm for a BMSP (Bottleneck Machine Scheduling Problem) to obtain a minimum makespan schedule under the condition of no intermission on a specified bottleneck machine in a jobshop. The detail of the proposed optimization steps is described to minimize a makespan as well as the mean flow time of schedule. To improve the enormous computational efforts in the algorithm, the upper bound is devised by employing a simple heuristic as well as several feasibility inspections. From the analysis of numerical examples, the efficiency of the proposed optimal procedure is shown as the reduction of search space for the whole solutions. Quantitative results are also discussed focusing on the number of branches, computational time, and criteria values, such as the mean flow time and the makespan of schedule.

5. Heuristic Approach to a Bottleneck Machine Scheduling Problem in a Jobshop

Yasuhiko Hosono, Musashi Institute of Technology

This paper deals with a Bottleneck Machine Scheduling Problem (BMSP) under the constraint of no idle time within the operation schedule on a single specified bottleneck machine in a jobshop. BMSP may appear in the situation where we wish to continue to operate a specified machine without any intermission once it starts for a set of jobs, regarded as a bottleneck under the traditional jobshop schedule minimizing a makespan. Here, we propose a heuristic approach to find out a BMSP solution that has no idle time in the schedule for the arbitrary specified machine among a real sized jobshop machines with a smaller makespan criterion. Numerical results demonstrate the effectiveness of this approach compared with the results from the enumerative approach equipped with a feasibility test. The feasibility test functions to reduce a number of invalid solutions in the enumeration process.

Session 103: SUN. 15:30 - Mediterráneo 2
International Cases in OM

Cluster: POM Pedagogy

Chair: **Marie Opheim**, Norwegian University of Science and Technology

1. Cellular Manufacturing Systems: A Case Study - Productivity Improvement in a Two Wheelers' Carburetor Assembly Line

Thangasamy Nambirajan, Pondicherry University

The present work was carried out in a multinational company manufacturing carburetors. The objective of the present work is to reduce the throughput time to assemble a two wheeler carburetor in a assembly line. Eight KAIZENS have been recommended. Time study has been done taking into consideration of the 22 stages in the assembly line . While doing time study, machine cycle time, operator cycle time and walking cycle time are taken into consideration. Steps have been taken to balance the men, workstations and materials in order to improve the productivity in the above assembly line. After the incorporation of my recommendations, the number of carburetors produced per shift has increased beyond 680 from the initial shift production quantity of 480. In addition to this, reworks have come down. Delivery schedule and cost of manufacturing a carburetor have improved.

2. Competitiveness Sustained by Integration of Advanced Practices of Operations Management: A Case Study

Sergio De Gusmão, Pontifícia Universidade Católica do Rio Grande do Sul

This paper presents the results of a study about the integration of advanced practices of operations management and the impact on company competitiveness. The study shows how integration among Six Sigma, Theory of Constraints and Lean Manufacturing contributed to success for a North American firm established in Brazil, producing auto parts. The firm has also attained high levels of competitiveness and national recognition in the form of the National Prize of Quality, similar to the Malcom Baldridge award in the USA or the Deming Prize in Japan.

3. Internationalization: The Experience of an Italian Candy Producer and Its Production Plant in Viet Nam

Hoc Le, Univsersity of Trento
Enrico Zaninotto, University of Trento

The interpretation of the role of organizational variables in production management follows two main lines. One stream stresses a deterministic relationship between structural factors (markets and technologies) and organizational choices. Another stream of literature, describes organizational choices as dictated by the necessity of buffering structural constraints with factors having impacts on the working of technology in a specific environment. A global environment put new light to the debate: Does a global production environment imply a global organization? Or does a global production need local organizations? This paper aims at providing a further empirical evidence to understand how firms internationalize their production process. Comparing the practices of an Italian candy producer's home factory and its manufacturing plant in Viet Nam, we examine the circumstances by which firms internationalize production process: (1) either transferring their production process and organization to other countries; or (2) making adaptation as required by local conditions.

4. The Transfer of Capabilities for Product Diversification: A Case Study of Failure

Oktay Ozdenli, Aston University
David Bennett, Aston University

Capability transfer for diversification should include effective market research as well as know-how for processing new products. In the UK, Sturge Industries attempted to diversify from its traditional products into electrical and electronic components by transferring capability from its US parent. This had been successful in the US but was a failure in the UK. One reason was not defining the market according to process capabilities and customer needs. Experience with potential customers showed that any product should be analyzed according to the specifics of the processes and requirements of different geographical markets. This paper describes and analyses the case of Sturge Industries from its own and its US parent's perspective. It illustrates the need for considerable tacit knowledge to be transferred relating to processes, applications and markets. Not capturing and transferring this tacit knowledge and a lack of common understanding between partners is a common reason for failure.

5. The Influence of Localization Decisions on Operations Management

Marie Opheim, Norwegian University of Science and Technology
Sverre Konrad Nilsen, Norwegian University of Science and Technology

Globalization has led to an increased number of new international establishments, which has created new challenges when it comes to the operation of these new global companies. Business homogeneity and heterogeneity are seen as two main strategies regarding this development, homogeneity like coca-cola, heterogeneity as local diversity. In this paper we will show how localization decisions for the automotive industry influences the possibilities for the operational management of these firms. Over several years we have been working in close relation with a firm which has gone through several internationalization processes. With special emphasis on one of these processes, we will elaborate a twofold hypothesis: a localization characterized by high knowledge and skills makes homogenizing processes difficult, while localizations characterized by low knowledge and skills will complicate the contribution of local adaptations and involvement, and vice versa.

Session 104: MON. 7:00 - Caesar 1
Logistics Research and Models

Cluster: Operations and Logistics

Chair: **Roger Rios**, Universidad Autonoma de Nuevo Leon

1. Floating Stocks in Intermodal Supply Chains

Rommert Dekker, Erasmus University
Geerten Ochtman, Erasmus University Rotterdam
Eelco Van Asperen, Erasmus University Rotterdam

In this presentation we investigate the positioning of floating stocks in intermodal FMCG supply chains. We show that advanced deployment of a part of the cycle stock can be profitable, but that not all of it. Safety stock however, should remain centralized and transported unimodally. We present an analytical model and conduct a case study in Western-Europe using a simulation model.

2. Using Multiple Research Strategies in Logistics Research

Daniel Hellström, Lund University
Fredrik Nilsson, Lund University

The use of multiple research strategies may be beneficial in several research areas. Mixing qualitative and quantitative research strategies may provide a more coherent picture of the phenomenon that is being investigated. The purpose of this paper is to discuss the advantages of using a qualitative strategy, the case study, and a quantitative strategy, simulation in the study of logistics phenomena. While the case study strategy shows several advantages in terms of being ideographic and that the context is taken into concern, critics often argue that the results are just stories and the research is not rigors enough. Simulation strategies are often reported as being good for optimization and understanding, however critics argue that it is to superficial and only solves problem in the computer. By combining these

methods it is concluded that there are several synergies that provide great value to the research being conducted.

3. Trade Credits as Part of Distribution – Decision Problems in Generic Market Situations

Jörgen Dernroth, Jönköping University College

Management of trade credits has become more specialized and complicated and internal functions to manage trade credits have been well established. However, management of trade credits is often done with the single purpose to reduce credit losses and without any linkages to overall market goals. In the ideal case, the overall risk exposure in accounts receivable is adjusted as markets goes through cycles of growth and recessions. If the actual level of risk exposure is too low, the company might lose market shares, if the actual risk exposure level is too high, the company might face increasing credit losses. In each decision, subcontractors must find the right balance between various failure costs. The impact of wrong decisions, thus the size of the failure costs, varies depending on the generic market condition facing the organization. This paper captures the impact of generic market structures on trade credit decision criteria.

4. Using Simulation to Promote Efficient Traffic Flow at U.S/Mexico Border Ports of Entry: A Proposal for Further Analysis

Delia Valles-Rosales, New Mexico State University
Nalini Govindarajulu, New Mexico State University
Bonnie Daily, New Mexico State University

Transportation difficulties at the U.S.-Mexico border including increased immigration measures, increased security constraints due to 9/11, non-compatibility between U.S. and Mexican trucking laws and regulations, lack of automated customs clearance and vehicle tracking, weak infrastructure including poor quality highways, and inadequate security personnel, hinder the operations of maquiladora industries that rely on just-in-time operations (GAO Report, 2001; Stank & Crum, 1997). Hence, analysis of bridge-transportation data may help find ways to improve traffic flow at the border and reduce impacts on time-based competition. Accordingly, this study aims to conduct simulation analysis to provide feedback on possible improvements in border delays. We propose to conduct interviews and collect data on current transportation issues from U.S/Mexico Port of Entry (POE) Bridges' officials, transportation carriers, and broker companies in the El Paso/Juarez area for the simulation.

5. Natural Gas Transmission Systems: An Overview of Optimization Methods

Roger Rios, Universidad Autonoma de Nuevo Leon

In this talk, we will present an overview of state-of-the-art research on problems deriving from the natural gas industry. In particular, we will highlight solution methodologies for pipeline network transmission systems. This includes a description of special problem properties which motivate the use of these solution approaches. In addition, we will discuss the most promising research trends in this area.

Session 105: MON. 7:00 - Caesar 2
Operations Strategy VIII

Cluster: Strategy and Design

Chair: **Philip Chong**, California State University, Long Beach

1. Creating New Business Opportunities Through SME Material Technology Network Collaboration

Tiina Valjakka, VTT Industrial Systems
Petri Kalliokoski, VTT Industrial Systems

This paper describes the development of a strategic network between material technology SMEs and presents a framework of new business creation. The main objective of this research is to recognize and define the mechanisms of how the multilateral strategic networks generate new business. As a method, the experimental development study is used, the research team actively participating in building the network. A framework of the new business creation is built and tested in a case network called "Partnet". The Partnet project is composed of three different enterprise networks, each of which has started to evolve towards a strategic network. The core of the case network consists of three Finnish SMEs, representing sheet metal, plastic and aluminum industry. The results of the research suggest that strategic collaboration of an SME material technology network bring along possibilities to create new business opportunities.

2. An Integrated Analysis Approach Using System Dynamics and ANP in Manufacturing System Design Process

Daniel Semere, Royal Institute of Technology
Bengt Lindberg, Royal Institute of Technology

A number of configuration alternatives may emerge in the manufacturing system design process among which the best has to be selected. The design process is guided by the operation goal of the firm expressed by the competitive priorities, which render the problem as a multi criteria decision-making. Since analytical methods cannot handle analysis of complex systems, simulation tools are the only resort. Detailed simulation analysis may become costly hence rapid and less expensive

assessment methods are necessary to relegate inferiors at earlier stage. Dynamic rough-cut analysis is an approach to make rapid and qualitatively accurate assessments. In this paper, an integrated approach using System Dynamics and Analytical Network Process is proposed as an efficient method for analysis. The synergy between System Dynamics and ANP enables one to make efficient assessments consistent with the operation strategy of the manufacturing firm. An illustrative case is presented to exemplify the proposed approach.

3. Crafting Strategy Through a Purpose-Oriented Approach

Tsutomu Mishina, Akita Prefectural University
Seiji Kurosu, Waseda University
Shizue Kubokawa, California State Polytechnic University

Recent business environments require quicker and more adequate decision-making by firms than before. Because the environmental changes are extremely large, the decision-makers may confront the difficulty of predicting their futures by following previous cases. A purpose expansion method which originated from Work Design helps to create strategic alternatives that are not based on previous experiences. The concept of a strategy based on a purpose-oriented approach provides original strategic alternatives. However, new attempts furnished with entirely new perspectives sometimes end up collapsing when the scheme is diversified. Generally, when decision-makers try to craft a strategy, they encounter four main factors. This method focuses on balancing goals and actions in the process of implementing strategies by considering the factors as well as triggers that emerge in an organization. The main process of the proposed method is to design the triggers that indirectly achieve the organizational goal.

4. A General Hypothesis in Consensus Team Decision Making Involving Allocation of Resources Using A Decision Matrix

Philip Chong, California State University, Long Beach
Omer Benli, California State University, Long Beach

In consensus team decision-making involving the allocation of resources, compromises are made between decision makers in order to arrive at an agreement. Rational models based on some formula are introduced, and resource allocation can be calculated. This paper proposes the following hypothesis:
The model selected by the team must have the property of minimum sum of squares of monetary regrets if the highest-ranking model is not chosen. In section one, we develop a general algebraic representation of the hypothesis as stated above. We will show that this hypothesis can be interpreted as the Nash equilibrium involving mixed strategies when the entire problem is viewed in game theoretic framework. In section two, we provide an explanation of the reasoning process pursued by five business college department chairs involving three models, in a case example of an actual consensus decision-making in budget allocation to illustrate the above hypothesis.

Session 106: MON. 7:00 - Caesar 3
Services in Manufacturing Environments

Cluster: Service and Quality

Chair: **Roberto Rotondaro**, University of São Paulo

1. Lean Production and Agile Manufacturing Concepts in Telecommunication Industry

Helmer Keppke, EAESP/Fundação Getulio Vargas
João Mário Csillag, EAESP/Fundação Getúlio Vargas

This papers analyses Lean production and Agile manufacturing concepts in Brazilian Telecommunication Industry. The specific industry segment analyzed is corporate data communication services. Case studies with three Brazilian Telecommunication Services providers enrich this study.

2. The Information in Maintenance Management in a Pharmaceutical Factory

Daniel Gaspar, Escola Superior de Tecnologia de Viseu
António Brito, Faculdade de Engenharia da Universidade do Porto

This article is about a way of managing the information in maintenance management and its connection with the production management in a pharmaceutical factory. In an industrial company maintenance management is different from production management. Indeed, the goals, procedures, the know-how, the tools are not the same. As a consequence, information management should be different in the maintenance and production areas. In a competitive and fast changing environment information management becomes essential to the successful development of any organization.

3. The Material Strategic Positioning Matrix – The Automobile Dealership Case

Marcelo Klippel, Universidade do Vale do Rio dos Sinos
Ricardo Cassel, Universidade do Vale do Rio dos Sinos
José Antonio Antunes Júnior, Universidade do Vale do Rio dos Sinos
Rodrigo Leis, Universidade do Vale do Rio dos Sinos

Effective material management represents an important issue. This article has two primary

objectives: 1) presenting the primary theoretical concepts to support and implement the Material Strategic Positioning Matrix, adapted to the service sector; 2) supporting the potential contribution and benefits of the Matrix implementation through presenting an application case at the automobile dealership. We present the importance of materials management, the procedures to implement the Matrix, as well as the set of resulting benefits of this application through a pilot project at automobile dealership. Finally, it emphasizes the importance of continuous material management, involving the management segmentation at the different quadrant of the Matrix and supported by a mechanism for the performance measurement adopted by the Company.

4. Customer Service Logistics: Analyzing and Taking Actions on Risks Contingent to the Process.

Roberto Rotondaro, University of São Paulo

Most of the efforts of logistics professionals in planning and monitoring their projects is directed towards the implementation of an efficient operation under normal conditions. At the same time, steps should be taken to handle unexpected events that may impair the system and the results. This paper analyses the Logistics Service Flow of a large soft drink and beer distributor located in the city of São Paulo, Brazil, by identifying and assessing three steps involving the customer participation and where there is a great potential for the occurrence of contingent issues that should be either predicted or corrected. A study was conducted by a group of employees to define and implement preventive actions that, besides preventing contingent issues, customize the service and ensure customer loyalty . An indicator system , was used to monitor this work and show the status of the actions and the results achieved.

Session 107: MON. 7:00 - Caesar 4
Agent-Based Supply Networks

Cluster: Environment and International

Chair: **David Dilts**, Vanderbilt University

1. Global Supply Chain Management Based on Collective Intelligence

Leonid Sheremetov, Mexican Petroleum Institute
Luis Rocha, Mexican Petroleum Institute
Miguel Contreras-Montoya, Mexican Petroleum Institute

An approach to the problem of optimization of local decisions to assure global optimization in supply chain performance is developed within the framework of a Collective Intelligence (COIN). The proposed framework is focused on the interactions at local and global levels with the agents in order to improve the overall supply chain business process behavior. As a COIN, we mean a large Multi-Agent System (MAS) where there is no centralized control and communication, but also, there is a global task to complete. Besides, learning consists of adapting the local behavior of each entity with the aim of optimizing a given global behavior. Reinforcement learning algorithms are used at the local level, while generalization of Q-neural algorithm is used to optimize the global behavior. The framework is implemented over an agent platform CAPNET. The work demonstrates that SCM is a good experimental field for the application of COIN theory.

2. Ontology-Driven Approach to Constraint-Based VSN Configuration

Alexander Smirnov, St.Petersburg Institute for Informatics and Automation of RAS
Leonid Sheremetov, Mexican Petroleum Institute

Currently, application of ontologies is one of the most promising mechanisms to construct open communities of applications and to coordinate them with regard to semantics. One of the most well-known initiatives in this area is SemanticWeb.org aimed to establishing explicit joint ontologies and metadata repository creation where ontologies provide a specification of knowledge content. The paper presents an approach to VSN configuration based on ontologies representing the problem domain in the formalism of object-oriented constraint networks. This enables both using constraint satisfaction mechanisms (such as ILOG) for the problem solving and sharing information about the problem domain with other applications. The paper also describes a prototype of the presented approach that is based on a multiagent framework and uses Web service - based interface for communications with external applications. Main results of the research are discussed in the conclusion.

3. A Supply Chain Network Economy: Cooperation and Competition

Ding Zhang, State University of New York
June Dong, State University of New York
Anna Nagurney, University of Massachusetts

We present a supernetwork model of a supply chain economy in the case of multiple products and multiple markets. The model allows for the formulation and analysis of both intra and inter supply chain cooperation and competition.

4. The Participation of Small and Medium Sized Firms in International Supply Chains through Electronic Networks

David Johnston, York University

The reality of trade is that it takes two or more parties, and therefore the capabilities of both selling and buying firms are important. Where

over 60% of US and Canadian SMEs have adopted some form of business process through a computer mediated network, such as the internet, other countries have significantly lower adoption rates. In other countries, where as many as 99% of all firms are classified as SMEs, low adoption rates may be an impediment to increased international trade. We present a typology of the business processes networked over computer mediated processes for 40 SMEs interviewed in Canada, Japan, China and Mexico. It highlights gaps in the capable of trading firms to participate in international supply chains. We elaborate on the probable causes from this preliminary research. A model of international SME capability is proposed to guide future research targeted at improving adoption and implementation.

5. CAS-SIM: Complex Adaptive Supply Network Simulator, A Scenario Analysis Tool For Analyzing Supply Networks
Surya Pathak, Vanderbilt University
David Dilts, Vanderbilt University

Increasingly, researchers are looking at supply networks as complex adaptive systems with dynamic emergent properties. This paper builds on our previous work and presents CAS-SIM, an agent based simulation tool suite for simulating supply networks as complex adaptive systems. The suite helps in modeling different scenarios related to supply network growth and evolution over extended periods of time. In this paper we show example experiments and output analysis, indicating how CAS-SIM can help in investigating the evolution dynamics present in supply networks. We discuss some of our initial results that indicate how supply networks may be modeled as complex adaptive systems. We also present a set of factors that appear to strongly affect the growth of supply networks.

Session 108: MON. 7:00 - Caesar 5
Demand and Inventory Management

Cluster: Operations and Logistics

Chair: **Hirohisa Sakai**, Toyota Motor Corporation

1. Make-to-Order Incentives in JIT Logistics Under ARIMA Demand
John Liu, Hong Kong Polytechnic University

We consider incentives for make-to-order production in a JIT logistics system with nonzero leadtime at each stage under an ARIMA time series demand, which is known as nonstationary since its unconditional mean and covariances are divergent. We refer to this supply chain as an ARIMA lagged order fulfillment (LAGOF) system, and formulate a LAGOF system as a two-player forecast-facilitated dynamic MTO incentive game, a generalization of an MTO beer game played over a finite number of time periods. We are concerned with equilibrium MTO incentives of a LAGOF in terms of coordination, information sharing, and stabilization. We develop in this paper the concept of feedback equilibrium based on conditional expectation that is applicable to the non-stationary time-series systems. We then study the behavior and obtain application properties of the MTO feedback equilibrium incentives for the LAGOF system under an ARIMA demand.

2. Demand Allocation in Multiple-Product, Multiple-Facility Make-to-Stock Systems
Mohsen Elhafsi, University of California
Saif Benjaafar, University of Minnesota
Francis De Vericourt, Duke University

We consider the problem of allocating demand arising from multiple products to multiple production facilities with finite capacity and load-dependent leadtimes. Production facilities can choose to manufacture items either to-stock or to-order. We develop models and solution procedures to determine the optimal allocation of demand to facilities and the optimal inventory level for products at each facility. We consider two types of demand allocation, one in which we allow the demand for a product to be split among facilities and the other in which demand from each product must be satisfied by a single facility. We consider two forms of inventory warehousing: factory-based and centralized inventories. We also consider systems with multiple customer classes. We characterize, analytically, several properties of the optimal solution. In particular, we highlight eight principles that relate the effects of cost, congestion, inventory pooling, multiple sourcing, customer segmentation, inventory rationing, and process and demand variability.

3. The Optimum Ordering Policy for a Dynamic Inventory Model with Discrete Demand
Michinori Sakaguchi, Hiroshima Shudo University
Masanori Kodama, Hiroshima Shudo University

We study an economical ordering quantity of the standard example in an inventory problem of multi-period under the assumption that the demand is a discrete random variable. There are some results to find an optimal policy in examples with discrete demand. It is an application of analyses of the probabilistic inventory model that the authors construct using the theory of the dynamic programming.

4. Inventory Management for Spare Parts
Aris Syntetos, University of Salford
John Boylan, Buckinghamshire Chilterns University College

Intermittent demand patterns are very difficult to forecast and subsequently manage regarding stock and they are, most commonly, associated with spare parts' requirements. The purpose of

this paper is to assess the empirical "stock control" performance of intermittent demand estimation procedures. The forecasting methods considered are the simple exponential smoothing, Croston's method and a new method recently developed by the authors of this paper. We first justify the selection of the standard periodic order-up-to-level stock control model for simulation purposes. We then discuss the nature of the empirical demand data set (3,000 Stock Keeping Units – Automotive Industry) as well as the technical details (distributional assumptions, managerial constraints imposed on the system, optimization of the parameters etc.) of the simulation experiment. The empirical results demonstrate the superior performance of the new intermittent demand forecasting method. The paper ends with a discussion of the implications of our empirical findings.

5. Proposal and Implementation of Human Intelligence-Production Operating System

Hirohisa Sakai, Toyota Motor Corporation
Kakuro Amasaka, Aoyama Gakuin University

From now on, "Global simultaneous production startup and same-level quality" will be important to reach the success of globalization of production. We think that the new key for the success is the intelligence of production operator for manufacturing. In the region with numerous or limited vehicle demands, it is the man who operates the high-production equipment and the production system. Therefore, we propose the humanistic, new production structure, "HI-POS", which has the three core systems. The key technologies are the following: (1) Human Intelligence Diagnosis System that prevents the factor from inhibiting the high quality "HID", (2) Human Integrated Assist System "HIA", which connects the human knowledge with technology tradition, and (3) Human Digital Pipeline System "HDP" from the design to the manufacture. And then we are able to verify the effectiveness of the proposed "HI-POS" in Toyota, and this is done in preparation for the forthcoming Toyota Production System.

Session 109: MON. 7:00 - Caesar 6
Batch Sizing for Stabilizing Dynamic Environments

Cluster: Operations and Logistics

Chair: **Shailesh Kulkarni**, University of North Texas

1. Forming Batches: Exhaustive vs Partitioning Methods

Ramakrishnan Sundaram, Florida International University
Martha Centeno, Florida International University

In this paper we discuss the challenges of forming batches in an exhaustive manner as well as forming batches using a partitioning approach. Under the exhaustive method, the main challenge was generating all the possible combinations for each batch. Once that was achieved, a ranking method was used to determine the best combinations; however, when the number of items to batch is larger than 50 and the batch size is larger than 3, the time required to generate the combinations and to rank them was prohibited. Thus, an alternate partitioning method was tried, that resulted in a major reduction in computational time and only a minimal reduction on the optimality of the solution.

2. Freezing the MPS in Make-to-Order Supply Chains: Impact of Schedule Stability on Manufacturing and Procurement Costs

Powell Robinson, Texas A&M University
Funda Sahin, The University of Tennessee
Li-Lian Gao, Hofstra University

Freezing the MPS has an opposing impact on the manufacturer's and vendor's costs. While the manufacturer benefits from schedule flexibility, the vendor requires a stable requirement schedule to coordinate replenishment activities. However, prior research only considers the manufacturer ignoring the impact of MPS policy on the vendor. We provide an experimental framework addressing manufacturer-vendor tradeoffs and experimental results investigating the impact of MPS freezing strategies and environmental factors on manufacturer, vendor, and system performance. The findings indicate channel flexibility, the length of the planning horizon, frozen interval, re-planning frequency, and demand range are significant cost drivers. Optimal system strategies are provided for different flexibility ratios, and the opportunity costs for following a manufacturer-oriented versus system strategy are identified. Implications for future research and industry practice are provided.

3. Deterministic Optimal Lot Sizing Decisions Using the Wagner-Whitin Model with Backorders: A Spreadsheet Version

Juan Gonzalez, University of Texas at San Antonio
Raydel Tullous, UTSA

A simple and practical way to find the optimal solution to the lot size ordering problem with backorders is presented. The process of optimization uses the framework of the transportation problem, generating a solution equivalent to the one produced by the Wagner and Whitin algorithm. We recommend using a spreadsheet as the environment to carry out the computations required.

4. Relationship Between Master Production Schedule Stability and Customer Service in a Capacity-Constrained Environment

Ray Venkataraman, Pennsylvania State University, Erie

Although several studies have addressed the relationship between Master Production Schedule (MPS) stability and customer service levels, they have focused on a single product item with no capacity restrictions. Building on prior research on MPS in a rolling horizon setting, this paper addresses the relationship between MPS stability and customer service levels for a multi-product, capacity-constrained environment. Data from a food manufacturer provides the research environment for this study. Simulation experiments will be conducted to isolate the best combination of MPS design factors that will reduce MPS instability for given levels of customer service.

5. Quality Loss Costs in a Generalized Lot-Sizing Model with Yield Uncertainty

Shailesh Kulkarni, University of North Texas

In this paper we examine a joint lot-sizing and process investment problem when the process yield is uncertain and backlogging is allowed. We allow for inspections and develop stochastic models which provide the optimal process investment for variance reduction, as well as the optimal inspection and lot-sizing policy. We capture the process quality loss profile around the target with a modification of the Reflected Normal loss function. We conduct numerical experiments assuming that the proportion of defectives follows a Uniform distribution while the process quality characteristic follows a Normal distribution. We develop closed form solutions which allow us to examine the nature of optimal policies when inspection, yield uncertainty and process investment are included in a generalized lot-sizing model. Overall, our models and analysis provide some interesting insights into this complex inventory problem and open up several avenues for future work in this area.

Session 110: MON. 7:00 - Caesar 7
Conceptual Frameworks

Cluster: Strategy and Design

Chair: **Andrew Neely**, Advanced Institute of Management

1. Measuring the Effectiveness of an E-Business Strategy: Preliminary Findings

Archie Lockamy, III, Samford University
Kimberlee Synder, Winona State University

Through the used of advanced information technology, organizations are striving to create long-term customer relationships, rather than just engaging in short-term economic transactions. Thus, organizations are devising E-business strategies that allow for the effective use of today's information technology capabilities. However, the use of advanced information technology in international commerce not only provides organizations with opportunities, but also many challenges. For example, the traditional strategy of geographical dispersion to be closer to customers becomes secondary to understanding what product features or attributes are shared among customer groups. The purpose of this paper is to provide some preliminary findings on how E-business strategies are measured and evaluated to determine their effectiveness in achieving a competitive advantage. The results of the study are based on a survey of firms who are attempting to implement E-business strategies for achieving a competitive advantage.

2. Linking Customers, Strategy, and Activities: An Empirical Investigation

Steven Melnyk, Michigan State University
Roger Calantone, Michigan State University
Douglas Steward, Michigan State University
Joan Luft, Michigan State University
George Zsidisin, Michigan State University

Metrics play an important role in the operation of every system, whether it is an activity such as operating a workstation, or a function such as the Operations Management system, or a firm or even a supply chain. In this presentation, based on findings from an on-going research project, we explore the following question: What is the process by which corporate objectives are translated into execution level activities and metrics and what factors affect this process? This question is explored using a multi-method research approach that draws on such methodologies as deep interviews, on-site visits, and on-line surveys. The findings will focus on such issues as the challenge of metrics alignment, the problems created by "noise," and the problems created by creating "top line" metrics (metrics pertaining to market growth, sales, and innovation), as compared to "bottom line" metrics (metrics pertaining to cost reduction and efficient).

3. Monitoring Supply Chain Operations Using a Performance Dashboard

Marco Busi, Norwegian University of Science and Technology

The importance of performance management in relation to supply chain management is to play a vital role in translating strategy into achievable objective along and at the single nodes of the chain. The subject of performance management being a wide one, the author needs to narrow the scope of this paper to the analysis of how performance indicators selection and representation should be carried out to support such strategy translation. This paper raises three questions: how can key performance indicators

(KPIs) for controlling supply chain operations be identified and selected; how should these KPIs be displayed into a supply chain control panel, i.e. performance dashboard; how could the existing information and communication technology be used in order to support true supply chain performance management. Answers to these questions are based on review of existing literature as well as on results from action research in which the author has been involved.

4. A New Logistics Concept for Mass Customization in the Shoe Industry
Helmut Roeben, Fraunhofer Institute IFF
Michael Schenk, Fraunhofer Institute IFF
Ralph Seelmann-Eggebert, Fraunhofer Institute IFF

With this presentation we will introduce a new concept for a logistics process chains for Mass Customization. This process chain is developed together with a small- and medium- sized enterprise with sells mass customized shoes for women. On behalf of the processes of this enterprise and a theoretical model for a logistics process chain, a new process chain has been created. With this new logistics process chain for Mass Customization the enterprise processes will be optimized. In a holistic view from configuration of a product to delivery of this product to the customer this process chain is been developed. With this integrated view the rate of errors will sink and the quality will rise and the time of delivery is been reduced. Using the resources of the partners in this project efficiently an optimal solution in time and costs will be found.

5. The Power of Performance
Andrew Neely, Advanced Institute of Management

This paper explores the role of performance measurement in organizations and argues that rather than providing simply a means of control, there are in fact seven different roles of measurement. These include - clarify, check, compare, commit, comply, communicate and challenge. Examples drawn from a variety of research projects will be used to illustrate these different roles of measurement and explore how they relate to one another.

Session 111: MON. 7:00 - Caesar 8
Scheduling Improvements with TOC, Cells and Neural Networks

Cluster: Operations and Logistics

Chair: **Pieter Van Nyen**, Technische Universiteit Eindhoven

1. Comparison of a Hybrid Manufacturing System with Conventional Cellular Manufacturing and Job Shop
Saeed Zolfaghari, Ryerson University
Erika Lopez, Ryerson University

Cellular manufacturing has tested positive in significantly reducing material handling and setup time as compared to a job shop, but it falls behind job shops in terms of flexibility. In this study, a new hybrid system is proposed that takes advantage of the flexibility of a job shop while it keeps the setup time at a reduced level. The performance of the proposed hybrid system is compared to the conventional cellular manufacturing system. Both systems are evaluated within a cellular layout, utilizing group scheduling rules DDSI and MSSPT. A simulation model, with random due dates and quantities is developed and tested.

2. A Study of Drum-Buffer-Rope Scheduling Systems: When Free Goods Are Scheduled
Satya Chakravorty, Kennesaw State University

The scheduling system Theory of Constraints (TOC) uses is often referred to as Drum-Buffer-Rope (DBR). DBR systems operate by developing a schedule for the system's primary resource constraint. In TOC, any product that is not processed at the systems' primary resource constraint is referred to as a free good. Because free goods do not use capacity at the primary resource constraint, very little attention is given to them under TOC literature. Based on simulation of a job shop operation, this study finds that the performance of DBR is very sensitive to changes in the levels of free goods released into the operation. Therefore, contrary to the way free goods have been treated in the past, schedulers using DBR need to be cognizant of how orders of these items are accepted and scheduled.

3. Advanced Techniques of Theory of Constraints and Activity Based Costing for Scheduling of High-Tech Production Lines
Matteo Savino, University of Sannio
Stefano Apolloni, University of Naples Federico II
Marcello Lando, University of Naples Federico II

One of the most important decisions that a manager should make is to determine a product mix to be scheduled able to maximize profits. To make right decisions he needs more accurate information about the optimal product mix and the restrictive bottlenecks of its company.
The objective of this paper is to demonstrate as using the Activity Based Costing (ABC) approach together with the Theory of Constraints (TOC) philosophy we are able to locate an optimal solution to the product mix problem and the bottlenecks machines on the shop floor.
A case study is provided in order to show the applicability of the proposed approach to a real case. Specifically we have analyzed an aeronautical firm where, applying our methodology we have located a new layout able

to reduce the total cost per unit during the amortization time.

4. An Artificial Neural Network Job Shop Scheduling

Hamid Davoudpour, AmirKabir University of Technology
A. Sharayie, Amirkabir University of Technology

Machine scheduling is a central task in production planning. The job-shop scheduling problem is one of the most complicated and it aims to allocate m machine to perform n jobs in order to optimize certain criterion. Job-shop scheduling belongs to NP-hard class of problems. This paper presents an Artificial Neural Network algorithm to solve a n/m/j/c problem. We first develop a non linear and Integer programming and then use Artificial Neural Network to find the optimum solution. The algorithm has been applied to a set of known test problems and reveals that the new algorithm performs very well and can compete against the current solutions.

5. Using Cyclical Production Plannings to Control Integrated Production-Inventory Systems

Pieter Van Nyen, Technische Universiteit Eindhoven
J.W.M. Bertrand, Technische Universiteit Eindhoven
H.P.G. Van Ooijen, Technische Universiteit Eindhoven

This paper investigates a multi-product multi-workcenter production-inventory system, characterized by job shop routings and stochastic demand interarrival times, set-up times and processing times. The inventory points and the production system are controlled integrally by a centralized decision maker. We present a control method based on cyclical production plannings that minimizes the relevant costs by making near-optimal production and inventory control decisions. The method is tested in an extensive simulation study and the results are discussed.

Session 112: MON. 7:00 - Caribe
Company-Wide Issues

Cluster: Service and Quality

Chair: **Douglas Stewart**, Michigan State University

1. Effective Strategies for Shared Services Implementation: An Empirical Investigation

Andrea Masini, London Business School
Zeynep Aksin Karaesmen, Koc University

The growing pressure to reduce costs and improve efficiency induces many organizations to undertake shared services initiatives. Yet, in spite of these efforts, most companies still struggle to devise optimal strategies and to generate adequate returns on investments for their projects, because none of the approaches that are commonly adopted is recognized as universally effective. This paper builds upon the "structure-environment" perspective to explain why and under what circumstances some shared services strategies exhibit superior results. The conceptual model proposed challenges the notion of "best practice" and suggests that the effectiveness of a shared services project depends on the degree of complementarity between the "needs" arising from the environment in which a company operates and the specific capabilities developed to address these needs. The theoretical findings are validated empirically through the analysis of a large sample of European firms that recently undertook initiatives in this domain.

2. A Comparison of Non-Financial versus Financial Measures in the Service Profit Chain Business Model

Marcia Weidenmier, Texas Christian University
Douglas Morrice, University of Texas at Austin

Several empirical studies have been conducted to assess the benefit of using non-financial performance measures as leading indicators of future financial performance. These studies have yielded inconclusive and conflicting results. The mixed results can be attributed to a number of factors including research design limitations and limited duration time series datasets that do not capture the time-lag relationship between non-financial and financial measures. In this research, we provide a more conclusive study for a particular business model using simulation. Our business model is the well-known Service Profit Chain which has been studied extensively in the academic literature and has been implemented by several very successful organizations including FedEx, Sears, and Southwest Airlines. Using simulation, we determine the conditions under which the use of non-financial measures leads to superior financial performance.

3. Embryonic Professional Service Firms: Managing the Big Contract

Ivor Morgan, Babson College

This paper focuses on the embryonic professional service firm and its challenges in managing contracts and clients, challenges that persist even for larger firms. However, in embryonic professional service firms, mistakes can lead to major disruptions and even bankruptcy. Similar mistakes in larger firms may not be so fatal. The embryonic professional service firm manages its flow of work in a very uncertain environment. Since the embryonic state often coincides with low market visibility and a relatively dynamic structure, the firm may wish to accept all or most opportunities offered to it. The paper investigates the potential effects of "lumpiness"—"lumpiness" being a reflection of

the firm's small size and the relative size of a client contract—on the embryonic firm and the options firms may have in managing it.

4. Into the Breach: Psychological Contracts in the Service Encounter

Douglas Stewart, Michigan State University

The psychological contract is a well developed construct used to explain the interchange between individuals, and it has seen extensive use in the management literature to describe the employer-employee relationship. Despite appearing to be appropriate for the relationship between customers and the service provider, and closely related to the concept of customer scripting in the encounter, it does not appear to have been addressed in the service literature in this context. This paper explores what constitutes the psychological contract in the service encounter, how this differs from the legal and implied contract, expectations for and by the customer, the sources and implications of contractual breach, and the types of services where the management implications of psychological contracting are greatest.

Session 113: MON. 7:00 - Coral
Industry Specific Supply Chain Studies

Cluster: Environment and International

Chair: **Adrian Done**, London Business School

1. An Empirical Study of Supply Chain Management Practices in Latin America

Luis Solis, Instituto de Empresa
Alberto Rodriguez, Instituto Tecnológico y de Estudios Superiores de Monterrey
Angel Diaz, Instituto de Empresa
Suhong Li, Bryant College

Little is known about Supply Chain Management practices in Latin America. We do not know to what extend SCM is been diffused in Latin American companies, what type of practices are being implemented, or what supply chain capabilities have been developed. This research aims to fill this gap by studying the level of implementation of supply chain management practices in companies located in Mexico, Colombia and Bolivia. Through a questionnaire based survey, practices on the following dimensions were measured: top management support, supplier relationships, customer relationships, information sharing, information quality, lean practices, and postponement practices. Our preliminary results show that companies in these three countries have already built some initial supply chain capabilities. Also, at the country level this study shows differences in the level of supply chain management practices implementation. Implications for management and future research will be presented.

2. Logistics Issues in Fitting Less Developed Countries into Global Value Chains

Adegoke Oke, Cranfield University
Arnie Maltz, Arizona State University
Octavio Carranza, Universidad Panamericana

Sourcing decisions routinely include manufacturers and suppliers in developing countries. One of the key drivers for such decisions is cost. Other key drivers have been largely ignored in the literature. For the cost analysis, the tradition has been to look primarily at transportation and infrastructure cost, rather than total logistics costs (Owen, 1987; Simon, 1996). We identify global manufacturing companies sourcing from and operating in less-developed countries (LDCs), suppliers in LDCs and third party logistics providers operating in LDCs. We carried out interviews and case studies in these companies to investigate the logistics operations and supply chain management issues and decisions that arise when fitting less-developed countries into global network. We also investigate the procedures and challenges that are encountered in serving less-developed countries and what is required to provide service on a global scale.

3. A Customer-Orientated Profitability Model for an Australian Timber Company

Willem Selen, Macquarie Graduate School of Management
Peter Palmer, Weyerhaeuser Australia Pty Ltd

In the timber industry, production-orientation is so strongly entrenched that even today the needs of the customer are often overlooked. This paper positions the production setting of the timber industry, with the aim of developing a generic profitability model that may assist in the adoption of a customer-orientated production management approach that is better suited in today's timber supply chains. The unit of analysis is an Australian timber company engaged in the growing, harvesting, milling, post processing, selling and delivery of softwood timber. Driving variables of the model are identified as process effectiveness, process efficiency, marketing effectiveness, order fulfillment, value-add and customer satisfaction, and profitability.

4. The Forrester Effect Reduction: One Size Fits All?

Henrique Correa, FGV Business School
Joseph Saab, FGV Business School

The proposed paper is the result of research aiming at testing and analyzing different policies for mitigating the so called Forrester effect (or bullwhip effect) in a particular supply chain – the consumer care products downstream supply chain of Johnson & Johnson in Brazil including manufacturer, distributor and retailer. The method used was numerical simulation using VENSINã software, academic version. Several

(19) models and policies found in the relevant literature which aimed at reducing the bullwhip effect were tested (e.g. Kirkwood´s, Sterman´s, Forrester´s) and extensive sensitivity analysis performed. The results point out the fact that some general assumptions found in the practitioner's and even in the academic literature – such as the VMI approach led by the manufacturer – may not be the best solution for all cases. There seems to be some contingency involved which deserves further attention. Some managerial and theoretical implications are drawn.

5. Supply Chain Maturity and Performance in Healthcare: An Empirical Evaluation

Adrian Done, London Business School
Mark Frohlich, London Business School
Chris Voss, London Business School

This paper investigates the supply chain "maturity" of healthcare service suppliers and its impact upon multiple performance measures. A second order construct is proposed comprising the dimensions of Planning, Sourcing, Making, Delivering, New Product Development and Returns adopted from the Supply Chain Council's SCOR framework. These underlying dimensions are formulated according to practices identified from an extensive academic and practitioner literature review. Data collected via an innovative, rigorous online survey of 200 first-tier suppliers to healthcare providers is used to develop scales for each of the underlying dimensions. Confirmatory factor analysis validates supply chain maturity structural models and group invariance analysis indicates the equivalence of the construct across different healthcare supplier classifications. Set correlation analysis identifies certain maturity dimensions as being significant drivers of specific operational performance measures. The managerial implications are discussed within the context of service-oriented supply chain operations. Also implications for further research are considered.

Session 114: MON. 8:45 - Caesar 1
Channel Management and Execution

Cluster: Operations and Logistics

Chair: **Wendell Gilland**, University of North Carolina

1. A Study on the Value of Re-Usable Simulation Components for the Analysis of E-Business Processes

Pavel Albores, University of Strathclyde
Peter Ball, University of Strathclyde
Jillian MacBryde, University of Strathclyde

Given the complex nature of e-business applications, it is important to test their feasibility, financial and operational implications, not only in the processes directly involved, but also the knock-on effects on other processes. The paper presents a research project into the investigation of the use of simulation as decision support tool for the implementation of e-business strategies in the manufacturing sector. The development of re-usable simulation components is explored as an aid for the quicker building of e-process simulation models. A number of e-business simulation components are presented. The components were then tested with a group of thirty simulation users in order to ascertain the usability and usefulness of such components. The results are presented and conclusions drawn from the study. The components are being tested on both British and Mexican companies in order to evaluate their "operationability". Preliminary results of this testing are presented.

2. Electronic Commerce in Companies with Direct Market Distribution: A Case Study of the Brazilian Cosmetic Industry

Marta Maia, Fundacao Getulio Vargas - SP
Susana Pereira, EAESP/Fundação Getúlio Vargas
Luiz Carlos Di Serio, EAESP/Fundação Getúlio Vargas

This research evaluates the virtualization process of a company that has traditionally distributed its products through a direct market channel. As a way of understanding this virtualization process, a case study research was carried out in a leading organization of the Brazilian cosmetic sector, well known for its trading trough direct marketing, that has started trading direct to their end consumers through the Internet.
The strategies adopted by the company to strengthen, and not kill, the physical and leading channel, and the challenges involved in the distribution of its products and services through the Internet to the final consumer will be described.

3. The Impact of Internet on Operator's Tour Packages and on Their Relationship with Travel Agencies

Estela Schreiner, Fundação Getulio Vargas
Luiz Carlos Di Serio, EAESP/Fundação Getúlio Vargas
Ricardo Souza, EAESP/Fundação Getúlio Vargas

The Internet impacts strongly upon the tourism industry, mainly because it is a platform that provides information, makes reservations and does business directly from the service provider to the end user, enabling clients to elaborate their own travel tour. This way of doing business threatens the traditional travel format model of the tour operator, as it is based on standardized packages and on the inflexibility of the tourist to build his or her own packages. This article analyses, in a explanatory way, the impact of the Internet on the elaboration of packages by tour operators and the relationship with travel agencies, the main distribution channel to the

user, having as a proposition the fact that the tour operator uses the Internet as a supporting tool in the development of their products, directing them to the user's preference.

4. An Analysis of Selection Criteria for Grocery Home Delivery and Effects of Operational Execution on Repeat Purchasing

Kenneth Boyer, Michigan State University
Mark Frohlich, London Business School

A cluster analysis of 1,919 customers of home delivery grocers identifies four groups of customers based on reasons for selecting this service. Results indicate that convenience is the primary attraction, with price being of least importance. In contrast to traditional grocery stores, grocers that take orders online and deliver to customer homes can compete on service quality rather than an over-arching emphasis on low prices. The data clearly demonstrate that there is a market for this service, while deeper examination based on the customer groups examines the impact of operational execution. Linear regression to predict customer loyalty and future purchases by customer group indicates that the retailer's ability to provide high quality products, efficient online transactions, high levels of in-stock products and high service quality all impact customer intentions to purchase again. Furthermore, these operational factors have differing impacts based on customer selection group.

5. Coordinating Internet and Traditional Channels: The Manufacturer's Perspective

Wendell Gilland, University of North Carolina
Kyle Cattani, University of North Carolina
Jay Swaminathan, University of North Carolina
Han Sebastian Heese, University of North Carolina

In this paper, we analyze a scenario where a manufacturer with a traditional channel partner (i.e., a retailer) opens up a direct Internet channel that is in competition with the traditional channel partner. We first consider that the manufacturer, who chooses wholesale prices as a Stackelberg leader, commits to match the retailer's price in the new direct channel in order to mitigate the channel conflict. The equal-pricing strategy that optimizes profits for the manufacturer often is also preferred by the retailer and customers over the other equal-pricing strategies. We next consider the implications of the equal-pricing constraint through a numerical experiment that indicates that the equal-pricing strategy is appropriate as long as the Internet channel is significantly less convenient than the traditional channel; otherwise the manufacturer has tremendous incentive to abandon the equal-pricing policy – at great peril to the traditional retailer.

Session 115: MON. 8:45 - Caesar 2

Retail Operations Management

Cluster: Operations and Logistics

Chair: **Ram Ganeshan**, College of William and Mary

1. Implementing 3D Body Scanning in Retail Operations

Marie-Ève Faust, École Polytechnique de Montréal
Serge Carrier, Université du Québec à Montréal

Our research demonstrates that more than 40 % of women will take the same garment in two sizes or more to the fitting room because they are unsure at to the size they need, the fit of a garment or, more simply, the way it will look on them. Similarly, they will return approximately 40 % of the garments ordered by catalogue. Both theses behaviors prove extremely costly to the retailing operation. This paper proposes to demonstrate that, although it has often been promoted as a tool to support internet sales, 3D Body Scanning technology could be adapted to an in-store use and contribute to decrease the retail operation's costs and improve customer satisfaction.

2. What is CPFR and Where Does IT/IS Fit In?

Ulric Gelinas, Bentley College
M. Lynne Markus, Bentley College

Innovative supply chain management practices such as continuous replenishment/vendor-managed inventory (CRP/VMI) and collaborative forecasting, planning and replenishment (CPFR) can deliver a variety of benefits. Through a detailed comparison of five major supply chain management innovations, including CRP/VMI, CMI, CFAR, CPcR, and CPFR, this research seeks to determine the source of these benefits—better material flows or better information sharing supported by IT—and if the benefits are shared equally by buyers and suppliers. The objectives of this research are: 1) to identify the types of improvements in supply chain performance achieved by each innovation; 2) to articulate the costs and risks of each approach and how its costs, benefits, and risks are experienced by buyers, suppliers, and the supply chain as a whole, and 3) to assess the extent to which the costs, benefits, and risks are related to better information sharing supported by IT or to business process change.

3. Value of Information for Retail Management of Perishables

Michael Ketzenberg, Colorado State University
Mark Ferguson, Georgia Institute of Technology

In this study, we explore the value of sharing information from upstream suppliers to downstream retailers of perishable products using Markov decision processes. We evaluate

the effectiveness of various inventory methods when the lifetime of perishables is known.

4. Central vs. Local Control in Retail Operations

Nicole DeHoratius, University of Chicago

Retailers have invested, and continue to invest, substantial amounts of money in information technology (IT) mostly to track merchandise and operations, automate transactions, and optimize inventory levels and other supply chain decisions. Such IT investments have facilitated the transfer of local knowledge to corporate headquarters thereby allowing many retailers to centralize decision rights about select merchandising activities (e.g., assortment planning, inventory levels), activities once performed by store employees. Some of these retailers, however, are struggling with the design of incentives to accommodate this shift in decision rights. Our objective is to examine the advantages and disadvantages of central versus local control in retailing, to understand why some retailers elect to centralize decision rights while other do not, and to provide data on the type of incentive mechanisms used to align employee and firm objectives in retailing.

5. A Cost Framework to Compare Local vs. Central Control in Retail Operations

Ram Ganeshan, College of William and Mary

The implementation of retail merchandizing systems has in many cases resulted in the restructuring of the buying organization – moving assortment and replenishment decisions from local to central decision makers. Using our experience with a mid-size retailer, we provide a simple cost model to quantify the impact of such reorganization on supply chain costs.

Session 116: MON. 8:45 - Caesar 3
OM Education II

Cluster: POM Pedagogy

Chair: **Roberta Russell**, Virginia Tech

1. An Innovative Operational Teaching Model Using Business Simulators in Large Scale Applications: A Brazilian Case Study

Richard Lucht, ESPM Business School
Claudinei Santos, ESPM - Business School
Carlos Monteiro Neto, ESPM - Business School

To accomplish efficient learning, Executive MBA students need the opportunity to practice the concepts, methodologies and managerial tools. In this sense, the use of business simulators is a good option. However, the feasibility of their operational management, with restricted computing resources and a limited number of experienced instructors for a large number of groups geographically scattered, taking place simultaneously, make up a great challenge. This article submits a case study of a successful experience with the use of the Web Marketplace simulator, in a famous business school in Brazil. Using an innovative teaching methodology and logistics, positive results have been achieved, guaranteeing a suitable standardization in the application, control and evaluation, involving simultaneously 600 students organized in 14 groups, led by 12 teachers in 4 different cities. The major contribution of this work is to create an alternative for a useful teaching model for many other business schools.

2. The Hidden Face of Outsourcing: Reflections on the Impact on Organizational Culture

Clandia Gomes, University of São Paulo
Isak Kruglianskas, University of São Paulo
Elenir Vieira, University of São Paulo
Junio Fuentes, University of São Paulo

The objective of this paper is to discuss the impact of outsourcing on organizational culture, as perceived by employees of the firm. The study was conducted in the service administration unit of an oil- industry enterprise. The methodology was based on the theory of Andrew Pettigrew and consisted of interviews with career employees and with newly-hired enterprise employees. The main conclusion of the study shows the impact of outsourcing in the culture, influencing the acceptance of the hired employee by the career employee, over fears of job loss in the organization, the difficultly in working relationships, with the work itself and with broader implications for the enterprise. The result of this change involved the creation of a sub-culture of the contract-employed personnel, comprising a distinctive group.

3. Operations Management Education Utilizing eLearning Techniques

Emory Zimmers, Jr., Lehigh University
Gregory Tonkay, Lehigh University
Nancy Baskin, Greenfield Coalition
Larry Butler, Butler Engineering
Muhammad Ahmed, Wayne State University

This paper describes activities in an operations management eLearning course in three different environments: classroom, web-based, and experiential. The activities are presented using discovery and experiential learning to convey concepts that are difficult to teach in a traditional classroom. Web-based activities help create interactive learning. Students explore a condition and discover, individually or collaboratively, the effects of various parameters on specific outputs. Specific course development examples are drawn from the NSF's Greenfield Coalition Learning System. The industry–university development team collaboration process explained in the paper uses videoconferencing to share applications such that the design review and the editing process can occur in real time.

This includes dynamic motion examples. Team members create or manipulate dynamic objects that are integrated into the final work product. The paper also includes lessons learned from earlier course development activities. Course objectives and examples of course content are included.

4. Flexibility in eLearning
Clovis Mo, EAESP/Fundação Getúlio Vargas

E-learning is a new tool for delivering education that has been developed in recent years. It is expected to be the answer to the increasing needs (both quantity and quality) of academic and professional training in modern economy. The development of pedagogical theoretical base for e-learning is crucial for its effective usage. Michael Moore showed the importance of two variables in Distance Learning: transactional distance and level of structure. Our research in studying 4 e-learning courses at Bradesco Foundation showed that a third variable is also important: the flexibility level. Offering more flexibility in time and distance improves learner accessibility and lowers the cost but deteriorates the interactivity and transactional distance. In other words, quality of teaching/learning process gets lower. The balance of flexibility offered is critical. This study also suggests that there are means to alleviate the problem by using the appropriate pedagogical approaches.

5. Improving the Teaching/Learning Process in Large Classes
Roberta Russell, Virginia Tech

Professors faced with large class sizes may find that previously successful teaching strategies are not producing desired levels of student learning. This session shares techniques for improving communication, setting clear expectations, managing classroom behavior, and creating more effective presentations in larger classes. Participants will leave the session with concrete ideas for enhancing student learning without overtaxing the professor.

Session 117: MON. 8:45 - Caesar 4
Operations Planning, Scheduling and Control / Planificación y Programación de Operaciones

Cluster: Operations and Logistics

Chair: **Luis Daniel Strumiello**, Faculdade Adventista Paranaense

1. Minimizing the Work Overload in Mixed-Model Production Lines
Joaquín Bautista, Universidad Politécnica de Catalunya
Jaime Cano, Universidad Politécnica de Catalunya
Jordi Pereira, Universidad Politécnica de Catalunya

One of the formulations to schedule mixed model production lines under JIT environment was proposed by Yano & Rachamadugu. This formulation considers the existence of time windows in each work station causing work overload when stations cannot fulfill all assigned tasks. In the Yano & Rachamadugu problem, a worker is assigned to each work station. The worker has a limited space - usually known as window - where his assigned operations must be conducted while the product flows at a constant rate. If the required work cannot be fulfilled inside the window, it is considered work overload. The present work shows a set of heuristic procedures to solve the related scheduling problem of minimising work overload, and compares these procedures with some of the existing ones. A computational experience is carried to compare new and existing procedures using a set of instances with different typologies.

2. Sequencing in Mixed-Model Assembly Line Subject to Capacity Constraints
Joaquín Bautista, Universidad Politécnica de Catalunya
Jordi Pereira, Universidad Politécnica de Catalunya
Jaime Cano, Universidad Politécnica de Catalunya

The Car Sequencing Problem is one of the possible formulations of the mixed-model assembly line sequencing problem. In this problem, a number of cars must be produced. Cars are not identical, each requiring a subset of special options (sunroof, air conditioner, etc.). Each special option usually implies extra assembly time in a workstation, in some cases over the cycle time. In the Car Sequencing Problem, cycle time limitations are expressed as option constraints; each option is subject to capacity constraints in the form pj/qj, whose meaning is: each option j can appear a maximum of pj times on each subsequence of maximum qj length. The present work proposes a Mixed Integer Linear Programming formulation for the Car Sequencing satisfaction Problem. A computational experience is conducted using a reference data set from the literature. Different variants of the model are tested, each using different constraint blocks that represent the problem.

3. Study and Evaluation About the use of Computerized Tools for Operations Management in Apparel Industry at Medellin
Carlos Castro Zuluaga, EAFIT University

The use of computerized tools for Production Planning, Control and Scheduling of manufacturing companies is essential to increase its productivity and competitiveness. The Apparel sector in Colombia, and mainly in

Medellín, is considered one of the epicenters of fashion at National and Latin-American level, becoming in one of the main industries for the development of the region and the country. This study evaluates the use of computerized tools in activities of Production Planning, Control and Scheduling of small and medium companies in Apparel sector, with the objective to establish its strengths and weaknesses and determine the real necessities of the sector to face the new market opportunities that has the country.

4. Propuesta de un Sistema de Planeamento, Control de Producción y Costos para Pequeñas Empresas de Vestuario

Luis Daniel Strumiello, Faculdade Adventista Paranaense
Rolf Erdmann, Universidade Federal de Santa Catarina

El trabajo propone una estructura de planeamento y control de producción que sea adaptable a pequeñas empresas. Apesar del gran avance experimentado por los sistemas de producción en los ultimos tiempos, se nota que no todos son aplicables a las pequeñas empresas en función de varias peculiaridades, bajo las cuales estas empresas están expuestas en el día a día. Dentro de este contexto, el presente trabajo pretende llenar este vacio, al abordar el PCP bajo el punto de vista del sistema de producción de pequeñas empresas, con énfasis en el control de costos, culminando con un modelo que sirva como cuadro referencial para las mismas. La implantación de la propuesta en una empresa posibilitó su desarrollo y la percepción de las posibilidades de mejorías que ofrece, haciéndolo más accesible al lenguaje de empresarios y gerentes.

Session 118: MON. 8:45 - Caesar 5
Cases in Operations Strategy

Cluster: Strategy and Design

Chair: **Marcus Schweitzer**, University of Saarland

1. Overcoming Difficulties in Multiple Organization Case-Based Research

Prakash Singh, The University of Melbourne
Danny Samson, The University of Melbourne

Many areas within the field of POM (e.g., supply chain management, logistics, purchasing) involve multiple organizations. Rigorous case based research in these areas requires access to data, facilities and personnel across these organizations. In many instances, the same level of access to all organizations is not available, thereby compromising the quality of the research. There is a need to develop strategies and methods for overcoming this problem. In this paper, a number of practical approaches to overcoming this problem are presented via a case study of a supply chain of a railways company in which there are three main players. The nature of the relationship between the focal organization and one of the other two has been strongly adversarial, making it difficult to obtain meaningful information from this organization. Details of the case are presented, as well as the epistemological principles that underpin the practical steps that were taken.

2. Outsourcing versus In-Sourcing Decisions and Contract Manufacturers: A Case of Circuit Card Assembly

Michael Cox, General Dynamics
Robert Hinz, Intel Corporation
Thomas Choi, Arizona State University

This case considers how contract manufacturers provide assemblers with new opportunities and new risks. The contract manufactures have emerged as key players in the supply chain and make the outsourcing decision an attractive option to assemblers with less costly labor rates and overheads, offering flexibility to adjust the volume of orders, and carrying the burden of inventories. However, at the same time, complete outsourcing will invariably lead to the loss of important internal technical capability. Then, again, partial outsourcing will lead to increased cost of manufacturing for the divisions that have decided to in-source the operations. With the emergence of contract manufacturers, the decision is no longer the simple make or buy; instead, it involves how much and when to outsource and how to maintain the relationship with the contract manufacturers. The case concludes with questions that pose these critical managerial issues and potential answers.

3. Managing Process Innovations in a Company Network

Iiro Salkari, VTT - Technical Research Centre of Finland
Magnus Simons, VTT - Technical Research Centre of Finland

This paper discusses management of process and process related innovations in a company network. The focus is on young, immature networks that seek shared working practices. In this paper, we identify and analyze elements that support managing process innovations in this kind of environment. The study concerns organizational levels from strategic to workshop floor level and during the study we also discuss briefly the interrelations between identified elements and between network and single company (strategic) objectives. Based on this understanding of the phenomena, we introduce a preliminary management model for supporting process innovations management in a company network. This paper is based on a real industry case study where a tactical network of 8 companies was set up in the boat building industry. The majority of companies belonging to

the case network are SMEs and thereby the SME viewpoint is emphasized throughout the paper.

4. The Avoidance of the Need to Manage by Business Process
Clovis Netto, University of São Paulo
Pedro Luiz Costa Neto, University of São Paulo

Although the process approach has been present in all relevant management models, from ISO9000 family (minimum requirements) to National Quality Award Prize criteria (state of the art), not all organizations have had success with this practice. The purpose of the study reported in this article has been to explore the avoidance of the need to be process focused. An action research is described which encompassed 2 companies, one private and the other governmental. In both cases the management declared an interest in implementing a process approach, via ISO 9001 certification. Some similarities have been found. These are related to operations strategy theory. Leadership and the position on a pyramid of competitive priorities (Noble, 1997) seem to be relevant. The managerial implications of the similarities are discussed, notably when participants seek to limit the need to compete in speed or flexibility when they still have much to improve in quality and reliability.

5. Insurance Capacity Planning
Marcus Schweitzer, University of Saarland

This case study in the area of service management deals with capacity planning for departments of motor vehicle insurance companies involved in damage claims processing. Damage claims processing refers to the registration and settling of claims for either damage suffered by the insurer's own customers (self-insurance sector) or damage caused to third parties by customers of the insurer (third party sector). Besides administrative work, tasks to be carried out include communication with customers, experts, and lawyers. Claims settlement processes pass through several departments, where not only the number of incoming claims is subject to stochastic fluctuations (causes include hail, icy roads, or theft), but also the processing times required for each case are stochastic. In the talk a chance-constrained-model with modified real data is presented which maximizes the expected net present value of the departments' staff capacities subject to different service level requirements.

Session 119: MON. 8:45 - Caesar 6

Spreadsheet Analytics in Operations Teaching and Research

POMS Invited Tutorial

by

Jeffrey Camm, University of Cincinnati

(See Tutorial section for details)

Session 120: MON. 8:45 - Caesar 7
Organizational Issues in Product Development

Cluster: Strategy and Design

Chair: **Sue Morton**, Loughborough University

1. Implications on Cultural and Formal Processes of the Front-End of New Product Development
Matti Perttula, Helsinki University of Technology

Front-end processes are employed to offer new product ideas that seek approval for formal development, a smooth ride through the front-end of new product development. Before implementing process control mechanisms for the front-end, companies must approach a variety of factors that may have a reference regarding the process choice and structure. This paper discusses how various product-related factors may have implications on the processes of the front-end. These factors are highlighted from literature and verified within case examples. In addition, the paper describes a typology of different cultural and formal front-end processes and presents reasoning and examples of each category. And finally, the paper provides empirical initiative by introducing two case studies that describe applications of different front-end processes. The descriptions are based on interviews with the front-end process owners of the companies. The case companies are technology-intensive manufacturing companies that are global market leaders in their product segments.

2. How Innovative are UK SMEs?
Adegoke Oke, Cranfield University
Gerard Burke, Cranfield University
Andy Myers, Cranfield University

Innovation activities in small and medium sized enterprises (SMEs) have been widely studied by academics. It has been argued that radical innovations, which tend to generate very high returns, are more predominant in small and medium sized companies (SMEs) compared to large organizations. But there has been a dearth of empirical studies that explore the types of innovation that are predominant in SMEs. Therefore, the first objective of the study was to explore the types of innovation that are predominant in SMEs and how these relate to their innovation performance.
It has also been argued that the knowledge base about how SMEs actually undertake innovative

activities remains limited. Therefore, the second objective of this study was to investigate empirically how SMEs manage the process of implementing innovations and new product development including identifying the enabling and inhibiting factors.

3. Organizational Culture Effects on Transferring of Product Design Knowledge
Krisda Bisalyaputra, Chulalongkorn University

Knowledge transfer in organizations has been studied extensively to support success of product design activity. The objective of this study is to investigate relationships between product designing knowledge sharing and suitable organizational orientations and attributes. The paper proposed study framework of organizational culture effects on four contexts of knowledge transfer. Organizational culture is assessed based on Schein's organizational culture study framework and product designing knowledge sharing is examined by four factor groups. The appropriate organizational culture is significantly reliable support on knowledge transfer success as the context of knowledge transfer process and essential success factors. The result of study framework can be applied for management in organizations to create the appropriate culture which will support product design knowledge sharing among Research and Development personnel to gain superior competitive advantage and sustain success for organizations.

4. PAVE the Way to Improving PD Performance: Profit Through Adding Value to Expertise
Sue Morton, Loughborough University
Neil Burns, Loughborough University
Chris Backhouse, Loughborough University

Restructuring organizations to optimize performance has involved considerable resource. Henderson's research suggests the search for an optimal form is fruitless: much of the real work in organizations happens despite the formal structure. Cross advocates organizations should encourage the development of social and human capital. Smart suggests managing design and development activity successfully may mean providing individuals with the opportunities to enhance their own networks of relationships. We postulate that learning to harness the positive aspects of the informal organization while managing the negative may be the way to improving PD performance. Our research developed a working model that has been able to manipulate the informal organization by enabling visualization of 'communities', and supplying focus for individuals and teams to manage relationships more effectively to improve PD performance. This paper reports our results to date and the implications for further use of the model.

Session 121: MON. 8:45 - Caesar 8

Setting a Research Agenda

Supply Chain Management College Sponsored Panel

Chair: **Ananth Raman**, Harvard Business School

Gabriel Bitran, MIT
Marshall Fisher, University of Pennsylvania
Paul Kleindorfer, University of Pennsylvania
Roy Shapiro, Harvard University

This panel seeks to identify compelling research questions in supply chain management. Senior members of our community will identify questions that they hope could be partially or completely addressed during the next 10-20 years. Each member of the panel will present a research agenda for around ten minutes, following which the rest of the time for the panel discussion will be used for questions and answers.

Session 122: MON. 8:45 - Caribe
Supplier-Buyer Coordination Issues

Cluster: Operations and Logistics

Chair: **Dirk Pieter Donk**, University of Groningen

1. Empirical Study on the Relationship Between Performance of Supply Chain and Coordination Strategies
Zhixiang Chen, Zhongshan University

Based on an agile supply chain context, this paper presents a framework that examines the impact of coordination strategies of supplier and buyer on supply chain performance. Using data analysis tool of SPSS software, the paper tests and analyzes hypothesis in the model. In the framework model, the coordination strategies include: (1) communication; (2) management experience exchange; (3) high level leader contact; (4) information linkage;(5) involved in problem solving; (6) cooperate to cut down cost. The coordination performance includes (1) average on time delivery level; (2) supplier's responsibility to buyer's demand change; (3) supplier's efficiency of solving complains from buyer; (4) buyer's ability of on time clearing payment; (5) supplier's trust degree to buyer; (6) buyer's trust degree to supplier. Based on the analysis in the paper, suggestions on how to improve the coordination performance of supply chain are provided.

2. Value of Upstream Information in a Two-Stage Supply Chain with Random Yields
Hyun-cheol Choi, Indiana University
Srinagesh Gavirneni, Indiana University

New developments in corporate information technology such as ERP systems have allowed information to flow among members of supply chains. However the benefits of sharing information can vary depending on the supply chain structure and its operational characteristics. Most of the existing research has studied the impact of downstream (e.g. retailer to supplier) information on the performance of the supply chain. We evaluate benefits of upstream (i.e. from supplier to retailer) information sharing, in a two-stage serial supply chain in which the supplier is faced with uncertainty in yield. We are interested in determining when this upstream information is most beneficial to the retailer. After establishing the appropriateness of simple order up-to policies, we performed a detailed computational study. We observed that information is most beneficial when there are low variations in end-customer demand, high variations in supplier's yield, and high penalty to holding cost ratio at the retailer.

3. Decentralized Management Model of a Partner-to-Partner Collaborative Relationship

Facundo Arredondo, GIDSATD - UTN - FRSF
César Zanel, GIDSATD - UTN - FRSF
Diego Zucchini, GIDSATD - UTN - FRSF
Pablo Villarreal, GIDSATD - UTN - FRSF
María Caliusco, GIDSATD - UTN - FRSF
María Galli, GIDSATD - UTN - FRSF
Omar Chiotti, GIDSATD - UTN - FRSF

In this work we describe a Partner-to-Partner integration model (P2P), whose objective is to allow the enterprise to jointly manage the material flow between them. In this model four main hierarchical collaboration processes are identified according to the planning level: (1) Collaboration agreement (clauses and rules definition), (2) Agreement on the production planning definition, (3) Agreement on the master production scheduling definition, and (4) Agreement on the material provision orders definition. The purpose is to define a continuous collaboration process between enterprises along all hierarchical planning levels, preserving the autonomy of enterprises. To this aim, the proposed collaboration process is managed in a decentralized way for each partner. The participation of each partner enterprise in the collaboration process, the information type and the decision flow to be exchanged in each process are defined in this work.

4. An Analysis of the Offshore Supply Vessel Industry in the Gulf of Mexico

Yasemin Aksoy, Tulane University

This study provides an analysis of the Offshore Supply Vessel (OSV) industry in the Gulf of Mexico. Some of the questions of interest are the current state and capacity of the industry, capacity shifts between the Gulf of Mexico and other global markets, opportunities and challenges in providing third party logistics services by the OSV companies to the oil and gas industry, and the nature of contracts and pricing of services based on contract duration.

5. Buyer Focus and Supply Chain Integration: Empirical Evidence

Dirk Pieter Donk, University of Groningen
Taco Vaart, University of Groningen

Within the supply chain literature a clear relation has been shown between supply chain integration and performance. Most studies, however, observe a limited number of integrative practices and pay little attention to business conditions and contextual factors that influence strategic choices with respect to designing the production process and the level of integration. We present a multiple case study that explores in depth the relationship between strategic choices made for designing the supply chain, the resulting configurations and the type of integrative practices. In total over 40 relationships between a supplier and its main buyers are investigated. From our study it can be concluded that supply chain integration is not always necessary or beneficial.

Session 123: MON. 8:45 - Coral
Cost Modeling

Cluster: Strategy and Design

Chair: **Gregory Graman**, Wright State University

1. An Empirical Evaluation of Problems in Performance Measurement Systems of Big Sized Firms in Turkey

Hilmi Yüksel, University of Dokuz Eylül

This paper investigates the problems that big firms mostly meet in their performance measurement systems. For this aim, a questionnaire has been designed and mailed to the big firms in Turkey. According to the results of the analysis, the problems that big firms meet in their performance measurement systems have been identified and relationships between the problems that firms mostly meet and the characteristics of the performance measurement systems of firms have been determined. After determining the problems according to the questionnaire survey, the reasons of these problems have been evaluated. This paper also aims to emphasize that the traditional performance measures are often insufficient. This claim has been tried to verify by demonstrating the relationships between the problems that firms meet in their performance measurement systems and tendency to use the financial and non-financial measures.

2. Performance Measurement Systems: Considerations of an Agrifood Supply Chain in Brazil

Susana Pereira, EAESP/Fundação Getúlio Vargas
João Mário Csillag, EAESP/Fundação Getúlio Vargas

The purpose of this study is to verify if there is any established system to evaluate the performance of meat and Industrialized poultry products supply chain in Brazil and its main characteristics. The research design adopted was exploratory, by means of using the case study method. The supply chain, object of analysis, was mapped and delimited using a company that represents the industrial macro-segment, denoted as a focal company. Semi-structured interviews were conducted with directors, managers and technicians of the focal company. A total of 38 semi-structured interviews were tape-recorded, adding up to a total of 30 hours of recordings.

3. Balanced Scorecard and Social Balance: A Case Study About a Brazilian Bank
Andresa Francischini, University of São Paulo
Paulino Francischini, University of São Paulo

This work considers the importance of publishing the Social Balance by Brazilian companies, which belong to the bank segment. It is used the Balanced Scorecard Methodology to provide a group of indicators which can be used to evaluate the performance of these organizations in the social area. This performance is, however, analyzed through four perspectives: financial, client, internal processes and innovation. For each of them, it is proposed a group of indicators, derived from a Social Balance Model already used by Brazilians organizations that belong to different economic segments. It is presented a case study with information about a large and important bank from Brazil which is very active in the domestic and foreign markets. The critical points about social performance are analyzed and the points which require improvements are also considered.

4. Cost Efficiency and Quality at the University. A Department's Evaluation Model
Jose Luis Martinez Parra, Universitat Autonoma de Barcelona
Victor M. Gimanez Garcia, Universidad Autonoma de Barcelona

In this work a cost efficiency model is presented. The model, belonging to the data envelopment analysis methodology, quantifies the difference between the observed cost and the optimal, or frontier, cost for a production unit. This difference is decomposed into four explanatory factors: a) technical inefficiency, depending on the quality of the factor utilized, the organization type and the human behavior b) the variable inputs mix and its impact on cost savings c) the availability of fix factors and their utilization d) the scale or production unit size. Finally, the model is applied to the departments of the Universitat Autònoma de Barcelona (Spain).

5. A Cost Model for Deciding if Postponement is Beneficial
Gregory Graman, Wright State University

One way to achieve mass customization is to adopt a postponement strategy. Postponement is the ability to delay the product-differentiating stage of an operation until demand for the customized product is known. There are costs associated with postponement because the operating cost in a postponement scenario is typically higher than in a non-postponement scenario. This study is motivated by a local manufacturer who has considered adoption of a postponement strategy to deal with product proliferation and demand uncertainty. A decision cost model was developed as an aid in determining if the benefits of postponement are greater than the additional costs.

Session 124: MON. 10:30 - Caesar 1
Games and Simulations

Cluster: POM Pedagogy

Chair: **Kenneth Klassen**, Brock University

1. A Spreadsheet Version of the Beer Distribution Game
Kenneth Klassen, Brock University

The well-known and much-used "Beer Game" (originally developed by John Sterman in the 1960's) has been updated and input into a spreadsheet format. Some of the main differences are that demand is randomized, ordering delays have been reduced (to reflect modern electronic ordering methods), and students work more as a team (which models open relationships where information is shared with suppliers and customers). Playing time has been reduced to 45 minutes or less (for a team of 4 students), efficiently obtaining the learning outcomes from the game in a short time period. Students have responded very favorably to the exercise, with many groups trying it a second time (improving their performance) even though they were not required to do so. Students learn about the bullwhip effect and other supply chain management challenges, and invest a lot of effort during the game discussing strategies for minimizing inventory levels.

2. On-Line Games in Ops Courses
Maureen Lojo, California State University, Sacramento

On-line games generate interest, participation, and a sense of fun in introductory courses. Games provide effective review of material and self-tests for students to assess their preparation for exams. This presentation will provide

examples of game templates available on the internet and discuss their use in various class formats.

3. Excel Model for Aggregate Planning
Francisco Aguado Correa, Carlos III University of Madrid / University of Huelva
Nuria Padilla Garrido, University of Huelva

Spreadsheets are the most common software tool managers use to analyze data and model quantitative problems. They have also become one of the preferred tools for teaching quantitative methods to business school students. In this paper we introduce an Excel model for aggregate planning, characterized by its great flexibility and for the use of Excel Solver, which in many cases allow us to find the optimal solution for a given set of conditions.

4. Using A Discovery-based Laboratory to Teach Supply Chain Management Fundamentals in Undergraduate Curriculum
Amy Zeng, Worcester Polytechnic Instiute
Sharon Johnson, Worcester Polytechnic Institute

Commonly-used pedagogical methods to enrich classroom discussions and to facilitate students learning in teaching supply chain management at both undergraduate and graduate levels include case studies and experiential simulation games. Although these tools have been used for several decades and proven effective, a number of disadvantages and shortcomings also exist. In this presentation, we describe a discovery-based laboratory that is developed to supplement an undergraduate introductory operations management course when the fundamentals of supply chain management are taught. The detailed description of the lab and the assessment results of the student learning effectiveness based on a rubric technique are provided. Additionally, the limitations and possible expansions of the lab are commented upon.

5. The Beer Game, an Implementation for Use Over the Web
Alexandre Graeml, EAESP/Fundação Getúlio Vargas - Brazil
Ronaldo Marques, Centro Federal de Educação Tecnológica do Paraná (CEFET-PR) - Brazil

The Beer Game was originally introduced by MIT professor Jay Forrester, in the 60's. Since then, it has been played by business students and executives all over the world, in order to simulate and better understand industry dynamics. It has proved to be an especially powerful tool to show the bull-whip effect, i.e., the magnification of the variability in demand as one moves from the customer towards the producer along the supply chain. Most implementations of the Beer Game are still very similar to its original proposition, using traditional material. The authors of this paper have developed a web-based version, which provides instructors and students with a great deal more flexibility to simulate the supply chain environment. This paper explains the advantages of the implementation of the Beer Game over the web and discusses ways in which it can be used to teach manufacturing concepts to undergraduate students and business managers.

Session 125: MON. 10:30 - Caesar 2
Strategies for Product Design

Cluster: Strategy and Design

Chair: **Peter Knittig**, Sophia University

1. Case Study: Effective Engineering Design, Environmental Performance and Logistics Applied into the Design and Develoment
Sergio Romero-Hernandez, Instituto Tecnologico Autonomo De Mexico
Cristina Gigola, Instituto Tecnologico Autonomo De Mexico
Omar Romero-Hernandez, Instituto Tecnologico Autonomo De Mexico

This paper presents a case study derived from the design and development of a fan model. There are several issues related to the optimum design of products. Among these issues, logistics, environmental performance and manufacturability highlight as critical design factors. However, deciding of the best holistic option usually comprises trade-offs among the previously mentioned factors. As such, this work presented the application of a high-end technical framework to determine the best design, applying a diverse range of tools such as CAD / CAE / Life Cycle Assessment and Logistics.

2. Incorporation of Effective Engineering Design, Environmental Performance and Logistics Planning for Products LCM
Sergio Romero-Hernandez, Instituto Tecnologico Autonomo De Mexico
Cristina Gigola, Instituto Tecnologico Autonomo De Mexico
Omar Romero-Hernandez, Instituto Tecnologico Autonomo De Mexico

The present paper is concerned with an integrative approach related to (i) the use of modern CAD and CAE tools, for early effective product design, (ii) an environmental management framework that evaluates the environmental performance of the product along its whole life cycle (raw materials selection, materials transformation, production processes, transportation, use, re-use, recycle, retirement/decommissioning) and (iii) a logistics assessment framework that evaluates the impact along the supply chain of modifications on the early stages of design. The main result is a conceptual and research-based framework for

multidisciplinary life cycle management. The presented research provides a high-end technical solution to determine the best product alternative in terms of market expectations, product-process specifications, economic and environmental impact in the long term, that is, along the whole life of a product. The integration of this framework is oriented towards rapid generation and evaluation of innovative products.

3. Product and Process Design of the Pet Plastic Supply Chain. Sustainability Analysis.
Omar Romero-Hernandez, Instituto Tecnologico Autonomo De Mexico

A practical application of product and process analysis from a sustainability point of view is presented. This project analyses those industries who participate in the PolyethyleneTereftalate (PET) market as resin producers, bottle manufacturers, soft drinks producers, distributors and plastic recyclers. PET market has increased substantially in the previous years due to its physicochemical properties and improved designs. In contrast, there is some concern about the environmental implications of PET use and the lack of analytical tools to describe the economic and environmental effects of PET as a material for new product designs. This paper provides a robust framework to analyze raw materials along the supply-chain. As such, a robust-simulation-model and a Life_Cycle_Assessment(LCA) of PET were performed, including all stages from raw material extraction to recycling and landfill. This framework can be used as a tool for product and process design and therefore, provide basis for decision making in industries.

4. Modularization and Its Limitations in the Automobile Industry
Peter Knittig, Sophia University
Shinji Shimizu, Sophia University
Robert Ballon, Sophia University

The purpose of this paper is to evaluate the recent approaches of automobile manufacturers pertaining to modularity and to assess the limitations of such modularisation strategies. At the outset, the general principles and contents of modularity are deliberated and its possible areas of application in the automobile industry are evaluated. This assessment reveals that modularity initiates significant changes with regard to car design, production, use, retirement, and the organizational structure in the automobile industry. Besides the undeniably advantages of modularization strategies, these approaches are also subject to certain limitations. In particular, modularity may result in higher development and retirement costs, converging car designs, redundant module functions, and over-customization. Most importantly, however, modularization strategies will accelerate the evolution of carmakers into mere brand and service providers, changing the core capability of carmakers irrefutably.

Session 126: MON. 10:30 - Caesar 3
Supply Chain Integration

Cluster: Strategy and Design

Chair: **Alan Cannon**, University of Texas at Arlington

1. Intercompany Engagement Processes Revisited
Olli-Pekka Juhantila, South Carelia Polytechnic
Veli-Matti Virolainen, Lappeenranta University of Technology

Companies must look for new sources of business success, thus it is essential to recognize that a company cannot achieve its objectives only through internal knowledge and capabilities. Successful companies have identified that engaging in collaborative relationships with other companies is an important value driver for them. In an earlier empirical study we have recognized that there is a mismatch between the intercompany relationship success factors and the evaluation criteria many companies utilize during supplier selection and qualification. Thus the companies being evaluated have to meet several different criteria and performance standards. We have identified a set of criteria through which measuring the existence of the success factors would be possible a priori. We will continue with the empirical data to study the question: How should these criteria be applied? I.e. what would be an appropriate process of supplier qualification to be used in order to assure successful collaborative engagements?

2. Integration of Virtual Supply Chains
Adolfo Crespo Márquez, University of Seville
Rafael Ruiz-Usano, University of Seville
Jose Manuel Framinan, University of Seville

This paper develops a comprehensive model of supply chain integration and uses it to analyze and assess the effectiveness of different tools for virtual supply chain integration. This model is also used to evaluate the importance of the sequence in which these tools are adopted in supply chain integration. Computational results from a validated system dynamics simulation model with different implementation sequences of the tools and different scenarios are presented.

3. Antecedents of Supply Chain Configuration: Toward a Contingency Theory
Peter Stonebraker, Northeastern Illinois University
Jianwen Liao, Northeastern Illinois University

Though supply chain management has emerged during the past several decades as a major

source of competitive advantage, there is a paucity of academic research on a typology of supply chain configuration and its antecedents. Built on two dimensions of supply chain integration, stage and form, this paper proposes a typology of supply chain integration which defines an independent integrator, a collaborative integrator, a controlling integrator and a full integrator. A model of environmental, strategic, and operational variables which directly impact supply chain configuration is proposed. Contributions, limitations, and implications are offered.

4. A Generic Product Development Process for Virtual Manufacturing Firms
Julio Macedo, Institut Strategies Industrielles

Real manufacturing firms design, make and distribute products whereas virtual manufacturing firms do not make products but design and distribute them. In the virtual case, the products are made by foreign subcontractors. Current literature does not define a generic process for developing new products in virtual firms. This paper presents a template that defines the activities of such process and, in addition, suggests a tool for the main activity of this process, namely to evaluate the manufacturing efficiency of the candidate foreign subcontractors in order to choose one. The suggested tool is a set of neural network based scorecards that allow measuring the gap between the current and the desired state of the candidate production system. These scorecards are applied using internet telecommunication between the evaluated subcontractor and the evaluator virtual firm. An application on the apparel sector is presented.

5. Synergy through Interorganizational Collaboration: Cultural Barriers & Enablers
Alan Cannon, University of Texas at Arlington
Caron St. John, Clemson University

Successful adoption of interorganizational integration depends greatly on the breaking of cognitive boundaries that encourage key decision-makers to view their responsibilities and actions as isolated from those of other managers and other firms. As this tendency toward bounded rationality does not develop overnight, however, it seems highly unlikely that it will be overcome without concerted and consistent effort over time. Further, as patterns of perceiving and acting on perceptions become entrenched in organizations, these shared perceptions likely will play a role in the success or failure of an interorganizational integration effort. In this research effort we develop a theoretical model linking interorganizational integration to dimensions of organizational culture as discussed extensively in the organizational theory literature. In so doing, we hope to illuminate cultural issues that must be considered when implementing interorganizational integration. Then, we offer up promising research questions for scholars studying this managerial phenomenon.

Session 127: MON. 10:30 - Caesar 4
Outsourcing Product Design

Cluster: Strategy and Design

Chair: **Moti Levi**, Pennsylvania State University

1. The Introduction of IT-Support into Order Execution in Freight Forwarding and Its Process Consequences
Katja Siek, University of Bremen
Nadja Shigo, University Bremen
Elmar Erkens, University of Bremen
Herbert Kopfer, University of Bremen

The order-execution-process in freight-forwarding is nowadays supported by IT within order-acceptation and scheduling activities. The physical transport of goods is ordinarily surveyed by check-up-calls of dispatchers via mobile telephone (GSM). This procedure is not efficient and can be optimized if supported by a so-called vehicle-communication-system. These systems are widely known by freight forwarders but not used in a considerable amount. This article aims to point out the differences in work routines connected with the order execution, if communication between dispatcher and driver is altered from a personal to data interchange. In addition, the changes of an introduction of scanning-devices in the new process are shown. These changes do not only affect the underlying communication but can alter different process-steps in all sequences. To visualize the diverging processes, the methods of process management are used. The conclusions will give an insight into the interface-, consulting- and preparation-requirements of these “re-designing-adventures”.

2. Engineering Supply Chains Under Partial Base-Stock Control
Lars Petersen, University of Saarland
Marcus Schweitzer, University of Saarland

Methods for redesigning products and processes in supply chains have become tools of emerging importance in global markets with growing product variety. Lee/Tang (1997) develop a model for analyzing redesign methods like standardization, modular design, and reversal of operations within a supply chain driven by a simple, fixed base-stock replenishment policy. In the present talk, this simplification is abandoned. The proposed model addresses the problem of setting optimal safety stocks in a multi-stage system with stochastic demand, stochastic lead times, and limited storage capacities; some stock levels may be zero, thus allowing for a decision between make-to-order and make-to-stock production. In particular, it is analyzed how the selection of optimal base stocks in convergent or divergent multi-stage supply chains interferes

with measures like standardization, changing the number of suppliers, or introduction of parallel processes. Furthermore, problems resulting from limited storage capacities and uncertainties of global markets are discussed.

3. Implications of Outsourcing Manufacturing on the New Product Development Process of Pharmaceutical Companies

Michael Kickuth, University of St. Gallen
Gerrit Reepmeyer, University of St. Gallen

As lifecycles of pharmaceutical products are shortening and markets in major therapy areas are becoming highly competitive, cost pressure and the request for genuinely innovative products have become a major concern for pharmaceutical companies. Many companies increasingly rely upon outsourcing R&D and manufacturing tasks to lower operating costs by avoiding to invest in expensive drug discovery technologies and manufacturing plants. However, outsourcing solitary steps of drug development and manufacturing does not allow to tap into probably the greatest area of improvement, which has been disregarded by many pharmaceutical companies since decades: integrating product and process development. As a consequence, this paper describes the impact of outsourcing manufacturing on research and development. We found that outsourcing of manufacturing operations can have a negative impact on new product development as technology transfer and process development become critical issues. The paper develops strategies to manage the interface between contract manufacturers and corporate R&D.

4. Cheating Your Developer: Contracting for Information Systems Using Pilot Projects

Moti Levi, Pennsylvania State University
Thomas Noe, Tulane University

Over $150 billion of IT projects are outsourced annually. Due to high failure rates contracts are increasingly complex. As a result, developers are often worried about project's cost. IT projects are highly representative of low codifiability projects (Levi 2002). We examine a firm that contracts with a developer for a pilot project, which generates a signal towards the final project's costs. We find, highly surprisingly, that a buyer may find it beneficial not to codify a transaction, in effect reducing the information provided to the developer, when it may want to re-contract with other suppliers. Thus, existence of other potential developers, in conjunction with uncodifiability may create a welfare reducing behavior. This mainly happens when the pilot is used due to strategic or technical reasons despite negative cost-benefit analysis. Further more, despite a high-cost signal, the firm may conduct a second pilot.

Session 128: MON. 10:30 - Caesar 5

Planning and Scheduling in the Service Industries

POMS Invited Tutorial

by

Michael Pinedo, New York University

(See Tutorial section for details)

Session 129: MON. 10:30 - Caesar 6
Supply Chain and Logistics Cases

Cluster: POM Pedagogy

Chair: **Ulric Gelinas**, Bentley College

1. A Study on Design of Supply Chains and Methodology of Process Innovation in an Industrial Motor Shop

Tae-Hyun Baek, Hyundai Industrial Research Institute, Hyundai Heavy Industries Co., Ltd.
Tae-Hoon Choi, Hyundai Industrial Research Institute, Hyundai Heavy Industries Co., Ltd.
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In this paper, we present the design of supply chains and methodology of process innovation for a scheduling and control system in an industrial motor shop. The industrial motor shop has three major problems: high WIP, imprecise lead-time and low rate of delivery service. Also in unusual cases, the products are customized according to the specific requirements of customers. The industrial motor shop operations are currently scheduled by a system based on MS-DOS which was developed 15 years ago. So production scheduling can not guarantee maximum efficiency. We have adopted a process innovation approach and applied WMS (Warehouse Management Systems) based on PDA (Personal Digital Assistants) after design of supply chains for OEM vendors, domestic warehouses and global agents. We show that the methodologies are successfully applied to the industrial motor shop problem.

2. Reverse Logistic and Remanufacturing in Automotive Industry: The GKN Brazil Case

André Koetz, Universidade do Vale do Rio dos Sinos
Marcelo Klippel, Universidade do Vale do Rio dos Sinos
Andrea Pampanelli, GKN

This paper introduces the activities development by GKN Brazil, an auto parts segment company, leader in the manufacturing of halfshaft parts in the Brazilian automotive market. It demonstrates the current state of reverse logistic operations for collecting, evaluating, stocking and transporting of parts that are remanufactured at the industrial unit responsible for the fulfillment of almost 100% of the Brazilian market. Also, it describe the specifics procedures which took place at this industrial unit, from the movements, production processes, quality tests and fulfillment of international certifications and standards until the distribution to sale points at the domestic market. Finally, the authors comment on the current state of development and establish questions for future requirements of study and orientation of reverse logistic operations and remanufacturing, considering the advent of European legislation that treats the statements of manufacturers related to the destination of auto parts and automobiles at the end of useful life.

3. A Case of Supply Chain Management in the Modular Consortium of VW in Brazil
Susana Pereira, EAESP/Fundação Getúlio Vargas
Marta Maia, EAESP/Fundação Getúlio Vargas
Luiz Carlos Di Serio, EAESP/Fundação Getúlio Vargas
Mauro Sampaio, EAESP/Fundação Getúlio Vargas

A number of cases and studies on supply chain management are emerging in current management literature and in the business context. The Modular Consortium, a new relationship concept, established by Volkswagen, in Brazil in 1994, is a good example of this trend. For the operation of this plant of buses and trucks, VW selected seven suppliers. In this partnership the suppliers share the risks of the capital investment in the business. This case analyzes the actual model, after nine years of its implementation, identifying the level of the relationship, the main difficulties in the relationship with the partners, and the aspects related to the evolution of the system.

4. Comparing Lean and Agile Logistics Strategies: A Case Study
Ruth Banomyong, Thammasat Business School
Nucharee Supatn, Thammasat Business School

The purpose of this paper is to compare the effect of lean and agile strategies on the manufacturing process of an aquarium manufacturer. Numerous studies have demonstrated the benefits of lean and agile strategies in enhancing the competitiveness of firms, but none has really discussed how performance differs when utilizing either strategy. Lean strategy can reduce, or even eliminate, waste in the production process, but it might not be able to respond to fluctuations in customer demand, while an agile strategy enhances the responsiveness of the manufacturer. The results of this research show that each strategy provides different types of impact for the manufacturer. The findings also suggest that the manufacturer should not select EITHER an lean or agile strategy, but rather should combine both strategies.

5. The Non-Production Purchasing Process
Ulric Gelinas, Bentley College
Catherine Usoff, Bentley College

This case describes the non-production purchasing process for a large ($1-2 billion sales) manufacturing firm. The detailed description of a business process allows achievement of learning objectives related to the modeling, measurement, assessment, and improvement of business processes. In addition, the case provides a business process application to integrate into an SAP component of a course. Process specific issues raised by the case include the inability to track purchase requisitions through the purchasing process, redundant data entry, convoluted and ineffective purchase approval and payment processes, lack of communication among stakeholders throughout the process, and an outdated and inadequate legacy MRP system that results in workarounds and too much paper processing. Other more general issues include change management, internal controls, IT support of and interaction with business processes, justification of IT investment, lack of a process perspective and process owner, and the influence of corporate culture on business processes.

Session 130: MON. 10:30 - Caesar 7
Logistics and Distribution Strategy

Cluster: Operations and Logistics

Chair: **Bidya Sahay**, Management Development Institute

1. The Competitive Factors of Brazilian Fresh Fruit Exportation
Roberta De Castro Souza, University of São Paulo
João Amato Neto, University of São Paulo

The aim of this article is to discuss the main factors which could be responsible for the increase of efficiency of Brazilian mango and grapes productive chains. Despite being a great producer the Brazilian percentage of fresh fruits in the foreign market does not get to a total of 1%. Among the main obstacles for the expansion of fresh fruit exportation we have the tariff and sanitary barriers imposed by most of the important importers. In relation to internal difficulties, we could point out the low quality of the fruits, the inadequate manipulation of the

product and the lack of coordination between producers and distributors.
Finally, this paper discusses the main competitive factors, such as quality attributes, trade barriers and distribution channels, in order to increase the exportation of mango and grapes from Brazil.

2. Postponement Strategies in Brazilian Supply Chain

Mauro Sampaio, EAESP/Fundação Getúlio Vargas
João Mário Csillag, EAESP/Fundação Getúlio Vargas

This work deals with the issue, postponement, a concept that is becoming more and more important in recent years. Postponement is an operational concept that aims to delay activities until customer orders are received. Despite of the potential theoretical and strategic importance of this subject, his implementation process is still not well known in the Brazilian business environment. The purpose of this paper was to study the implementation of postponement in five companies in Brazil, having in mind to identify the reason why their executives adopted such strategy. What are the drives and the obstacles to the implementation and what was postponement's contribution to increase the competition.

3. Logistics Processes of European Grocery Retailers: Facts and Fiction

Johanna Småros, Helsinki University of Technology

Although the grocery industry is known for its innovative supply chain management practices, many grocery companies have difficulties in implementing concepts such as information sharing and forecasting collaboration in their supply chains. In theory, these concepts should enable a significant increase in efficiency, but in practice implementation has been slower than expected. In order to better understand this slow development, we have conducted a series of in-depth interviews with leading grocery retailers in several European countries. Here, we present some preliminary findings concerning, among other things, European grocery retailers' current logistics performance, their forecasting processes and resources, as well as their incentives to share information and participate in forecasting collaboration with suppliers. The findings offer opportunities for operations management researchers to validate the assumptions that different supply chain models are based on as well as to identify new research areas.

4. The Influence of Automakers in Industrial Organization of Their Suppliers: The Case of the Brazilian Automotive Complex

Flavio D'Angelo, Universidade Paulista
João Amato Neto, University of São Paulo

This paper provides a multiple case study of the Brazilian automotive and auto parts industry and an analysis of trends on their organization and relationships. After a period following international standards in work organization and supply chain relationship, transnational automotive companies developed new models, like modular consortium and industrial condominium, to improve their production competitiveness. In these lean models, suppliers have an important role as mostly tier 1. In the past, product requirements were enough to guide the relationship between automakers and auto parts companies. Nowadays there are requirements of quality, logistic, product development, process control and cost. This global approach of automakers has as main line lean production principles and as a target wastes elimination. The result is that auto parts companies became lean, even though most of the time it is not clear to suppliers and in some automakers' departments either.

5. Third Party Logistics Practices: An India Perspective

Bidya Sahay, Management Development Institute
Ramneesh Mohan, Management Development Institute

Third party logistics (3PL) is a business dynamic of growing importance all over the world. However, it is at a very nascent stage in India, though some domestic and multinational companies are trying to establish themselves in this sector. This paper is an attempt to provide a 3PL perspective in India. The paper focuses on three major issues – present extent of usage of third party logistics services, reasons for outsourcing and impact of usage of third party logistics services on business results. The paper reveals that most 3PL users are satisfied with the current level of services provided by 3PL service providers as it has led to a positive impact on business results. As a result, the usage of third party logistics services is likely to increase substantially in the future.

Session 131: MON. 10:30 - Caesar 8
Operations Strategy IX

Cluster: Strategy and Design

Chair: **Danny Samson**, The University of Melbourne

1. Towards Theory Building in E-Commerce: Identification of Pertinent Research Streams and a Call for Further Research

Nalini Govindarajulu, New Mexico State University
Shalini Devi, New Mexico State University
Yiling Ge, New Mexico State University
Maria Gonzalez, New Mexico State University
David Loyd, New Mexico State University

Bonnie Daily, New Mexico State University

E-commerce is increasingly attracting the attention of researchers and managers in the 21st century. However, the literature on e-commerce remains fragmented and ambiguous. Furthermore, a literature review shows that only a few studies have examined major competencies in e-commerce that are relevant to operations management. Analysis of e-commerce issues aids understanding and improvement of the challenges faced by organizations, which is pertinent to achieving competitive advantage in an ever-changing economy. In addition, firms will be able to formulate strategies and invest resources appropriately, when the specific factors that enhance manufacturing and service performance are determined.
Hence, the objective of this study is to highlight potential e-commerce research themes within the realm of operations management. This article reviews relevant literature on e-commerce. Employing focus group methodology, it also identifies pertinent research questions that are suitable for further conceptual modeling and empirical testing.

2. A Stakeholder Approach of Reverse Logistics

Pascual Berrone, Universidad Carlos III de Madrid
Javier Husillos, Universidad Carlos III de Madrid

Reverse Logistics (RL) has become one of the fastest growing research topics in the operations management. However, no theoretical approach has been used to clearly justify the adoption of RL systems by firms. We use Stakeholders Theory to develop a model that explains which factors affect the implementation of RL programs. The model considers three major variables: the attributes of the stakeholder (power, legitimacy and urgency), the manager's attitude (progressive or conservative), and the adequate resources in order carry out the RL programs. Based on the model, we claim several propositions, which predict when RL will be implemented. Our major contribution is an answer to the growing claims for the scientific status reposition of the discipline by proving an imported framework from the organizational field to operations management.

3. The Psychology as Agent Between Operations Strategy and Human Resource Management

Johannes von Mikulicz-Radecki, University of Mannheim

Market-induced necessities affected changes in the strategic priorities from cost over quality to time and, in the last decade, to flexibility. This development must be considered rather an 'as well as'-aggregation-process than an 'either..or'-decision. Therefore industrial companies must strive for the perfect configuration of the different strategic priorities. Fast changing environments lead to permanent changes in this configuration. The functional area which is the hardest to align to this strategic inconsistency is certainly the human resource area because of its rigid character. A major challenge in operations management is the finding of key human resource measurements which are adaptable to every possible strategic configuration or environment. In the context of this search the psychology proves to be an useful agent between operations strategy and human resource management. This paper will show how the best fit between human resource decisions and operations strategies can be reached through considering insights of psychology.

4. The Enterprise's Operations System Integration Through an Appropriated Organizational Design

Edson Pinheiro de Lima, Pontifical Catholic University of Parana
Sergio Gouvea da Costa, Pontifical Catholic University of Parana

The integration of enterprise's operations system is an important issue at the present business agenda. An important activity for the technical design of operation systems is the definition of what technologies will compose those systems. Several systems are being offered as a solution to the value chain integration, particularly those based on advanced manufacturing technologies (AMT). The demand imposed by a dynamic, complex and global environment, however, poses a challenge to the effectiveness of those systems. A technical-based solution approach must be converted into an integral one, which would support the manufacturing strategy and be implemented by an appropriate organizational design. The main purpose of this paper is to study operation systems integration, based on an AMT solution, which is aligned in to the enterprise manufacturing strategy and implemented by an appropriated organizational design. The proposed organizational design solution is integrated to an AMT strategic selection framework.

5. Aligning Supply Chain Resourcing and Product Design Decisions with Market Orientation: A Theoretical Construct

Danny Samson, The University of Melbourne
John Wacker, Arizona State

This study provides a model of business strategy that integrates the market orientation approach with the resource-based view. Our approach is to decompose market segments 'atomistically' into individual customers' and their preference functions, and products into their constituent features. We define strategic waste as the opportunity losses from errors on specific strategic decisions.

Session 132: MON. 10:30 - Caribe
Process & Flow Shop Modeling: Theory and Application

Cluster: Operations and Logistics

Chair: **James O'Kane**, University of Northumbria

1. Selecting a Token-Based Control System Using Taguchi Methods

Pedro L. González, University of Seville
Jose Manuel Framinan, University of Seville
Rafael Ruiz-Usano, University of Seville

Token based control systems have been widely used in manufacturing systems and studied by researchers during the last years. The most known token-based control systems are Kanban and Conwip, although there are other token based control systems that have been developed recently. There exists several comparisons among these systems, regarding certain performance measures, but is a fact that no one system works better than the others in all cases. On the other hand, we know the importance of Taguchi methods® on selecting among different systems by means of a robust criterion. In this work we apply this methodology to select the most robust token based control system working under re-work jobs.

2. A Production-Storage System with Variable Production and Demand Rates and Limited Storage Capacity

Esmail Mohebbi, University of Nebraska-Lincoln

We consider a continuous-review production-storage system with compound Poisson demand, randomly changing production and demand rates, and limited storage capacity. Assuming that the changes in production and demand rates are characterized by continuous-time Markov chains, we develop a mathematical model for deriving the steady-state distribution of the inventory level and present some numerical results.

3. Designing a Tabu Search Algorithm for Flow Shop Scheduling

Hamid Davoudpour, Amirkabir University of Technology

The problem of scheduling on the Flow Shop Floor is widely encountered in the manufacturing industry. Flow-Shop scheduling is belong to a large class of NP-Complete (Non deterministic Polynomial time Complete) problems. [2] A variety of models and optimization algorithms have been developed for solving these problems. In order to overcome the above mentioned problem, a verity of Meta-heuristics Algorithms such as Genetic Algorithm, Neural Network and Tabu Search, have been developed and used in real-world. Tabu search algorithm has its origins in combinatorial procedures applied to nonlinear covering problems in the late 1970[4]. The study presented in this paper is based on the tabu search approach for solving the m machine, n jobs, with the goal of minimizing tardiness cost in a Flow shop environment. The solution procedure was found to perform well on tested problems and published data sets. The results of computational tests presented are very encouraging.

4. Assessing the Benefits of Remanufacturing Option Under One-Way Substitution and Capacity Constraint

Z. Pelin Bayindir, Erasmus University Rotterdam
Nesim Erkip, Middle East Technical University
Refik Gullu, Middle East Technical University

In this study, we investigate the profitability of remanufacturing option when the manufactured and remanufactured products are segmented to different markets and the production capacity is finite. It is assumed that remanufactured products can be substituted by the manufactured ones. A single period profit model under substitution is constructed to investigate the system conditions under which remanufacturing is profitable. We present analytical findings and computational results to show profitability of remanufacturing option under substitution policy subject to a capacity constraint of the joint manufacturing/remanufacturing facility.

5. A Knowledge-Based Simulation Approach to Modeling the Human Scheduler in a FMS

James O'Kane, University of Northumbria

This paper presents a knowledge-based system approach to modeling the human scheduler within a flexible manufacturing system. (FMS). The approach and system that was subsequently developed was based on the principle of automated intelligent decision-making via knowledge elicitation from FMS status data, together with knowledge base augmentation to facilitate a learning ability based on past experiences. A simulation model of a real FMS was used to study reactive scheduling policies and from this work a Prolog-based expert system was developed that was capable of interrogating FMS data and offering intelligent decision-making on specific reactive scheduling scenarios. A dynamic database approach for the knowledge-based system is proposed and experiments with a linked simulation model/knowledge-based system are described. A rudimentary “learning” system is described based on the dynamic database concept and these ideas are implemented into the environment to provide decision-making and control across a FMS schedule lifetime

Other Contributed Abstracts

1. Service Operations Management Teaching / Sobre la Docencia en Dirección de Operaciones en Servicios

José Machuca, University of Seville
Victor Aguilar, University of Seville

The huge importance that the services sector has taken on has caused courses to spring up devoted solely to Service Operations Management (SOM). Over a number of years we have undertake an in-depth research to analyse the content of these courses, of SOM handbooks and of the bibliography of both. This research has allowed us to offer a broad view of the state-of-the-art of this new field of study. In this paper we present for the first time the results of worldwide SOM teaching by analysing 180 SOM courses identified in 34 different countries. The main features of these courses are summarized together with a joint analysis of their syllabuses. As a result, we are able to identify the most outstanding aspects of SOM teaching and to draw up a typical program for a SOM course. / La gran importancia que ha adquirido el sector servicios ha provocado la aparición de cursos dedicados exclusivamente a Service Operations Management (SOM). El análisis del contenido de los mismos, de los manuales de SOM y de las referencias bibliográficas de ambos ha sido objeto de una investigación, desarrollada en varios años, que nos ha permitido ofrecer una visión amplia del estado de la cuestión en este reciente campo disciplinar. En este trabajo presentamos por vez primera los resultados en relación a la docencia de SOM a través del análisis del contenido de 180 cursos de SOM identificados en 34 países distintos. Se presenta un resumen de las principales características de los mismos, así como un análisis conjunto de su contenido temático. El resultado es la identificación de los aspectos más destacados en la docencia de SOM y la elaboración de un programa tipo para un curso de SOM.

2. The Impact of Research and Teaching Materials on Service Operations / Impacto de la Investigación y los Materiales Docentes en los Cursos de Dirección de Operaciones en Servicios

Victor Aguilar, University of Seville
José Machuca, University of Seville

Our research analyses the nature and evolution of the bibliographic materials used in 132 Service Operations Management (SOM) teaching programs in 29 countries, with a total of 2354 bibliographic references. The distribution of the number of references per program is analysed, together with a time-line analysis of said references. They are also classified according to their source of publication. Descriptions are given of the most-used materials, with distinctions being made between books, articles and cases, and of indicators of productivity and impact per author, institution, region and country. The results of this study may be of use to SOM teachers and researchers of SOM, whom they provide with a selection of bibliography, whilst also setting out the contributions made to the development of SOM teaching by different authors and institutions. / Este estudio analiza la naturaleza y evolución de los materiales bibliográficos a partir de las 2.354 referencias bibliográficas contenidas en 132 programas docentes de Service Operations Management (SOM) de 29 países. Se incluye la distribución del número de referencias por programa, el análisis temporal de las referencias y su clasificación por fuentes de publicación, un detalle de los materiales más empleados distinguiendo entre libros, artículos y casos, así como indicadores de productividad e impacto por autores, instituciones, regiones y países. Los resultados de este estudio permiten a los docentes e investigadores una selección bibliográfica al tiempo que ponen de manifiesto la contribución de los diferentes autores e instituciones al desarrollo docente de SOM.

3. Yield Management Research Through the Analysis of Scientific Journals: Preliminary Results / Análisis de la Investigación Sobre Yield Management en Revistas Científicas: Resultados Preliminares

M. Esther Chávez Miranda, University of Seville
Antonio Ruiz Jiménez, University of Seville

The aim of this paper is to analyse articles relating to Yield Management published in a selection of journals at international level during the period 1996-2002. These will then be classified at a later date on the basis of the List of Tourism Characteristic Products (drawn up by the World Tourism Organization and included in the Tourism Satellite Account), with a view to finding out, on the one hand, which sectors we have data on the application of Yield Management available for and, on the other hand, exploring new sectors that can be studied and researched. This paper forms part of a more broad-based paper which analyses publications relating to Yield Management in texts and monographs. The general goal of this line of research is to offer future researchers a methodical and exhaustive analysis of bibliography and research work done in the subject. / Con este trabajo se pretende realizar un análisis acerca de los artículos relativos al

Yield Management publicados en una selección de revistas a nivel internacional en el período 1996-2002. Posteriormente se procede a la clasificación de los mismos, basándonos en la Lista de Productos Característicos del Turismo (elaborada por la Organización Internacional de Turismo e incluida en la Cuenta Satélite de Turismo), con vistas a conocer de un lado aquellos sectores de los que disponemos de datos sobre la aplicación del Yield Management y, de otro, explorar nuevos sectores susceptibles de estudio e investigación. Este trabajo se incluye en otro de ámbito superior donde se analizan las publicaciones en manuales y monografías relativas al Yield Management. El objetivo general de esta línea de investigación es ofrecer a futuros investigadores un análisis metódico y exhaustivo de la bibliografía e investigaciones realizadas de la materia.

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Campos Filho, Luiz Alberto, York University, CANADA, camposfo@yahoo.com
Session 54: Sat. 15:30, Miramar 3

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Session 37: Sat. 13:30, Miramar 2

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Session 126: Mon. 10:30, Caesar 3

Cano, Jaime, Universidad Politécnica de Catalunya, SPAIN
Session 117: Mon. 8:45, Caesar 4
Session 117: Mon. 8:45, Caesar 4

Cantu, Humberto, Tecnologico de Monterrey - Campus Monterrey, MEXICO, hcantu@itesm.mx
Session 97: Sun. 15:30, Miramar 2

Capó, Josep, Universidad Politécnica de Valencia, SPAIN, pepcapo@omp.upv.es
Session 12: Fri. 15:30, Caesar 4
Session 31: Sat. 13:30, Caesar 4
Session 75: Sun. 13:30, Caesar 4

Cardenez, Miguel, San Diego Global University, USA, mcardina@mail.sdsu.edu
Session 9: Fri. 13:30, Caesar 7

Carranza, Octavio, Universidad Panamericana, MEXICO
Session 113: Mon. 7:00, Coral

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Session 115: Mon. 8:45, Caesar 2

Carrillo, Janice, University of Florida, USA, janice.carrillo@cba.ufl.edu
Session 89: Sun. 15:30, Caesar 2

Carter, Joseph, Arizona State University, USA, Joseph.Carter@asu.edu
Session 67: Sun. 10:30, Caesar 8

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Session 106: Mon. 7:00, Caesar 3

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Session 87: Sun. 13:30, Mediterraneo 2

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Session 117: Mon. 8:45, Caesar 4

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Session 51: Sat. 15:30, Caesar 8
Session 79: Sun. 13:30, Caesar 8
Session 114: Mon. 8:45, Caesar 1

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Session 73: Sun. 13:30, Caesar 2

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Session 63: Sun. 10:30, Caesar 4

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Session 48: Sat. 15:30, Caesar 5
Session 109: Mon. 7:00, Caesar 6

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Session 86: Sun. 13:30, Mediterraneo 1

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Session 27: Sat. 10:30, Mediterraneo 2

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Session 111: Mon. 7:00, Caesar 8

Challagalla, Goutam, Georgia Institute of Technology, USA
Session 70: Sun. 10:30, Mediterraneo 1

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Session 82: Sun. 13:30, Miramar 3

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Session 78: Sun. 13:30, Caesar 7

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Session 95: Sun. 15:30, Caesar 8

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Session 62: Sun. 10:30, Caesar 3

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Session 102: Sun. 15:30, Mediterraneo 1

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Session 78: Sun. 13:30, Caesar 7

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Session 82: Sun. 13:30, Miramar 3

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Session 74: Sun. 13:30, Caesar 3

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Session 87: Sun. 13:30, Mediterraneo 2

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Session 30: Sat. 13:30, Caesar 3
Session 122: Mon. 8:45, Caribe

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Session 36: Sat. 13:30, Miramar 1

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Session 122: Mon. 8:45, Caribe

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Session 122: Mon. 8:45, Caribe

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Session 129: Mon. 10:30, Caesar 6

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Session 118: Mon. 8:45, Caesar 5

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Session 105: Mon. 7:00, Caesar 2

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Session 44: Sat. 15:30, Caesar 1
Session 90: Sun. 15:30, Caesar 3

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Session 50: Sat. 15:30, Caesar 7

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Session 129: Mon. 10:30, Caesar 6

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Session 48: Sat. 15:30, Caesar 5

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Session 16: Sat. 10:30, Caesar 1

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Session 25: Sat. 10:30, Coral

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Session 56: Sat. 15:30, Caribe

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Session 14: Fri. 15:30, Caesar 7
Session 25: Sat. 10:30, Coral
Session 33: Sat. 13:30, Caesar 6
Session 66: Sun. 10:30, Caesar 7
Session 100: Sun. 15:30, Caribe

Conti, Robert, Bryant College, UK
Session 25: Sat. 10:30, Coral

Contreras-Montoya, Miguel, Mexican Petroleum Institute, MEXICO, mcontrer@imp.mx
Session 107: Mon. 7:00, Caesar 4

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Session 50: Sat. 15:30, Caesar 7

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Session 50: Sat. 15:30, Caesar 7

Cooper, Cary, Lancaster University Management School, UK
Session 25: Sat. 10:30, Coral

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Session 83: Sun. 13:30, Miramar 4

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Session 113: Mon. 7:00, Coral

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Session 18: Sat. 10:30, Caesar 3

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Session 44: Sat. 15:30, Caesar 1

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Session 40: Sat. 13:30, Caribe
Session 97: Sun. 15:30, Miramar 2
Session 118: Mon. 8:45, Caesar 5

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Session 118: Mon. 8:45, Caesar 5

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Session 14: Fri. 15:30, Caesar 7
Session 41: Sat. 13:30, Coral
Session 126: Mon. 10:30, Caesar 3

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Session 65: Sun. 10:30, Caesar 6

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Session 57: Sat. 15:30, Coral

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Session 70: Sun. 10:30, Mediterraneo 1

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Session 60: Sun. 10:30, Caesar 1
Session 100: Sun. 15:30, Caribe
Session 106: Mon. 7:00, Caesar 3
Session 123: Mon. 8:45, Coral
Session 130: Mon. 10:30, Caesar 7

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Session 47: Sat. 15:30, Caesar 4

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Session 8: Fri. 13:30, Caesar 6

Dahan, Ely, UCLA
Session 51: Sat. 15:30, Caesar 8

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Session 104: Mon. 7:00, Caesar 1
Session 131: Mon. 10:30, Caesar 8

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Session 59: Sat. 15:30, Mediterraneo 2
Session 71: Sun. 10:30, Mediterraneo 2

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Session 39: Sat. 13:30, Miramar 4
Session 101: Sun. 15:30, Coral

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Session 130: Mon. 10:30, Caesar 7

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Session 41: Sat. 13:30, Coral

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Session 67: Sun. 10:30, Caesar 8

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Session 33: Sat. 13:30, Caesar 6

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Session 111: Mon. 7:00, Caesar 8
Session 132: Mon. 10:30, Caribe

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Session 80: Sun. 13:30, Miramar 1

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Session 32: Sat. 13:30, Caesar 5

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Session 130: Mon. 10:30, Caesar 7

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Session 64: Sun. 10:30, Caesar 5

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Session 103: Sun. 15:30, Mediterraneo 2

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Session 64: Sun. 10:30, Caesar 5

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Session 68: Sun. 10:30, Caribe
Session 76: Sun. 13:30, Caesar 5
Session 80: Sun. 13:30, Miramar 1

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Session 99: Sun. 15:30, Miramar 4

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Session 52: Sat. 15:30, Miramar 1

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Session 76: Sun. 13:30, Caesar 5

De Pablo Lopez, Isidro, Universidad Autonoma de Madrid, SPAIN, isidro.de.pablo@uam.es
Session 75: Sun. 13:30, Caesar 4

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Session 21: Sat. 10:30, Caesar 6

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Session 28: Sat. 13:30, Caesar 1

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Session 108: Mon. 7:00, Caesar 5

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Session 21: Sat. 10:30, Caesar 6

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Session 115: Mon. 8:45, Caesar 2

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Session 11: Fri. 15:30, Caesar 2
Session 104: Mon. 7:00, Caesar 1

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Session 7: Fri. 13:30, Caesar 4

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Session 58: Sat. 15:30, Mediterraneo 1

Demeulemeester, Erik, Katholieke Universiteit Leuven, BELGIUM, erik.demeulemeester@econ.kuleuven.ac.be
Session 21: Sat. 10:30, Caesar 6

Dernroth, Jörgen, Jönköping School of Engineering, SWEDEN, jorgen.dernroth@ing.hj.se
Session 92: Sun. 15:30, Caesar 5

Session 97: Sun. 15:30, Miramar 2

Fensterseifer, Jaime, Federal University of Rio Grande do Sul / PPGA/EA and CEPAN, BRAZIL, jfenster@ea.ufrgs.br
Session 56: Sat. 15:30, Caribe

Ferdows, Kasra, Georgetwon Universtiy, USA, ferdowsk@georgetown.edu
Session 51: Sat. 15:30, Caesar 8

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Session 70: Sun. 10:30, Mediterraneo 1
Session 115: Mon. 8:45, Caesar 2

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Session 18: Sat. 10:30, Caesar 3

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Session 40: Sat. 13:30, Caribe

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Session 28: Sat. 13:30, Caesar 1

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Session 69: Sun. 10:30, Coral

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Session 3: Fri. 10:30, Caesar 6

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Session 42: Sat. 13:30, Mediterraneo 1

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Session 81: Sun. 13:30, Miramar 2

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Session 42: Sat. 13:30, Mediterraneo 1
Session 101: Sun. 15:30, Coral

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Session 81: Sun. 13:30, Miramar 2

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Session 54: Sat. 15:30, Miramar 3

Fleury, Afonso, University of São Paulo, BRAZIL, acfleury@usp.br
Session 32: Sat. 13:30, Caesar 5
Session 98: Sun. 15:30, Miramar 3

Fleury, Maria Tereza, University of São Paulo, BRAZIL, mtfleury@usp.br
Session 32: Sat. 13:30, Caesar 5

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Session 100: Sun. 15:30, Caribe

Framinan, Jose Manuel, University of Seville, SPAIN, jose@esi.us.es
Session 24: Sat. 10:30, Caribe
Session 41: Sat. 13:30, Coral
Session 99: Sun. 15:30, Miramar 4
Session 126: Mon. 10:30, Caesar 3
Session 132: Mon. 10:30, Caribe

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Session 123: Mon. 8:45, Coral

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Session 76: Sun. 13:30, Caesar 5
Session 123: Mon. 8:45, Coral

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Session 35: Sat. 13:30, Caesar 8

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Session 71: Sun. 10:30, Mediterraneo 2

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Session 42: Sat. 13:30, Mediterraneo 1

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Session 46: Sat. 15:30, Caesar 3

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Session 80: Sun. 13:30, Miramar 1

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Session 34: Sat. 13:30, Caesar 7

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Session 69: Sun. 10:30, Coral

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Session 49: Sat. 15:30, Caesar 6

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Session 22: Sat. 10:30, Caesar 7
Session 49: Sat. 15:30, Caesar 6
Session 72: Sun. 13:30, Caesar 1

Session 113: Mon. 7:00, Coral
Session 114: Mon. 8:45, Caesar 1

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Session 54: Sat. 15:30, Miramar 3

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Session 116: Mon. 8:45, Caesar 3

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Session 74: Sun. 13:30, Caesar 3

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Session 86: Sun. 13:30, Mediterraneo 1

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Session 38: Sat. 13:30, Miramar 3

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Session 46: Sat. 15:30, Caesar 3

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Session 42: Sat. 13:30, Mediterraneo 1

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Session 54: Sat. 15:30, Miramar 3

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Session 71: Sun. 10:30, Mediterraneo 2

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Session 11: Fri. 15:30, Caesar 2
Session 109: Mon. 7:00, Caesar 6

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Session 82: Sun. 13:30, Miramar 3

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Session 19: Sat. 10:30, Caesar 4

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Session 43: Sat. 13:30, Mediterraneo 2
Session 64: Sun. 10:30, Caesar 5

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Session 106: Mon. 7:00, Caesar 3

Gattiker, Thomas, Miami University, USA, gattiktf@muohio.edu
Session 66: Sun. 10:30, Caesar 7
Session 96: Sun. 15:30, Miramar 1

Gaukler, Gary, Stanford University, USA, gaukler@stanford.edu
Session 95: Sun. 15:30, Caesar 8

Gaur, Vishal, New York University, USA, vgaur@stern.nyu.edu
Session 35: Sat. 13:30, Caesar 8
Session 83: Sun. 13:30, Miramar 4

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Session 101: Sun. 15:30, Coral
Session 122: Mon. 8:45, Caribe

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Session 131: Mon. 10:30, Caesar 8

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Session 18: Sat. 10:30, Caesar 3

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Session 115: Mon. 8:45, Caesar 2
Session 129: Mon. 10:30, Caesar 6

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Session 57: Sat. 15:30, Coral

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Session 64: Sun. 10:30, Caesar 5

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Session 52: Sat. 15:30, Miramar 1

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Session 74: Sun. 13:30, Caesar 3

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Session 125: Mon. 10:30, Caesar 2

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Session 46: Sat. 15:30, Caesar 3

Gill, Colin, University of Cambridge, UK
Session 25: Sat. 10:30, Coral

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Session 79: Sun. 13:30, Caesar 8
Session 114: Mon. 8:45, Caesar 1

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Session 76: Sun. 13:30, Caesar 5

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Session 123: Mon. 8:45, Coral

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Session 86: Sun. 13:30, Mediterraneo 1

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Session 16: Sat. 10:30, Caesar 1

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Session 29: Sat. 13:30, Caesar 2

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Session 70: Sun. 10:30, Mediterraneo 1

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Session 132: Mon. 10:30, Caribe

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Session 61: Sun. 10:30, Caesar 2
Session 97: Sun. 15:30, Miramar 2

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Session 57: Sat. 15:30, Coral

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Session 98: Sun. 15:30, Miramar 3
Session 131: Mon. 10:30, Caesar 8

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Session 131: Mon. 10:30, Caesar 8

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Session 8: Fri. 13:30, Caesar 6
Session 60: Sun. 10:30, Caesar 1
Session 84: Sun. 13:30, Caribe
Session 124: Mon. 10:30, Caesar 1

Graeml, Felipe, Universidade Federal de Santa Catarina, BRAZIL, felipe.graeml@netpar.com.br
Session 8: Fri. 13:30, Caesar 6
Session 99: Sun. 15:30, Miramar 4

Graeml, Karin, Universidade Federal do Paraná, BRAZIL, karin.graeml@netpar.com.br
Session 84: Sun. 13:30, Caribe
Session 99: Sun. 15:30, Miramar 4

Graham, Allan, University of Rhode Island, USA, grahamaw@uri.edu
Session 51: Sat. 15:30, Caesar 8
Session 88: Sun. 15:30, Caesar 1

Grahovac, Jovan, Tulane University, USA, jgrahov@tulane.edu
Session 33: Sat. 13:30, Caesar 6
Session 89: Sun. 15:30, Caesar 2

Graman, Gregory, Wright State University, USA, greg.graman@wright.edu
Session 123: Mon. 8:45, Coral

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Session 100: Sun. 15:30, Caribe

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Session 87: Sun. 13:30, Mediterraneo 2

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Session 37: Sat. 13:30, Miramar 2

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Session 36: Sat. 13:30, Miramar 1

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Session 80: Sun. 13:30, Miramar 1

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Session 132: Mon. 10:30, Caribe

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Session 59: Sat. 15:30, Mediterraneo 2
Session 102: Sun. 15:30, Mediterraneo 1

Gupta, Jatinder, University of Alabama in Huntsville, USA, guptaj@uah.edu
Session 14: Fri. 15:30, Caesar 7
Session 18: Sat. 10:30, Caesar 3

Gupta, Surendra, Northeastern University, USA, gupta@neu.edu
Session 3: Fri. 10:30, Caesar 6

Gupta, Sushil, Florida International University, USA, guptask@fiu.edu
Session 18: Sat. 10:30, Caesar 3
Session 28: Sat. 13:30, Caesar 1

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Session 64: Sun. 10:30, Caesar 5

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Session 62: Sun. 10:30, Caesar 3

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Session 59: Sat. 15:30, Mediterraneo 2
Session 101: Sun. 15:30, Coral

Hamister, James, State University of New York, USA, jwh4@buffalo.edu
Session 54: Sat. 15:30, Miramar 3

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Session 37: Sat. 13:30, Miramar 2

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Session 21: Sat. 10:30, Caesar 6

Hariharan, Seetaraman, Queen Elizabeth Hospital, BARBADOS, hariharan@sunbeach.net
Session 101: Sun. 15:30, Coral

Harker, Patrick, University of Pennsylvania, USA, harker@wharton.upenn.edu
Session 49: Sat. 15:30, Caesar 6

Harris, Leslie, Georgia Institute of Technology, USA
Session 70: Sun. 10:30, Mediterraneo 1

Haughton, Michael, Wilfrid Laurier University, CANADA, mhaughto@wlu.ca
Session 68: Sun. 10:30, Caribe

Hausman, Warren, Stanford University
Session 95: Sun. 15:30, Caesar 8

Hays, Julie, University of St. Thomas, USA, jmhays@stthomas.edu
Session 70: Sun. 10:30, Mediterraneo 1

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Session 43: Sat. 13:30, Mediterraneo 2

Heese, Han Sebastian, University of North Carolina, USA, heeseh@bschool.unc.edu
Session 114: Mon. 8:45, Caesar 1

Hegele, Chris, Daimler Chryser, USA
Session 66: Sun. 10:30, Caesar 7

Heiser, Daniel, DePaul University, USA, dheiser@depaul.edu
Session 88: Sun. 15:30, Caesar 1

Helgheim, Berit, Molde University College, NORWAY
Session 36: Sat. 13:30, Miramar 1

Hellström, Daniel, Lund University, SWEDEN, daniel.hellstrom@plog.lth.se
Session 104: Mon. 7:00, Caesar 1

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Session 41: Sat. 13:30, Coral

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Session 43: Sat. 13:30, Mediterraneo 2

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Session 83: Sun. 13:30, Miramar 4

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Session 86: Sun. 13:30, Mediterraneo 1

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Session 21: Sat. 10:30, Caesar 6

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Session 66: Sun. 10:30, Caesar 7

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Session 94: Sun. 15:30, Caesar 7

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Session 70: Sun. 10:30, Mediterraneo 1

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Session 38: Sat. 13:30, Miramar 3
Session 54: Sat. 15:30, Miramar 3

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Session 118: Mon. 8:45, Caesar 5

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Session 39: Sat. 13:30, Miramar 4

Hoffman, Joyce, Stephen F. Austin State University, USA, jhoffman@sfasu.edu
Session 20: Sat. 10:30, Caesar 5
Session 57: Sat. 15:30, Coral

Holweg, Matthias, Judge Institute for Management Studies, UK
Session 14: Fri. 15:30, Caesar 7

Homa, Ken, Georgetown University
Session 51: Sat. 15:30, Caesar 8

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Session 52: Sat. 15:30, Miramar 1

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Session 102: Sun. 15:30, Mediterraneo 1

Hospitaler, Antonio, Universidad Politécnica de Valencia, SPAIN
Session 12: Fri. 15:30, Caesar 4

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Session 54: Sat. 15:30, Miramar 3

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Session 131: Mon. 10:30, Caesar 8

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Session 86: Sun. 13:30, Mediterraneo 1

Ingelsson, Karolina, Lund University, SWEDEN
Session 30: Sat. 13:30, Caesar 3

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Session 32: Sat. 13:30, Caesar 5

Jack, Eric, University of Alabama at Birmingham, USA, ejack@www.business.uab.edu
Session 74: Sun. 13:30, Caesar 3

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Session 8: Fri. 13:30, Caesar 6
Session 101: Sun. 15:30, Coral

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Session 48: Sat. 15:30, Caesar 5

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Session 94: Sun. 15:30, Caesar 7

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Session 31: Sat. 13:30, Caesar 4

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Session 62: Sun. 10:30, Caesar 3

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Session 33: Sat. 13:30, Caesar 6
Session 81: Sun. 13:30, Miramar 2

Johnson, Dana, Michigan Technological University, USA, dana@mtu.edu
Session 90: Sun. 15:30, Caesar 3

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Session 51: Sat. 15:30, Caesar 8
Session 79: Sun. 13:30, Caesar 8

Johnson, Sharon, Worcester Polytechnic Institute, USA
Session 124: Mon. 10:30, Caesar 1

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Session 96: Sun. 15:30, Miramar 1
Session 107: Mon. 7:00, Caesar 4

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Session 64: Sun. 10:30, Caesar 5

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Session 87: Sun. 13:30, Mediterraneo 2

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Session 41: Sat. 13:30, Coral

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Session 102: Sun. 15:30, Mediterraneo 1

Juhantila, Olli-Pekka, South Carelia Polytechnic, FINLAND, olli-pekka.juhantila@scp.fi
Session 126: Mon. 10:30, Caesar 3

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Session 16: Sat. 10:30, Caesar 1

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Session 23: Sat. 10:30, Caesar 8

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Session 9: Fri. 13:30, Caesar 7
Session 105: Mon. 7:00, Caesar 2

Kanet, John, University of Dayton, USA, kanet@udayton.edu
Session 61: Sun. 10:30, Caesar 2
Session 97: Sun. 15:30, Miramar 2

Kapur, Kailash, University of Washington, USA, kkapur@u.washington.edu
Session 97: Sun. 15:30, Miramar 2

Karasawa, Hideyasu, Data CakeBaker Corporation, JAPAN, h-kara@ra2.so-net.ne.jp
Session 26: Sat. 10:30, Mediterraneo 1
Session 78: Sun. 13:30, Caesar 7

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Session 65: Sun. 10:30, Caesar 6

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Session 77: Sun. 13:30, Caesar 6

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Session 78: Sun. 13:30, Caesar 7

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Session 87: Sun. 13:30, Mediterraneo 2

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Session 77: Sun. 13:30, Caesar 6

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Session 106: Mon. 7:00, Caesar 3

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Session 35: Sat. 13:30, Caesar 8

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Session 115: Mon. 8:45, Caesar 2

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Session 69: Sun. 10:30, Coral
Session 127: Mon. 10:30, Caesar 4

Kim, Hyung-Shik, Hyundai Industrial Research Institute, Hyundai Heavy Industries Co., Ltd., KOREA, hskim@hhi.co.kr
Session 129: Mon. 10:30, Caesar 6

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Session 82: Sun. 13:30, Miramar 3

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Session 83: Sun. 13:30, Miramar 4

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Session 81: Sun. 13:30, Miramar 2

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Session 124: Mon. 10:30, Caesar 1

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Session 85: Sun. 13:30, Coral

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Session 85: Sun. 13:30, Coral

Klippel, Marcelo, Universidade do Vale do Rio dos Sinos, BRAZIL, marcelo@klippel.com.br
Session 50: Sat. 15:30, Caesar 7
Session 84: Sun. 13:30, Caribe
Session 85: Sun. 13:30, Coral
Session 106: Mon. 7:00, Caesar 3
Session 129: Mon. 10:30, Caesar 6

Knittig, Peter, Sophia University, JAPAN, knittig_psab@compuserve.com
Session 125: Mon. 10:30, Caesar 2

Kobayashi, Minoru, Tokai University, JAPAN, kobayam@keyaki.cc.u-tokai.ac.jp
Session 26: Sat. 10:30, Mediterraneo 1

Kochhar, Ashok, Aston University, UK, A.K.Kochhar@aston.ac.uk
Session 72: Sun. 13:30, Caesar 1

Kodama, Masanori, Hiroshima Shudo University, JAPAN, kodama@shudo-u.ac.jp
Session 108: Mon. 7:00, Caesar 5

Koetz, André, Universidade do Vale do Rio dos Sinos, BRAZIL, alkoetz@hotmail.com
Session 50: Sat. 15:30, Caesar 7

Session 84: Sun. 13:30, Caribe
Session 85: Sun. 13:30, Coral
Session 129: Mon. 10:30, Caesar 6

Koltai, Tamás, Budapest University of Technology and Economics, Hungary, koltai@imvt.bme.hu
Session 16: Sat. 10:30, Caesar 1

Kopfer, Herbert, University of Bremen, Germany, kopfer@logistik.uni-bremen.de
Session 127: Mon. 10:30, Caesar 4

Kowalski, Krzysztof, Department of Transportation, USA
Session 68: Sun. 10:30, Caribe

Krishnamoorthy, Meenakshi, Alliant International University, USA, mkrish@alliant.edu
Session 9: Fri. 13:30, Caesar 7

Krishnan, Vish, University of Texas at Austin, USA, krishnan@mail.utexas.edu
Session 78: Sun. 13:30, Caesar 7

Kruglianskas, Isak, University of São Paulo, Brazil, ikruglia@usp.br
Session 116: Mon. 8:45, Caesar 3

Kubokawa, Shizue, California State Polytechnic University, USA, skubokawa@csupomona.edu
Session 105: Mon. 7:00, Caesar 2

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Session 80: Sun. 13:30, Miramar 1

Kulkarni, Shailesh, University of North Texas, USA, kulkarni@unt.edu
Session 73: Sun. 13:30, Caesar 2
Session 109: Mon. 7:00, Caesar 6

Kumar, Rachna, Alliant International University, USA, rkumar@alliant.edu
Session 9: Fri. 13:30, Caesar 7

Kurosu, Seiji, Waseda University, Japan, kurosu@wiaps.waseda.ac.jp
Session 105: Mon. 7:00, Caesar 2

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Session 50: Sat. 15:30, Caesar 7

Lambrecht, Marc, Katholieke Universiteit Leuven, Belgium, marc.lambrecht@econ.kuleuven.ac.be
Session 52: Sat. 15:30, Miramar 1

Lando, Marcello, University of Naples Federico II, Italy, lando@unina.it
Session 84: Sun. 13:30, Caribe
Session 111: Mon. 7:00, Caesar 8

Laosirihongthong, Tritos, Thamasat University, Thailand
Session 71: Sun. 10:30, Mediterraneo 2

Lapré, Michael, Vanderbilt University, USA, michael.lapre@owen.vanderbilt.edu
Session 87: Sun. 13:30, Mediterraneo 2

Lario, Francisco, Universidad Politécnica de Valencia, Spain, fclario@cigip.upv.es
Session 12: Fri. 15:30, Caesar 4
Session 47: Sat. 15:30, Caesar 4

Laseter, Timothy, University of Virginia, USA, lasetert@darden.virginia.edu
Session 69: Sun. 10:30, Coral
Session 88: Sun. 15:30, Caesar 1

Laurindo, Fernando, University of São Paulo, Brazil, fjblau@usp.br
Session 28: Sat. 13:30, Caesar 1

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Session 74: Sun. 13:30, Caesar 3

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Session 103: Sun. 15:30, Mediterraneo 2

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Session 68: Sun. 10:30, Caribe

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Session 54: Sat. 15:30, Miramar 3

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Session 28: Sat. 13:30, Caesar 1

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Session 106: Mon. 7:00, Caesar 3

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Session 39: Sat. 13:30, Miramar 4
Session 55: Sat. 15:30, Miramar 4

Leus, Roel, Katholieke Universiteit Leuven, Belgium, roel.leus@econ.kuleuven.ac.be
Session 21: Sat. 10:30, Caesar 6

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Session 127: Mon. 10:30, Caesar 4

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Session 14: Fri. 15:30, Caesar 7
Session 51: Sat. 15:30, Caesar 8

Li, Suhong, Bryant College, USA, sli@bryant.edu
Session 113: Mon. 7:00, Coral

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Session 87: Sun. 13:30, Mediterraneo 2

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Session 126: Mon. 10:30, Caesar 3

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Session 90: Sun. 15:30, Caesar 3

Lin, Kuo-Lung, Florida International University, USA
Session 28: Sat. 13:30, Caesar 1

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Session 105: Mon. 7:00, Caesar 2

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Session 82: Sun. 13:30, Miramar 3

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Session 108: Mon. 7:00, Caesar 5

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Session 40: Sat. 13:30, Caribe
Session 74: Sun. 13:30, Caesar 3

Lloyd, Tomas, Rationalia, Sweden
Session 23: Sat. 10:30, Caesar 8

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Session 110: Mon. 7:00, Caesar 7

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Session 59: Sat. 15:30, Mediterraneo 2

Lojo, Maureen, California State University, Sacramento, USA, lojom@csus.edu
Session 124: Mon. 10:30, Caesar 1

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Session 111: Mon. 7:00, Caesar 8

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Session 24: Sat. 10:30, Caribe

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Session 54: Sat. 15:30, Miramar 3

Love, Doug, Aston University, UK, d.m.love@aston.ac.uk
Session 25: Sat. 10:30, Coral
Session 30: Sat. 13:30, Caesar 3

Loyd, David, New Mexico State University, USA, DAVID.T.LOYD@nasa.gov
Session 131: Mon. 10:30, Caesar 8

Luchi, Roberto, IAE Business School, Argentina, rluchi@iae.edu.ar
Session 40: Sat. 13:30, Caribe

Lucht, Richard, ESPM Business School, Brazil, richard@espm.br
Session 116: Mon. 8:45, Caesar 3

Luft, Joan, Michigan State University, USA
Session 110: Mon. 7:00, Caesar 7

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Session 96: Sun. 15:30, Miramar 1

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Session 40: Sat. 13:30, Caribe

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Session 114: Mon. 8:45, Caesar 1

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Session 24: Sat. 10:30, Caribe
Session 46: Sat. 15:30, Caesar 3
Session 126: Mon. 10:30, Caesar 3

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Session 19: Sat. 10:30, Caesar 4
Session 45: Sat. 15:30, Caesar 2
Session 51: Sat. 15:30, Caesar 8
Session 91: Sun. 15:30, Caesar 4

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Session 47: Sat. 15:30, Caesar 4

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Session 43: Sat. 13:30, Mediterraneo 2

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Session 71: Sun. 10:30, Mediterraneo 2

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Session 90: Sun. 15:30, Caesar 3
Session 114: Mon. 8:45, Caesar 1
Session 129: Mon. 10:30, Caesar 6

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Session 37: Sat. 13:30, Miramar 2

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Session 81: Sun. 13:30, Miramar 2

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Session 113: Mon. 7:00, Coral

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Session 18: Sat. 10:30, Caesar 3

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Session 115: Mon. 8:45, Caesar 2

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Session 53: Sat. 15:30, Miramar 2

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Session 124: Mon. 10:30, Caesar 1

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Session 34: Sat. 13:30, Caesar 7

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Session 2: Fri. 10:30, Caesar 4

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Session 20: Sat. 10:30, Caesar 5

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Session 20: Sat. 10:30, Caesar 5

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Session 123: Mon. 8:45, Coral

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Session 63: Sun. 10:30, Caesar 4

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Session 112: Mon. 7:00, Caribe

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Session 36: Sat. 13:30, Miramar 1

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Session 81: Sun. 13:30, Miramar 2

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Session 96: Sun. 15:30, Miramar 1

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Session 25: Sat. 10:30, Coral

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Session 3: Fri. 10:30, Caesar 6

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Session 64: Sun. 10:30, Caesar 5

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Session 34: Sat. 13:30, Caesar 7

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Session 63: Sun. 10:30, Caesar 4
Session 91: Sun. 15:30, Caesar 4

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Session 99: Sun. 15:30, Miramar 4

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Session 67: Sun. 10:30, Caesar 8
Session 79: Sun. 13:30, Caesar 8
Session 110: Mon. 7:00, Caesar 7

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Session 13: Fri. 15:30, Caesar 6

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Session 85: Sun. 13:30, Coral

Miguel-Dávila, José-Ángel, University of León, Spain, ddejmd@unileon.es
Session 31: Sat. 13:30, Caesar 4

Min, Sang-gu, Hyundai Industrial Research Institute, Hyundai Heavy Industries Co., Ltd, Korea, vjava@shinbiro.com
Session 129: Mon. 10:30, Caesar 6

Minguela Rata, Beatriz, UCM-DMR Consulting E-Business Research Center, Spain, minguela@ccee.ucm.es
Session 24: Sat. 10:30, Caribe
Session 60: Sun. 10:30, Caesar 1
Session 62: Sun. 10:30, Caesar 3
Session 98: Sun. 15:30, Miramar 3

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Session 31: Sat. 13:30, Caesar 4

Neely, Andrew, Advanced Institute of Management, UK, aneely@london.edu
Session 110: Mon. 7:00, Caesar 7

Nelson, Paul, Michigan Technological University, USA, pnelson@mtu.edu
Session 90: Sun. 15:30, Caesar 3

Neto, Alvaro, Federal University of Minas Gerais, Brazil, alvaroneto@dep.ufmg.br
Session 14: Fri. 15:30, Caesar 7

Netto, Clovis, University of São Paulo, Brazil, clovisnt@usp.br
Session 40: Sat. 13:30, Caribe
Session 97: Sun. 15:30, Miramar 2
Session 118: Mon. 8:45, Caesar 5

Neureuther, Brian, Indiana State University, USA, sdbrian@isugw.indstate.edu
Session 85: Sun. 13:30, Coral

Newman, Rocky, Miami University, USA, newmanw@muohio.edu
Session 66: Sun. 10:30, Caesar 7

Nguyen, Nguyen, Okayama University, Japan, nguyendn@et6500.mech.okayama-u.ac.jp
Session 36: Sat. 13:30, Miramar 1

Nilsen, Sverre Konrad, Norwegian University of Science and Technology, Norway, Sverre.Konrad.Nilsen@svt.ntnu.no
Session 32: Sat. 13:30, Caesar 5
Session 103: Sun. 15:30, Mediterraneo 2

Nilsson, Fredrik, Lund University, Sweden, fredrik.nilsson@plog.lth.se
Session 30: Sat. 13:30, Caesar 3
Session 104: Mon. 7:00, Caesar 1

Noe, Thomas, Tulane University, USA, tnoe@tulane.edu
Session 127: Mon. 10:30, Caesar 4

Nooriafshar, Mehryar, University of Southern Queensland, Australia, mehryar@usq.edu.au
Session 88: Sun. 15:30, Caesar 1

Nottingham, Quinton, Virginia Tech, USA, notti@vt.edu
Session 50: Sat. 15:30, Caesar 7

Nunes, Breno, Federal University of Rio Grande do Norte, Brazil, breno-nunes@bol.com.br
Session 34: Sat. 13:30, Caesar 7

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Session 104: Mon. 7:00, Caesar 1

Odake, Nobutaka, Nagoya Institute of Technology, Japan, odake.nobutaka@nitech.ac.jp
Session 11: Fri. 15:30, Caesar 2

O'Kane, James, University of Northumbria, UK, james.okane@unn.ac.uk
Session 28: Sat. 13:30, Caesar 1
Session 132: Mon. 10:30, Caribe

Oke, Adegoke, Cranfield University, UK, a.oke@cranfield.ac.uk
Session 113: Mon. 7:00, Coral
Session 120: Mon. 8:45, Caesar 7

Oliva, Rogelio, Harvard Business School, USA, roliva@hbs.edu
Session 65: Sun. 10:30, Caesar 6

Oliveira, Antonio, Faculdade de Tecnologia de Botucatu - CEETPS, BRAZIL, antonio.c.oliveira@poli.usp.br
Session 76: Sun. 13:30, Caesar 5

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Session 63: Sun. 10:30, Caesar 4

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Session 42: Sat. 13:30, Mediterraneo 1

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Session 100: Sun. 15:30, Caribe

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Session 14: Fri. 15:30, Caesar 7

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Session 32: Sat. 13:30, Caesar 5

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Session 103: Sun. 15:30, Mediterraneo 2

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Session 20: Sat. 10:30, Caesar 5
Session 57: Sat. 15:30, Coral

Ortiz, Angel, Universidad Politécnica de Valencia, SPAIN, aortiz@cigip.upv.es
Session 31: Sat. 13:30, Caesar 4
Session 47: Sat. 15:30, Caesar 4

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Session 47: Sat. 15:30, Caesar 4

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Session 55: Sat. 15:30, Miramar 4
Session 103: Sun. 15:30, Mediterraneo 2

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Session 27: Sat. 10:30, Mediterraneo 2

Padilla Garrido, Nuria, University of Huelva, SPAIN, padilla@uhu.es
Session 124: Mon. 10:30, Caesar 1

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Session 2: Fri. 10:30, Caesar 4

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Session 26: Sat. 10:30, Mediterraneo 1

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Session 26: Sat. 10:30, Mediterraneo 1

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Session 113: Mon. 7:00, Coral

Pampanelli, Andrea, GKN, BRAZIL
Session 129: Mon. 10:30, Caesar 6

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Session 78: Sun. 13:30, Caesar 7

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Session 55: Sat. 15:30, Miramar 4

Pangburn, Michael, University of Oregon, USA, pangburn@uoregon.edu
Session 52: Sat. 15:30, Miramar 1

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Session 88: Sun. 15:30, Caesar 1

Pantaleo, Dan, SAP America, USA, daniel.pantaleo@sap.com
Session 13: Fri. 15:30, Caesar 6

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Session 129: Mon. 10:30, Caesar 6

Park, Ju-Chull, University of Ulsan, KOREA, jcpark@uou.ulsan.ac.kr
Session 129: Mon. 10:30, Caesar 6

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Session 33: Sat. 13:30, Caesar 6
Session 81: Sun. 13:30, Miramar 2
Session 89: Sun. 15:30, Caesar 2

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Session 99: Sun. 15:30, Miramar 4

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Session 22: Sat. 10:30, Caesar 7

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Session 107: Mon. 7:00, Caesar 4

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Session 71: Sun. 10:30, Mediterraneo 2

Pawlowski, Jan, University of Duisburg-Essen, GERMANY, jan.pawlowski@icb.uni-essen.de
Session 59: Sat. 15:30, Mediterraneo 2

Pedersen, Esben, Copenhagen Business School, DENMARK, erp.om@cbs.dk
Session 58: Sat. 15:30, Mediterraneo 1

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Session 14: Fri. 15:30, Caesar 7

Peel, Adrian, Kellog Brown and Root Ltd, UK
Session 86: Sun. 13:30, Mediterraneo 1
Session 101: Sun. 15:30, Coral

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Session 19: Sat. 10:30, Caesar 4

Pereira, Jordi, Universidad Politécnica de Catalunya, SPAIN
Session 117: Mon. 8:45, Caesar 4

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Session 100: Sun. 15:30, Caribe

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Session 100: Sun. 15:30, Caribe
Session 114: Mon. 8:45, Caesar 1
Session 123: Mon. 8:45, Coral
Session 129: Mon. 10:30, Caesar 6

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Session 19: Sat. 10:30, Caesar 4

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Session 120: Mon. 8:45, Caesar 7

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Session 127: Mon. 10:30, Caesar 4

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Session 43: Sat. 13:30, Mediterraneo 2

Pinar, Musa, Pittsburg State University, USA, mpinar@pittstate.edu
Session 57: Sat. 15:30, Coral

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Session 128: Mon. 10:30, Caesar 5

Pinheiro de Lima, Edson, Pontifical Catholic University of Parana, BRAZIL, pinheiro@ccet.pucpr.br
Session 56: Sat. 15:30, Caribe
Session 131: Mon. 10:30, Caesar 8

Piplani, Rajesh, Nanyang Technological University, SINGAPORE
Session 23: Sat. 10:30, Caesar 8

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Session 98: Sun. 15:30, Miramar 3

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Session 19: Sat. 10:30, Caesar 4

Pochampally, Kishore, Northeastern University, USA
Session 3: Fri. 10:30, Caesar 6

Polajnar, Andrej, Univerity of Maribor, SLOVENIA
Session 55: Sat. 15:30, Miramar 4

Poler, Raúl, Polytechnic University of Valencia, SPAIN, rpoler@omp.upv.es
Session 12: Fri. 15:30, Caesar 4
Session 47: Sat. 15:30, Caesar 4
Session 75: Sun. 13:30, Caesar 4
Session 82: Sun. 13:30, Miramar 3

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Session 11: Fri. 15:30, Caesar 2

Prado Prado, José-Carlos, University of Vigo, SPAIN, jcprado@uvigo.es
Session 40: Sat. 13:30, Caribe
Session 47: Sat. 15:30, Caesar 4

Prater, Edmund, University of Texas at Arlington, USA, eprater@uta.edu
Session 42: Sat. 13:30, Mediterraneo 1

Presley, Adrien, Truman State University, USA, apresley@truman.edu
Session 34: Sat. 13:30, Caesar 7

Price, Willard, University of the Pacific, USA, wprice@pacific.edu
Session 99: Sun. 15:30, Miramar 4

Puddicombe, Michael, Norwich University, USA, mpuddico@norwich.edu
Session 90: Sun. 15:30, Caesar 3

Puri, Vinay, Florida International University, USA, vpuri002@fiu.edu
Session 74: Sun. 13:30, Caesar 3

Puttergill, Nikki, University of Cape Town, SOUTH AFRICA
Session 44: Sat. 15:30, Caesar 1

Quintão, Ronan, Federal University of Minas Gerais, BRAZIL, rtquintao@task.com.br
Session 33: Sat. 13:30, Caesar 6
Session 100: Sun. 15:30, Caribe

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Session 59: Sat. 15:30, Mediterraneo 2

Radnor, Zoe, Warwick Business School, UK, Zoe.Radnor@wbs.ac.uk
Session 72: Sun. 13:30, Caesar 1

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Session 37: Sat. 13:30, Miramar 2

Ramakrishnan, Satheesh, Arizona State University, USA, satheesh.ramakrishnan@asu.edu
Session 62: Sun. 10:30, Caesar 3

Raman, Ananth, Harvard Business School, USA, araman@hbs.edu
Session 35: Sat. 13:30, Caesar 8
Session 83: Sun. 13:30, Miramar 4
Session 121: Mon. 8:45, Caesar 8

Ramis-Pujol, Juan, University Ramon Llull, SPAIN, j.ramis.p@esade.edu
Session 94: Sun. 15:30, Caesar 7

Ramos, Rubens, Federal University of Rio Grande do Norte, BRAZIL, rubens@pep.ufrn.br
Session 14: Fri. 15:30, Caesar 7
Session 34: Sat. 13:30, Caesar 7
Session 56: Sat. 15:30, Caribe

Randall, Taylor, University of Utah, USA
Session 36: Sat. 13:30, Miramar 1

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Session 37: Sat. 13:30, Miramar 2

Rapp, Birger, Linkoping University, SWEDEN, birra@ida.liu.se
Session 85: Sun. 13:30, Coral

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Session 74: Sun. 13:30, Caesar 3

Ravelo, Teodoro, Universidad de La Laguna, SPAIN, travelo@ull.es
Session 7: Fri. 13:30, Caesar 4

Readman, Jeff, CENTRIM, University of Brighton, UK, J.A.Readman@brighton.ac.uk
Session 16: Sat. 10:30, Caesar 1

Reepmeyer, Gerrit, University of St. Gallen, SWITZERLAND, gerrit.reepmeyer@unisg.ch
Session 127: Mon. 10:30, Caesar 4

Reid, Richard, University of New Mexico, USA, reid@mgt.unm.edu
Session 57: Sat. 15:30, Coral

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Session 66: Sun. 10:30, Caesar 7

Reyes, Pedro, Baylor University, USA, pedro_reyes@baylor.edu
Session 42: Sat. 13:30, Mediterraneo 1

Rios, Roger, Universidad Autonoma de Nuevo Leon, MEXICO, roger@yalma.fime.uanl.mx
Session 104: Mon. 7:00, Caesar 1

Robins, Paul, Aston Business School, UK, p.c.robins@aston.ac.uk
Session 25: Sat. 10:30, Coral

Robinson, Powell, Texas A&M University, USA, probinson@cgsb.tamu.edu
Session 11: Fri. 15:30, Caesar 2
Session 109: Mon. 7:00, Caesar 6

Robusté, Francesc, Universidad Politécnica de Cataluña, SPAIN, f.robuste@upc.es
Session 68: Sun. 10:30, Caribe

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Session 107: Mon. 7:00, Caesar 4

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Session 100: Sun. 15:30, Caribe

Rodrigues Filho, Lino, University of São Paulo, BRAZIL, linok@usp.br
Session 57: Sat. 15:30, Coral

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Session 113: Mon. 7:00, Coral

Rodriguez, Victoria, University of Navarra, SPAIN, vrodriguez@mik.es
Session 68: Sun. 10:30, Caribe

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Session 24: Sat. 10:30, Caribe
Session 60: Sun. 10:30, Caesar 1
Session 62: Sun. 10:30, Caesar 3
Session 98: Sun. 15:30, Miramar 3

Rodriguez Romero, Dayra, Instituto Tecnológico y de Estudios Superiores de Monterrey, MEXICO, dayra17@prodigy.net.mx
Session 18: Sat. 10:30, Caesar 3

Rodríguez-Díaz, Manuel, Universidad de Las Palmas de Gran Canaria, SPAIN, mrodriguez@dede.ulpgc.es
Session 2: Fri. 10:30, Caesar 4

Rodriguez-Gonzalez, Andrés, Universidad de La Laguna, SPAIN, arguezg@ull.es
Session 53: Sat. 15:30, Miramar 2

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Session 110: Mon. 7:00, Caesar 7

Roeber, Marco, University of Northumbria, UK
Session 28: Sat. 13:30, Caesar 1

Roemer, Thomas, Massachusetts Institute of Technology, USA, troemer@mit.edu
Session 33: Sat. 13:30, Caesar 6
Session 81: Sun. 13:30, Miramar 2

Rogers, Jerry, Pittsburg State University, USA, jdrogers@pittstate.edu
Session 57: Sat. 15:30, Coral

Romero-Hernandez, Omar, Instituto Tecnologico Autonomo De Mexico, MEXICO, oromero@itam.mx
Session 88: Sun. 15:30, Caesar 1
Session 125: Mon. 10:30, Caesar 2

Romero-Hernandez, Sergio, Instituto Tecnologico Autonomo De Mexico, MEXICO, sromero@itam.mx
Session 125: Mon. 10:30, Caesar 2

Rosenzweig, Eve, Emory University, USA, Eve_Rosenzweig@bus.emory.edu
Session 83: Sun. 13:30, Miramar 4

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Session 42: Sat. 13:30, Mediterraneo 1
Session 56: Sat. 15:30, Caribe
Session 67: Sun. 10:30, Caesar 8
Session 87: Sun. 13:30, Mediterraneo 2

Rotondaro, Roberto, University of São Paulo, BRAZIL, rotondar@cwaynet.com.br
Session 89: Sun. 15:30, Caesar 2
Session 106: Mon. 7:00, Caesar 3

Ruiz, Ruben, Universidad Politécnica de Valencia, SPAIN, rruiz@eio.upv.es
Session 53: Sat. 15:30, Miramar 2
Session 53: Sat. 15:30, Miramar 2

Ruiz del Castillo, José Carlos, University of Seville, SPAIN, ruiz@us.es
Session 91: Sun. 15:30, Caesar 4

Ruiz Jiménez, Antonio, University of Seville, SPAIN, anruiz@us.es
Session 63: Sun. 10:30, Caesar 4

Ruiz-Usano, Rafael, University of Seville, SPAIN, usano@us.es
Session 24: Sat. 10:30, Caribe
Session 41: Sat. 13:30, Coral
Session 99: Sun. 15:30, Miramar 4
Session 126: Mon. 10:30, Caesar 3
Session 132: Mon. 10:30, Caribe

Russell, Dawn, Pennsylvania State University, USA, dmr28@psu.edu
Session 79: Sun. 13:30, Caesar 8

Russell, Roberta, Virginia Tech, USA, rrussell@vt.edu
Session 116: Mon. 8:45, Caesar 3

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Session 113: Mon. 7:00, Coral

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Session 28: Sat. 13:30, Caesar 1

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Session 46: Sat. 15:30, Caesar 3

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Session 76: Sun. 13:30, Caesar 5

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Session 130: Mon. 10:30, Caesar 7

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Session 109: Mon. 7:00, Caesar 6

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Session 24: Sat. 10:30, Caribe

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Session 108: Mon. 7:00, Caesar 5

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Session 108: Mon. 7:00, Caesar 5

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Session 22: Sat. 10:30, Caesar 7
Session 129: Mon. 10:30, Caesar 6
Session 130: Mon. 10:30, Caesar 7

Sampson, Scott, Brigham Young University, USA, ses3+636oyi@email.byu.edu
Session 1: Fri. 10:30, Caesar 2
Session 70: Sun. 10:30, Mediterraneo 1

Samson, Danny, The University of Melbourne, AUSTRALIA, d.samson@unimelb.edu.au
Session 118: Mon. 8:45, Caesar 5
Session 131: Mon. 10:30, Caesar 8

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Session 24: Sat. 10:30, Caribe
Session 60: Sun. 10:30, Caesar 1
Session 62: Sun. 10:30, Caesar 3
Session 98: Sun. 15:30, Miramar 3

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Session 116: Mon. 8:45, Caesar 3

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Session 98: Sun. 15:30, Miramar 3

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Session 75: Sun. 13:30, Caesar 4

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Session 81: Sun. 13:30, Miramar 2

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Session 69: Sun. 10:30, Coral

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Session 84: Sun. 13:30, Caribe
Session 111: Mon. 7:00, Caesar 8

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Session 46: Sat. 15:30, Caesar 3

Scavarda, Annibal José, Pontifical Catholic University of Rio de Janeiro, BRAZIL, annibal@rdc.puc-rio.br
Session 70: Sun. 10:30, Mediterraneo 1

Schenk, Michael, Fraunhofer Institute IFF, GERMANY, michael.schenk@iff.fraunhofer.de

Session 16: Sat. 10:30, Caesar 1
Session 110: Mon. 7:00, Caesar 7

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Session 48: Sat. 15:30, Caesar 5
Session 88: Sun. 15:30, Caesar 1

Schmenner, Roger, Indiana University, USA, rschmenn@iupui.edu
Session 56: Sat. 15:30, Caribe

Schmidt, Glen, Georgetown University, USA, schmidtg@msb.edu
Session 51: Sat. 15:30, Caesar 8
Session 89: Sun. 15:30, Caesar 2

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Session 114: Mon. 8:45, Caesar 1

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Session 8: Fri. 13:30, Caesar 6

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Session 66: Sun. 10:30, Caesar 7

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Session 96: Sun. 15:30, Miramar 1

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Session 118: Mon. 8:45, Caesar 5
Session 127: Mon. 10:30, Caesar 4

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Session 16: Sat. 10:30, Caesar 1
Session 110: Mon. 7:00, Caesar 7

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Session 95: Sun. 15:30, Caesar 8

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Session 80: Sun. 13:30, Miramar 1

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Session 48: Sat. 15:30, Caesar 5
Session 113: Mon. 7:00, Coral

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Session 105: Mon. 7:00, Caesar 2

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Session 46: Sat. 15:30, Caesar 3

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Session 26: Sat. 10:30, Mediterraneo 1

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Session 71: Sun. 10:30, Mediterraneo 2

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Session 25: Sat. 10:30, Coral
Session 82: Sun. 13:30, Miramar 3

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Session 111: Mon. 7:00, Caesar 8

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Session 58: Sat. 15:30, Mediterraneo 1

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Session 38: Sat. 13:30, Miramar 3
Session 86: Sun. 13:30, Mediterraneo 1
Session 101: Sun. 15:30, Coral

Sheremetov, Leonid, Mexican Petroleum Institute, MEXICO, sher@imp.mx
Session 107: Mon. 7:00, Caesar 4

Shigeji, Miyazaki, Okayama University, JAPAN, miyazaki@et6500.mech.okayama-u.ac.jp
Session 36: Sat. 13:30, Miramar 1

Shigo, Nadja, University Bremen, GERMANY, shigo@logistik.uni-bremen.de
Session 127: Mon. 10:30, Caesar 4

Shimizu, Shinji, Sophia University, JAPAN, s_simizu@me.sophia.ac.jp
Session 125: Mon. 10:30, Caesar 2

Shinde, Rahul, University of Wisconsin, Madison, USA, rshinde@cae.wisc.edu
Session 82: Sun. 13:30, Miramar 3

Shraim, Mustafa, S Q P S, USA, mus_shraim@yahoo.com
Session 20: Sat. 10:30, Caesar 5

Sicilia, Joaquín, Universidad de La Laguna, SPAIN, jsicilia@ull.es
Session 53: Sat. 15:30, Miramar 2

Siek, Katja, University of Bremen, GERMANY, siek@logistik.uni-bremen.de
Session 127: Mon. 10:30, Caesar 4

Siemsen, Enno, University of North Carolina, USA, siemsene@kenan-flagler.unc.edu
Session 56: Sat. 15:30, Caribe

Simmons, Donald, Ithaca College, USA, dsimmons@ithaca.edu
Session 87: Sun. 13:30, Mediterraneo 2

Simons, Magnus, VTT - Technical Research Centre of Finland, FINLAND
Session 118: Mon. 8:45, Caesar 5

Singh, Kashi, Indian Institute of Management, Lucknow, INDIA, kns@iiml.ac.in
Session 78: Sun. 13:30, Caesar 7

Singh, Prakash, The University of Melbourne, AUSTRALIA, pjsingh@unimelb.edu.au
Session 118: Mon. 8:45, Caesar 5

Singhal, Kalyan, University of Baltimore, ksinghal@ubalt.edu
Session 93: Sun. 15:30, Caesar 6

Singhal, Vinod, Georgia Institute of technology, USA, vinod.singhal@mgt.gatech.edu
Session 83: Sun. 13:30, Miramar 4

Sinha, Kingshuk, University of Minnesota, USA, ksinha@csom.umn.edu
Session 41: Sat. 13:30, Coral
Session 81: Sun. 13:30, Miramar 2

Sisaye, Seleshi, Duquesne University, USA, sisaye@duq.edu
Session 50: Sat. 15:30, Caesar 7

Skjoett-Larsen, Tage, Copenhagen Business School, DENMARK, tsl.om@cbs.dk
Session 77: Sun. 13:30, Caesar 6

Småros, Johanna, Helsinki University of Technology, FINLAND, johanna.smaros@hut.fi
Session 23: Sat. 10:30, Caesar 8
Session 35: Sat. 13:30, Caesar 8
Session 130: Mon. 10:30, Caesar 7

Smirnov, Alexander, St.Petersburg Institute for Informatics and Automation of RAS, RUSSIA, smir@iias.spb.su
Session 107: Mon. 7:00, Caesar 4

Smith-Daniels, Dwight, Arizona State University, USA, dwight.smith-daniels@asu.edu
Session 62: Sun. 10:30, Caesar 3

Smith-Daniels, Vicki, Arizona State University, USA, Vicki.Smith-Daniels@asu.edu
Session 79: Sun. 13:30, Caesar 8

Smunt, Timothy, Wake Forest University, USA, tim.smunt@mba.wfu.edu
Session 6: Fri. 13:30, Caesar 2
Session 74: Sun. 13:30, Caesar 3

Smyrnios, Kosmas, Royal Melbourne Institute of Technology, AUSTRALIA, kosmas.smyrnios@rmit.edu.au
Session 71: Sun. 10:30, Mediterraneo 2

Solis, Luis, Instituto de Empresa, SPAIN, luis.solis@ie.edu
Session 37: Sat. 13:30, Miramar 2
Session 113: Mon. 7:00, Coral

Soni, Ashok, Indiana University, USA, soni@indiana.edu
Session 8: Fri. 13:30, Caesar 6
Session 13: Fri. 15:30, Caesar 6

Soriano-Pinar, Isabel, Universidad Rey Juan Carlos, SPAIN, isoriano@fcjs.urjc.es
Session 19: Sat. 10:30, Caesar 4

Sousa, Ana Beatriz, Federal University of Rio Grande do Norte, BRAZIL, ablsousa@ig.com.br
Session 14: Fri. 15:30, Caesar 7
Session 56: Sat. 15:30, Caribe

Souza, Gilvan, University of Maryland, USA, gsouza@rhsmith.umd.edu
Session 80: Sun. 13:30, Miramar 1

Souza, Ricardo, Fundação Getulio Vargas, BRAZIL, fasti@fgvsp.br
Session 114: Mon. 8:45, Caesar 1

Souza, Roberta, University of São Paulo, BRAZIL, roberta.souza@poli.usp.br
Session 100: Sun. 15:30, Caribe

Spina, Gianluca, Politecnico di Milano, ITALY, gianluca.spina@polimi.it
Session 37: Sat. 13:30, Miramar 2

Squire, Brian, CENTAIM, University of Bath, UK, mnpbcs@management.bath.ac.uk
Session 16: Sat. 10:30, Caesar 1

Squire, Michelle, North Carolina Agricultural and Technical State University, USA, michellesquire@aol.com
Session 18: Sat. 10:30, Caesar 3

Srivastava, Pallavi, Jaipuria Institute of Management, Lucknow, INDIA, pallavi_samir@yahoo.com
Session 44: Sat. 15:30, Caesar 1

Srivastava, Rajesh, Florida Gulf Coast University, USA, rsrivast@fgcu.edu
Session 82: Sun. 13:30, Miramar 3

Srivastava, Rajiv, Indian Institute of Management, Lucknow, INDIA, rks@iiml.ac.in
Session 3: Fri. 10:30, Caesar 6
Session 92: Sun. 15:30, Caesar 5

Srivastava, Samir, Indian Institute of Management, Lucknow, INDIA, samir_k_srivastava@iiml.ac.in
Session 3: Fri. 10:30, Caesar 6
Session 44: Sat. 15:30, Caesar 1
Session 92: Sun. 15:30, Caesar 5

Sroufe, Robert, Boston College, USA, sroufe@bc.edu
Session 3: Fri. 10:30, Caesar 6

St. John, Caron, Clemson University, USA, scaron@clemson.edu
Session 126: Mon. 10:30, Caesar 3

Stafford, Jr., Edward, University of Alabama in Huntsville, USA, staffoef@uah.edu
Session 18: Sat. 10:30, Caesar 3

Starr, Martin, Rollins College, mkstarr@attglobal.net
Session 17: Sat. 10:30, Caesar 2

Stecke, Kathryn, University of Texas at Dallas, USA, kstecke@utdallas.edu
Session 16: Sat. 10:30, Caesar 1

Steenhuis, Harm-Jan, Eastern Washington University, USA, hsteenhuis@mail.ewu.edu
Session 32: Sat. 13:30, Caesar 5

Sterman, John, Massachusetts Institute of Technology, USA, sterman@MIT.EDU
Session 65: Sun. 10:30, Caesar 6

Steward, Douglas, Michigan State University, USA
Session 110: Mon. 7:00, Caesar 7

Stewart, Douglas, Michigan State University, USA, dmstew@msu.edu
Session 112: Mon. 7:00, Caribe

Stonebraker, Peter, Northeastern Illinois University, USA, p-stonebraker@neiu.edu
Session 126: Mon. 10:30, Caesar 3

Stratman, Jeff, Georgia Institute of Technology, USA, jeff.stratman@dupree.gatech.edu
Session 28: Sat. 13:30, Caesar 1
Session 83: Sun. 13:30, Miramar 4

Stratton, Roy, Nottingham Trent University, UK, roy.stratton@ntu.ac.uk
Session 58: Sat. 15:30, Mediterraneo 1

Strumiello, Luis Daniel, Faculdade Adventista Paranaense, BRAZIL, strumiello@iap.org.br;strumiello@hotmail.com
Session 7: Fri. 13:30, Caesar 4
Session 63: Sun. 10:30, Caesar 4
Session 117: Mon. 8:45, Caesar 4

Su, Jin, University of North Carolina at Greensboro, USA, j_su@uncg.edu
Session 43: Sat. 13:30, Mediterraneo 2

Suerie, Christopher, TU Darmstadt, GERMANY, suerie@bwl.tu-darmstadt.de
Session 38: Sat. 13:30, Miramar 3

Sundaram, Ramakrishnan, Florida International University, USA, rsund001@fiu.edu
Session 109: Mon. 7:00, Caesar 6

Supatn, Nucharee, Thammasat Business School, THAILAND
Session 129: Mon. 10:30, Caesar 6

Suresh, Nallan, State University at New York, USA, ncsuresh@buffalo.edu
Session 54: Sat. 15:30, Miramar 3

Suri, Rajan, University of Wisconsin, Madison, USA, suri@engr.wisc.edu
Session 82: Sun. 13:30, Miramar 3

Susanibar, Irwin, Faculdade Adventista Paranaense, BRAZIL, susanibar@bol.com.br
Session 7: Fri. 13:30, Caesar 4

Suzuki, Hideo, University of Tsukuba, JAPAN, hsuzuki@sk.tsukuba.ac.jp
Session 50: Sat. 15:30, Caesar 7

Swafford, Patricia, University of Texas at Arlington, USA, swafford@uta.edu
Session 74: Sun. 13:30, Caesar 3

Swaminathan, Jay, University of North Carolina, USA, jay_swaminathan@unc.edu
Session 114: Mon. 8:45, Caesar 1

Swink, Morgan, Michigan State University, USA, swinkm@msu.edu
Session 78: Sun. 13:30, Caesar 7

Synder, Kimberlee, Winona State University, USA, KSnyder@winona.edu
Session 110: Mon. 7:00, Caesar 7

Syntetos, Aris, University of Salford, UK, a.syntetos@salford.ac.uk
Session 108: Mon. 7:00, Caesar 5

Tadisna, Suresh, Southern Illinois University at Carbondale, USA, suresht@cba.siu.edu
Session 70: Sun. 10:30, Mediterraneo 1

Talluri, Srinivas, Michigan State University, USA, talluri@msu.edu
Session 96: Sun. 15:30, Miramar 1

Tamayo, Ignacio, University of Granada, IDEM, igtamayo@ugr.es
Session 40: Sat. 13:30, Caribe
Session 74: Sun. 13:30, Caesar 3

Tanskanen, Kari, Helsinki University of Technology, FINLAND, kari.tanskanen@hut.fi
Session 77: Sun. 13:30, Caesar 6

Tatikonda, Mohan, Indiana University, USA, tatikond@iupui.edu
Session 94: Sun. 15:30, Caesar 7

Terán, Alejandro, Instituto Tecnologico Autonomo De Mexico, MEXICO, ateran@itam.mx
Session 73: Sun. 13:30, Caesar 2

Teunter, Ruud, Erasmus University Rotterdam, THE NETHERLANDS, teunter@few.eur.nl
Session 26: Sat. 10:30, Mediterraneo 1

Thirumalai, Sriram, University of Minnesota, USA, sthirumalai@csom.umn.edu
Session 41: Sat. 13:30, Coral

Thomas, Doug, Pennsylvania State University, USA, dthomas@psu.edu
Session 22: Sat. 10:30, Caesar 7

Thompson, Gary, Cornell University, USA, gmt1@cornell.edu
Session 1: Fri. 10:30, Caesar 2

Thun, Jörn-Henrik, Mannheim University / Industrieseminar, GERMANY, thun@is.bwl.uni-mannheim.de
Session 44: Sat. 15:30, Caesar 1

Tipton, Darrell, Arcadis G&M, USA, dtipton@arcadis-us.com
Session 14: Fri. 15:30, Caesar 7

Tjärnlund, Carl-Henrik, Lund Univesity, SWEDEN
Session 30: Sat. 13:30, Caesar 3

Toledo, Geraldo, University of São Paulo, BRAZIL, gltoledo@usp.br
Session 57: Sat. 15:30, Coral

Tomita, Junichi, Tokyo University, JAPAN, tomita@grad.e.u-tokyo.ac.jp
Session 94: Sun. 15:30, Caesar 7

Ton, Zeynep, Harvard Business School, USA, zton@hbs.edu
Session 35: Sat. 13:30, Caesar 8
Session 65: Sun. 10:30, Caesar 6
Session 95: Sun. 15:30, Caesar 8

Tonkay, Gregory, Lehigh University, USA, glt2@lehigh.edu
Session 116: Mon. 8:45, Caesar 3

Tormo, Guillermina, Universidad Politécnica de Valencia, SPAIN
Session 31: Sat. 13:30, Caesar 4
Session 75: Sun. 13:30, Caesar 4

Towill, D., Cardiff Business School, UK, towilldr@cardiff.ac.uk
Session 52: Sat. 15:30, Miramar 1

Tsai, Weiyu, University of Utah, USA, weiyu.tsai@utah.edu
Session 62: Sun. 10:30, Caesar 3

Tseng, Fan, University of Alabama in Huntsville, USA, tsengf@uah.edu
Session 18: Sat. 10:30, Caesar 3

Tseng, Mitchell, Hong Kong University of Science and Technology, HONG KONG, tseng@ust.hk
Session 59: Sat. 15:30, Mediterraneo 2
Session 102: Sun. 15:30, Mediterraneo 1

Tsikriktsis, Nikos, London Business School, UK, nikos@london.edu
Session 49: Sat. 15:30, Caesar 6
Session 87: Sun. 13:30, Mediterraneo 2

Tsukuda, Junsei, Musashi Institute of Technology, JAPAN, tsukuda@si.musashi-tech.ac.jp
Session 32: Sat. 13:30, Caesar 5

Tullous, Raydel, UTSA, USA, rtullous@utsa.edu
Session 109: Mon. 7:00, Caesar 6

Tuma, Axel, University Augsburg, GERMANY, axel.tuma@wiwi.uni-augsburg.de
Session 34: Sat. 13:30, Caesar 7

Tyworth, John, Pennsylvania State University, USA, jet@psu.edu
Session 22: Sat. 10:30, Caesar 7
Session 67: Sun. 10:30, Caesar 8

Udomsawat, Gun, Northeastern University, USA
Session 3: Fri. 10:30, Caesar 6

Uehara, Osamu, Institute for Supply Management Japan, Inc., JAPAN, ouehara@ismjapan.org
Session 4: Fri. 10:30, Caesar 7

Ulku, Sezer, Georgetown University, USA, SU8@georgetown.edu
Session 89: Sun. 15:30, Caesar 2

Usoff, Catherine, Bentley College, USA, cusoff@bentley.edu
Session 129: Mon. 10:30, Caesar 6

Vaart, Taco, University of Groningen, THE NETHERLANDS, j.t.van.der.vaart@bdk.rug.nl
Session 122: Mon. 8:45, Caribe

Vaidya, Kirit, Aston University, UK, k.g.vaidya@aston.ac.uk
Session 39: Sat. 13:30, Miramar 4
Session 55: Sat. 15:30, Miramar 4

Valero, Alarcón, Universidad Politécnica de Valencia, SPAIN, faualva@omp.upv.es
Session 85: Sun. 13:30, Coral

Valjakka, Tiina, VTT Industrial Systems, FINLAND, Tiina.Valjakka@vtt.fi
Session 9: Fri. 13:30, Caesar 7
Session 105: Mon. 7:00, Caesar 2

Vallada, Eva, Universidad Politécnica de Valencia, SPAIN, evallada@eio.upv.es
Session 53: Sat. 15:30, Miramar 2

Valles-Rosales, Delia, New Mexico State University, USA, dvalles@nmsu.edu
Session 104: Mon. 7:00, Caesar 1

Van Alstyne, Marshal, University of Michigan, USA, mvanalst@umich.edu

Session 81: Sun. 13:30, Miramar 2

Van Asperen, Eelco, Erasmus University Rotterdam, THE NETHERLANDS, vanasperen@few.eur.nl
Session 104: Mon. 7:00, Caesar 1

Van de Velde, W., Procter and Gamble Services Company, BELGIUM, vandevelde.wm@pg.com
Session 52: Sat. 15:30, Miramar 1

Van De Vonder, Stijn, Katholieke Universiteit Leuven, BELGIUM, Stijn.VandeVonder@econ.kuleuven.ac.be
Session 21: Sat. 10:30, Caesar 6

Van der Laan, Erwin, Erasmus University Rotterdam, THE NETHERLANDS, elaan@fbk.eur.nl
Session 26: Sat. 10:30, Mediterraneo 1

Van Donk, Dirk Pieter, University of Groningen, THE NETHERLANDS, D.P.van.Donk@eco.rug.nl
Session 38: Sat. 13:30, Miramar 3

Van Donselaar, Karel, Technische Universiteit Eindhoven, THE NETHERLANDS, k.h.v.donselaar@tm.tue.nl
Session 35: Sat. 13:30, Caesar 8

Van Nunen, Jo, Erasmus University Rotterdam, THE NETHERLANDS, J.Nunen@fbk.eur.nl
Session 80: Sun. 13:30, Miramar 1

Van Nyen, Pieter, Technische Universiteit Eindhoven, THE NETHERLANDS, p.v.nyen@tm.tue.nl
Session 111: Mon. 7:00, Caesar 8

Van Ooijen, H.P.G., Technische Universiteit Eindhoven, THE NETHERLANDS, h.p.g.v.ooijen@tm.tue.nl
Session 111: Mon. 7:00, Caesar 8

Van Oorschot, Kim, Minase, THE NETHERLANDS, kim@minase.nl
Session 58: Sat. 15:30, Mediterraneo 1

Van Wassenhove, Luk, INSEAD, FRANCE, luk.van.wassenhove@insead.fr
Session 80: Sun. 13:30, Miramar 1

Van Wezel, Wout, University of Groningen, THE NETHERLANDS, w.m.c.van.wezel@bdk.rug.nl
Session 38: Sat. 13:30, Miramar 3

Van Woensel, Tom, Technische Universiteit Eindhoven, THE NETHERLANDS, t.v.woensel@tm.tue.nl
Session 35: Sat. 13:30, Caesar 8

Vandaele, Nico, University of Antwerp, BELGIUM, nico.vandaele@ua.ac.be
Session 52: Sat. 15:30, Miramar 1

Vanhoucke, Mario, Universiteit Gent, BELGIUM, mario.vanhoucke@ugent.be
Session 21: Sat. 10:30, Caesar 6

Várlaki, Peter, Széchenyi István University, HUNGARY, varlaki@jgi.bme.hu
Session 16: Sat. 10:30, Caesar 1

Vasconcellos, Eduardo, FEA/USP, BRAZIL, snzilber@usp.br
Session 60: Sun. 10:30, Caesar 1

Vasconcellos, Marcos, EAESP/Fundação Getúlio Vargas, BRAZIL, marcosav@fgvsp.br
Session 86: Sun. 13:30, Mediterraneo 1

Vassolo, Roberto, IAE Business School, ARGENTINA, rvassolo@iae.edu.ar
Session 40: Sat. 13:30, Caribe

Vemuganti, Rao, University of Baltimore, USA
Session 68: Sun. 10:30, Caribe

Venkataraman, Ray, Pennsylvania State University, Erie, USA, rrv2@psu.edu
Session 109: Mon. 7:00, Caesar 6

Venkatesh, Sundar, Asian Institute of Technology, THAILAND, svenkat@ait.ac.th
Session 64: Sun. 10:30, Caesar 5

Venugopal, Nandagopal, MCI, USA
Session 73: Sun. 13:30, Caesar 2

Verma, Rohit, University of Utah, USA, mgtrv@business.utah.edu
Session 62: Sun. 10:30, Caesar 3

Verma, Sanjay, Indian Institute of Management, INDIA, sverma@iimahd.ernet.in
Session 27: Sat. 10:30, Mediterraneo 2

Vicéns Salort, Eduardo, Universidad Politécnica de Valencia, SPAIN, evicens@omp.upv.es
Session 47: Sat. 15:30, Caesar 4

Vickery, Shawnee, Michigan State University, USA
Session 96: Sun. 15:30, Miramar 1

Vieira, Elenir, University of São Paulo, BRAZIL, elenirhv@uol.com.br
Session 116: Mon. 8:45, Caesar 3

Vijayan, Arun, University of Leeds, UK
Session 38: Sat. 13:30, Miramar 3

Villarreal, Bernardo, Universidad de Monterrey, MEXICO, bvillarreal@udem.edu.mx
Session 12: Fri. 15:30, Caesar 4
Session 47: Sat. 15:30, Caesar 4

Villarreal, Pablo, GIDSATD - UTN - FRSF, ARGENTINA, pvillarr@frsf.utn.edu.ar
Session 122: Mon. 8:45, Caribe

Vinagre, Marcellus, Federal University of Minas Gerais, BRAZIL, vinagrem@dep.ufmg.br
Session 14: Fri. 15:30, Caesar 7

Virolainen, Veli-Matti, Lappeenranta University of Technology, FINLAND, vmv@lut.fi
Session 126: Mon. 10:30, Caesar 3

Viswanathan, S., Nanyang Technological University, SINGAPORE, asviswa@ntu.edu.sg
Session 23: Sat. 10:30, Caesar 8

von Mikulicz-Radecki, Johannes, University of Mannheim, GERMANY, jvmr@is.bwl.uni-mannheim.de
Session 131: Mon. 10:30, Caesar 8

Voss, Chris, London Business School, UK, cvoss@london.edu
Session 22: Sat. 10:30, Caesar 7
Session 113: Mon. 7:00, Coral

Wacker, John, Arizona State, USA
Session 131: Mon. 10:30, Caesar 8

Wagner, Peter, University of Dayton, USA, peter.wagner@notes.udayton.edu
Session 61: Sun. 10:30, Caesar 2

Wang, Mulong, University of Rhode Island, USA, wang@uri.edu
Session 51: Sat. 15:30, Caesar 8
Session 88: Sun. 15:30, Caesar 1

Wang, Zhiping, Linkoping University, SWEDEN, zhiwa@ida.liu.se
Session 85: Sun. 13:30, Coral

Warburton, Roger, University of Massachusetts, Dartmouth, USA
Session 58: Sat. 15:30, Mediterraneo 1

Ward, Peter, The Ohio State University, USA, ward.1@osu.edu
Session 25: Sat. 10:30, Coral

Wardell, Don, University of Utah, USA, don.wardell@business.utah.edu
Session 36: Sat. 13:30, Miramar 1

Watson, Noel, Harvard Business School, USA, nwatson@hbs.edu
Session 65: Sun. 10:30, Caesar 6
Session 95: Sun. 15:30, Caesar 8

Weidenmier, Marcia, Texas Christian University, USA, M.Weidenmier@tcu.edu
Session 112: Mon. 7:00, Caribe

Wells, Peter, Centre for Automotive Industry Research, UK, WellsPE@cardiff.ac.uk
Session 34: Sat. 13:30, Caesar 7
Session 80: Sun. 13:30, Miramar 1

Widiarta, Handik, Nanyang Technological University, SINGAPORE
Session 23: Sat. 10:30, Caesar 8

Wigal, Cecelia, The University of Tennessee at Chattanooga, USA, cecelia-wigal@utc.edu
Session 14: Fri. 15:30, Caesar 7

Wilk, Eduardo, Federal University of Rio Grande do Sul/CEPAN, BRAZIL
Session 56: Sat. 15:30, Caribe

Winroth, Mats, Jönköping University, SWEDEN, mats.winroth@ing.hj.se
Session 40: Sat. 13:30, Caribe
Session 86: Sun. 13:30, Mediterraneo 1

Witt, Edwin, National Renewable Energy Laboratory, USA, ed_witt@nrel.gov
Session 94: Sun. 15:30, Caesar 7

Wullink, Gerhard, Universiteit Twente, THE NETHERLANDS, g.wullink@sms.utwente.nl
Session 21: Sat. 10:30, Caesar 6

Xue, Mei, Boston College, USA, xueme@bc.edu
Session 49: Sat. 15:30, Caesar 6

Yamani, Naresh, Linköping University, SWEDEN
Session 23: Sat. 10:30, Caesar 8

Yan, Houmin, University of Texas at Dallas, USA, yan@se.cuhk.edu.hk
Session 71: Sun. 10:30, Mediterraneo 2

Yang, Y. Helio, San Diego State University, USA, hyang@mail.sdsu.edu
Session 86: Sun. 13:30, Mediterraneo 1

Yates-Wells, Rebecca, University of Dayton, USA
Session 61: Sun. 10:30, Caesar 2

Yoshinari, Yanagawa, Okayama University, JAPAN, yanagawa@et6500.mech.okayama-u.ac.jp
Session 36: Sat. 13:30, Miramar 1

Yüksel, Hilmi, University of Dokuz Eylül, TURKEY, hilmi.yuksel@deu.edu.tr
Session 123: Mon. 8:45, Coral

Zanel, César, GIDSATD - UTN - FRSF, ARGENTINA, cesar_zanel@hotmail.com
Session 122: Mon. 8:45, Caribe

Zaninotto, Enrico, University of Trento, ITALY, enrico.zaninotto@economia.unitn.it
Session 103: Sun. 15:30, Mediterraneo 2

Zeng, Amy, Worcester Polytechnic Institute, USA, azeng@wpi.edu
Session 71: Sun. 10:30, Mediterraneo 2
Session 124: Mon. 10:30, Caesar 1

Zhang, Ding, State University of New York, USA, zhang@oswego.edu
Session 92: Sun. 15:30, Caesar 5
Session 107: Mon. 7:00, Caesar 4

Zhang, Muhong, University of California at Berkeley, USA, mhzhang@ieor.berkeley.edu
Session 92: Sun. 15:30, Caesar 5

Zhang, Qinli, Hong Kong University of Science and Technology, P.R. OF CHINA, qlzhang@ust.hk
Session 102: Sun. 15:30, Mediterraneo 1

Zheng, Yu-Sheng, The Wharton School, USA, zheng@wharton.upenn.edu
Session 65: Sun. 10:30, Caesar 6

Zilber, Silvia, Centro Universitário da FEI, BRAZIL, snzilber@usp.br
Session 60: Sun. 10:30, Caesar 1

Zimmers, Jr., Emory, Lehigh University, USA, ewz0@lehigh.edu
Session 116: Mon. 8:45, Caesar 3

Zobel, Christopher, Virginia Tech, USA, czobel@vt.edu
Session 50: Sat. 15:30, Caesar 7

Zolfaghari, Saeed, Ryerson University, CANADA, szolfagh@ryerson.ca
Session 111: Mon. 7:00, Caesar 8

Zotteri, Giulio, Politecnico di Torino, ITALY, giulio.zotteri@polito.it
Session 23: Sat. 10:30, Caesar 8
Session 35: Sat. 13:30, Caesar 8

Zsidisin, George, Michigan State University, USA
Session 110: Mon. 7:00, Caesar 7

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Session 122: Mon. 8:45, Caribe

Zuidwijk, Rob, Erasmus University Rotterdam, THE NETHERLANDS, R.Zuidwijk@fbk.eur.nl
Session 80: Sun. 13:30, Miramar 1

Participation by Country*

	COUNTRY	COUNT
	TOTAL	**513**
1.	Argentina	4
2.	Australia	6
3.	Barbados	1
4.	Belgium	6
5.	Brazil	55
6.	Canada	15
7.	China	2
8.	Colombia	5
9.	Cuba	1
10.	Cyprus	1
11.	Denmark	4
12.	England	4
13.	Finland	11
14.	France	2
15.	Germany	16
16.	Hong Kong (China)	2
17.	Hungary	1
18.	India	10
19.	Iran	3
20.	Italy	8
21.	Japan	20
22.	Korea	1
23.	Mexico	12
24.	Netherlands	15
25.	New Zealand	2
26.	Norway	3
27.	Portugal	4
28.	Republic of Singapore	1
29.	Russia	1
30.	Slovenia	1
31.	South Africa	2
32.	Spain	53
33.	Sweden	10
34.	Switzerland	4
35.	Thailand	5
36.	Turkey	2
37.	United Kingdom	43
38.	United States of America	177

	COUNTRY	COUNT
	TOTAL	**513**
1.	United States of America	177
2.	Brazil	55
3.	Spain	53
4.	United Kingdom	43
5.	Japan	20
6.	Germany	16
7.	Canada	15
8.	Netherlands	15
9.	Mexico	12
10.	Finland	11
11.	India	10
12.	Sweden	10
13.	Italy	8
14.	Australia	6
15.	Belgium	6
16.	Colombia	5
17.	Thailand	5
18.	Argentina	4
19.	Denmark	4
20.	England	4
21.	Portugal	4
22.	Switzerland	4
23.	Iran	3
24.	Norway	3
25.	China	2
26.	France	2
27.	Hong Kong (China)	2
28.	New Zealand	2
29.	South Africa	2
30.	Turkey	2
31.	Barbados	1
32.	Cuba	1
33.	Cyprus	1
34.	Hungary	1
35.	Korea	1
36.	Republic of Singapore	1
37.	Russia	1
38.	Slovenia	1

*Note: Country count is the number of unique corresponding authors of accepted papers.

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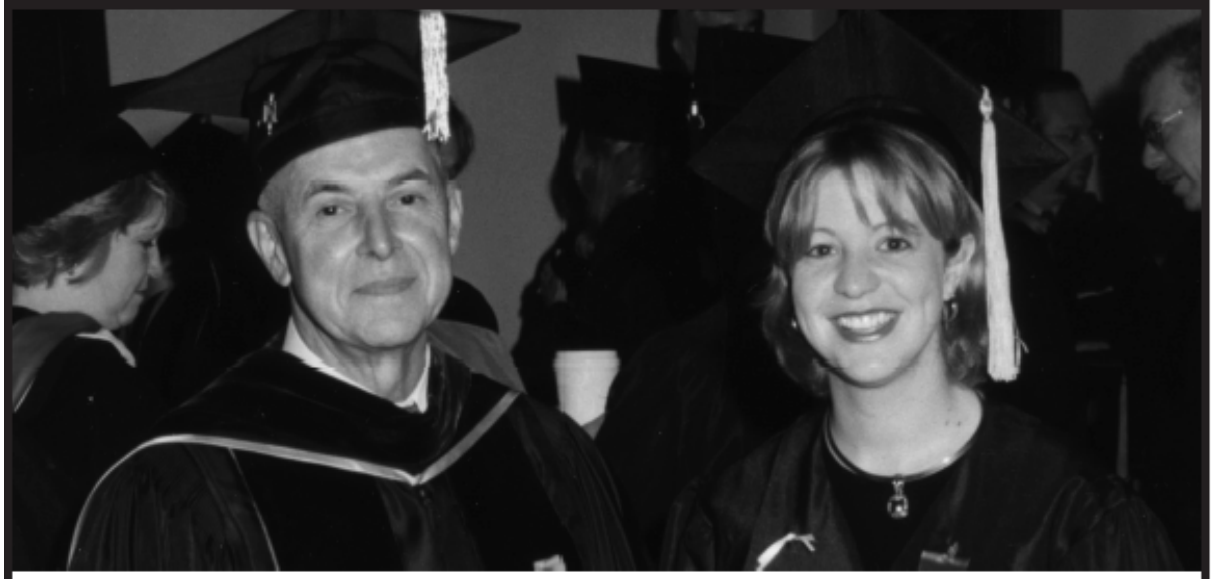

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